A steady increase in crude steel production is seen in newly industrializing countries such as Brazil (2.02 times), Mexico (1.72 times) and also in some countries in Middle East and the Republic of Korea and Taiwan in Asia (see Table B-3). For information, there is an increasing trend throughout the world to produce semis by continuously casting molten steel, and production by this process in major countries is shown in Table B-4.

II. Characteristics of Steel Industry in Major Countries and Regions

1. The United States

The Solomon Task Force of the U.S. Administration stressed in its report in December 1977 that the steel industry was one of the largest industries in the United States and its destiny was connected with the national economy and security and that a big shortage of capacity of the basic industry was a problem directly related with crisis in the national economy in future. The U.S. steel industry in recent years is characterized by the fact that its loss of international competitiveness is covered by restriction of steel import. This means that the steel industry in the United States could not enjoy status of an industry with superiority in international comparison and its vulnerability calls for protection from the viewpoint of national economy and security. Strategies to help survival of the steel industry which lost international competitiveness have to be reflected in the foreign trade policy of the nation as long as the problem of the industry cannot be solved within the frame of its industrial policy. The U.S. steel industry will be studied with focus on its structural characteristics which brought about the deterioration of its competitiveness.

1.1 Age Structure of Production Facilities

It was in the period of 1950s and early 1960s, more precisely in the latter part of the period, that capital investments of the U.S. steel industry was directed in a real sense to expansion of its capacity. During the period, the steel industry in Western Europe and Japan was striving for rehabilitation and reconstruction from the damages of World War II and their capital investments gained momentum in the 1960s and the 1970s.

Differing from the situation in Japan, steel mills in the United States were built in most cases far from seacoast. There are only three mills constructed near waterway, i.e., Burns Harbor

Table B-3-1 World Crude Steel Production by Country and Region

(1,000 MT)

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1981/1972
BELGIUM	14,532	15,522	16,227	11,582	12,145	11,256	12,601	13,442	12,322	12,283		
DENMARK	498	453	556	557	722	686	863	804	734	612		
FRANCE	24,054	25,270	27,021	21,531	23,227	22,094	22,841	23,360	23,176	21,261		
GERMANY, Fed. Rep.	45,705	49,521	53,232	40,412	42,413	38,984	41,253	46,040	43,838	41,610		
GREECE	675	1,087	926	666	715	759	936	1,000	935	909		
IRELAND	77	116	110	81	58	47	69	72	2	32		
ITALY	19,813	20,995	23,804	21,865	23,455	23,335	24,283	24,250	26,501	24,777		
LUXEMBOURG	5,457	5,924	6,447	4,624	4,565	4,529	4,790	4,949	4,618	3,791		
NETHERLANDS	5,585	5,623	5,857	4,817	5,178	4,923	5,583	5,806	5,264	5,464		
UNITED KINGDOM (1)	25,431	26,667	22,384	19,773	22,335	20,467	20,367	21,523	11,277	15,573		
SUB-TOTAL	139,827	151,178	156,524	125,908	134,813	126,880	133,586	141,246	128,667	126,312		90.3
AUSTRIA	4,069	4,238	4,699	4,069	4,476	4,093	4,335	4,917	4,623	4,656		
FINLAND	1,456	1,615	1,656	1616	1,649	2,196	2,333	2,464	2,508	2,411		
NORWAY	916	963	913	891	886	704	797	891	862	848		
PORTUGAL	425	459	387	419	461	531	608	650	659	551		
SPAIN	9,526	10,800	11,502	11,102	10,982	11,169	11,339	12,248	12,643	12,919		
SWEDEN	5,257	5,663	5,788	5,611	5,139	3,968	4,325	4,733	4,237	3,770		
SWITZERLAND	543	584	592	420	545	656	784	886	929	966		
TURKEY	1,557	1,354	1,590	1,703	1,972	1,902	2,172	2,396	2,536	2,425		
YUGOSLAVIA	2,588	2,676	2,836	2,916	2,751	3,182	3,456	3,535	3,634	3,977		
WESTERN EUROPE	166,164	179,530	186,687	154,655	163,674	155,261	163,735	173,966	161,298	158,835		95.6
BULGARIA	2,121	2,246	2,188	2,265	2,460	2,589	2,470	2,482	2,567	2,483		
CZECHOSLOVAKIA	12,728	13,158	13,640	14,324	14,693	15,054	15,294	14,817	14,925	15,270		
GERMAN DEM REP	6,065	5,855	6,165	6,480	6,740	6,850	6,976	7,024	7,308	7,467		
HUNGARY	3,273	3,332	3,468	3,673	3,652	3,723	3,877	3,907	3,767	3,645		
POLAND	13,424	14,057	14,556	15,007	15,640	17,841	19,250	19,218	19,485	15,719		
ROMANIA	7,401	8,161	8,840	9,549	10,970	11,457	11,779	12,909	13,175	13,025		
USSR	125,589	131,481	136,200	141,325	144,805	146,655	151,436	149,087	147,931	148,517		118.2
EASTERN EUROPE	170,601	178,290	185,057	192,623	198,960	204,169	211,082	209,444	209,158	206,126		120.8
CANADA	11,863	13,388	13,623	13,025	13,290	13,631	14,899	16,054	15,901	14,811		
UNITED STATES (2)	120,874	136,802	132,195	105,816	116,120	113,700	124,313	123,276	101,455	108,782		90.0
NORTH AMERICA	132,737	150,190	145,818	118,841	129,410	127,331	139,212	139,330	117,356	123,593		93.1
ARGENTINA	2,151	2,205	2,353	2,208	2,410	2,684	2,782	3,199	2,687	2,541		
BRAZIL	6,518	7,150	7,515	8,387	9,253	11,253	12,205	13,893	15,309	13,213		202.7
CENTRAL AMERICA	6	10	10	10	13	62	64	98	100	105		
CHILE	631	549	634	508	505	559	616	642	746	657		
COLOMBIA	373	362	311	390	370	350	390	361	402	396		
CUBA (3)	185	220	240	300	296	302	300	300	330	330		
ECUADOR									16	26		
MEXICO	4,431	4,760	5,138	5,272	5,298	5,601	6,711	7,005	7,099	7,605		171.6
PANAMA									6	50		
PERU	181	356	481	431	349	379	377	456	470	360		
TRINIDAD & TOBAGO										45		
URUGUAY	14	12	14	16	16	19	9	14	16	14		
VENEZUELA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	860	[illegible]	1,823	2,030		
LATIN AMERICA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

Table B-3-1 (cont'd.)

(1,000 MT)

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1981/1972
ALGERIA	98	195	175	221	356	410	580	417	534	550		
TUNISIA (6)	135	140	132	130	102	157	150	50	178	180		
SOUTH AFRICA	5,357	5,722	5,839	6,831	7,106	7,295	7,902	8,876	9,067	9,004		
ZIMBABWE	462	485	491	524	733	734	778	740	905	691		
OTHER (6)	90	100	128	120	120	150	150	150	150	150		
AFRICA	6,120	6,642	6,755	7,826	8,417	8,746	9,560	10,333	10,734	10,575		172.8
EGYPT (6)	450	525	500	500	500	600	600	800	800	900		
IRAN (7)		240	567	551	549	1,825	1,500	1,450	1,200	1,200		
ISRAEL	65	65	75	60	70	72	94	107	115	114		
QATAR							127	596	596	469		
OTHER (6)	72	69	85	70	65	51	55	170	170	180		
MIDDLE EAST	587	910	1,227	1,181	1,184	2,548	2,176	2,903	2,691	2,863		487.7
BANGLADESH	65	69	74	76	90	108	120	125	151	134		
CHINA (6)	26,385	25,219	21,119	26,905	26,459	28,740	31,780	54,484	37,121	35,600		
HONG KONG (6)	110	115	120	120	120	120	120	120	120	120		
INDIA	6,856	6,889	7,068	7,991	9,564	10,009	10,099	10,126	9,514	10,780		
INDONESIA	50	50	80	100	159	250	225	305	360	500		
JAPAN	96,900	119,022	117,131	102,313	107,599	102,405	102,105	111,748	111,395	101,676		
MALAYSIA (7)	187	180	182	185	190	194	205	207	210	210		
KOREA, Dem. Rep. (6)	2,500	2,900	3,200	2,900	5,000	4,000	5,080	5,400	5,800	5,500		
PHILIPPINES (7)	175	216	257	516	557	564	276	597	550	550		
SINGAPORE (7)	198	211	194	188	194	206	280	297	340	360		
REP.OF KOREA	586	1,157	1,947	1,994	3,515	4,647	4,969	7,610	8,558	10,755		
TAIWAN(ROC)	548	535	597	680	1,098	1,710	3,426	5,186	3,417	3,143		
THAILAND (7)	265	324	326	251	281	309	546	440	450	500		
OTHER (6)	190	200	200	200	200	250	230	225	225	220		
ASIA	132,091	134,386	132,475	141,215	146,496	148,012	159,259	174,670	177,971	169,656		128.5
AUSTRALIA	6,751	7,699	7,813	7,869	7,794	7,338	7,596	8,119	7,589	7,635		
NEW ZEALAND	157	190	194	185	222	218	225	229	230	221		113.1
OCEANIA	6,908	7,889	8,007	8,054	8,016	7,556	7,821	8,348	7,819	7,856		113.7
WORLD TOTAL	630,735	697,524	705,765	642,980	675,511	675,655	717,159	736,448	716,818	706,856		112.1

Source: IISI

Table B-3-2 World Crude Steel Production — Summary

Region	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1981/1972
WESTERN EUROPE	166,164	179,530	186,687	154,655	163,674	155,281	163,735	173,966	161,298	158,835		95.6
EASTERN EUROPE	170,601	178,290	185,057	192,623	198,960	204,169	211,082	209,444	209,158	206,126		120.8
NORTH AMERICA	132,737	150,190	145,818	116,841	129,410	127,331	139,212	139,330	117,556	123,593		93.1
LATIN AMERICA	15,617	16,687	17,737	18,585	19,444	21,992	24,514	27,454	29,001	27,372		175.3
AFRICA	6,120	6,642	6,755	7,826	8,417	8,746	9,560	10,333	10,734	10,575		172.8
MIDDLE EAST	587	910	1,227	1,181	1,184	2,548	2,176	2,903	2,681	2,863		487.7
ASIA	152,001	157,386	152,475	141,215	146,406	148,012	159,259	174,670	177,971	169,636		128.5
OCEANIA	6,908	7,889	8,007	8,054	8,016	7,556	7,821	8,348	7,819	7,856		113.7
WORLD TOTAL	630,755	697,524	703,763	642,980	675,511	675,635	717,159	746,448	716,018	706,856		112.1
WESTERN WORLD TOTAL (8)	454,066	490,957	494,463	423,608	453,326	443,502	468,940	497,904	464,683	459,191		105.8

(1) CALCULATED ON CALENDAR YEAR BASIS

(2) EXCLUDES STEEL FOR CASTINGS PRODUCED BY COMPANIES NOT PRODUCING STEEL INGOTS.(ABOUT 2,550,000 TONS IN 1975)

(3) CUBA:1972,1974,1978,1979,1980 & 1981 ARE ESTIMATED FIGURES.

(4) TUNISIA:1978 TO 1981 ESTIMATED

(5) ZIMBABWE:FROM 1973 TO 1978 :ESTIMATED.

(6) ESTIMATED SERIES.

(7) 1980 & 1981 :ESTIMATED

(8) WESTERN WORLD MEANS THE WORLD EXCLUDING THE USSR AND EASTERN EUROPE,CUBA,CHINA AND THE DEMOCRATIC REPUBLIC OF KOREA

Source : IISI

Table B-4 C.C. Semis Production in Major Countries

(1,000 MT, %)

Year \ Country	Western Europe								
	Belgium	Germany, FR	France	Italy	Luxemburg	Netherlands	E C (6)	Denmark	UK
1975	489 (4.1)	9,813 (24.3)	2,771 (12.9)	5,904 (27.0)	— (—)	— (—)	18,968 (18.1)	73 (13.1)	1,704 (6.5)
1976	693 (5.7)	12,014 (28.3)	4,212 (18.1)	7,559 (32.2)	— (—)	— (—)	24,478 (22.0)	512 (43.2)	2,165 (9.7)
1977	1,655 (14.7)	13,272 (34.0)	5,244 (23.7)	8,986 (38.5)	— (—)	— (—)	29,157 (27.7)	547 (50.6)	2,554 (12.5)
1978	2,672 (21.2)	15,670 (38.0)	6,286 (27.5)	10,073 (41.5)	— (—)	— (—)	34,701 (31.2)	481 (55.7)	3,149 (15.5)
1979	3,161 (23.5)	17,948 (39.0)	6,930 (29.7)	11,243 (46.4)	— (—)	— (—)	39,282 (33.5)	473 (58.6)	3,627 (16.9)
1980	3,170 (25.7)	20,162 (46.0)	9,561 (41.3)	13,500 (50.1)	— (—)	E332 (E6.5)	46,525 (40.2)	538 (75.5)	3,059 (27.1)
p 1981	3,789 (30.8)	22,319 (53.6)	10,917 (51.5)	12,578 (50.8)	252 (6.6)	1,159 (21.2)	51,014 (46.7)	586 (95.8)	4,958 (31.8)

Year \ Country	Western Europe							
	E C (8)	Austria	Finland	Norway	Portugal	Spain	Sweden	Yugoslavia
1975	20,745 (16.5)	866 (21.5)	1,235 (76.5)	140 (15.7)	35 (7.9)	2,335 (21.0)	1,390 (24.8)	530 (11.3)
1976	26,955 (20.1)	1,244 (27.6)	1,255 (76.1)	140 (15.8)	69 (15.0)	2,493 (22.7)	1,451 (28.2)	396 (14.5)
1977	32,058 (25.4)	1,553 (37.5)	1,831 (83.4)	140 (19.9)	195 (65.5)	2,987 (25.8)	1,214 (30.6)	824 (25.9)
1978	38,331 (28.9)	1,723 (39.7)	2,054 (88.0)	140 (17.6)	244 (59.0)	3,287 (29.0)	1,561 (36.1)	1,186 (34.5)
1979	43,582 (30.9)	2,336 (47.5)	2,187 (88.8)	130 (14.6)	245 (36.6)	3,885 (32.2)	1,624 (36.5)	1,286 (36.4)
1980	50,122 (39.2)	2,567 (51.9)	2,261 (90.2)	111 (12.9)	284 (43.1)	r 4,608 (36.4)	2,077 (49.0)	1,329 (36.6)
p 1981	56,558 (45.1)	2,907 (62.4)	2,251 (91.9)	E110 (E13.0)	211 (38.3)	5,058 (39.2)	2,517 (66.8)	1,720 (48.2)

Year \ Country	Total Western Europe	North America		Total North America	Latin America			
		USA	Canada		Argentina	Brazil	Chile	Mexico
1975	27,072 (17.5)	9,655 (9.1)	1,735 (13.3)	11,588 (9.6)	565 (25.6)	477 (5.7)	7 (1.4)	695 (13.2)
1976	34,005 (20.7)	12,246 (10.5)	1,582 (12.0)	13,828 (10.7)	665 (27.4)	1,119 (12.1)	11 (2.2)	682 (12.9)
1977	40,682 (26.3)	14,268 (12.5)	2,169 (15.9)	16,437 (12.9)	737 (27.5)	1,957 (17.4)	11 (2.0)	1,615 (28.8)
1978	48,526 (30.0)	18,905 (15.2)	3,011 (20.2)	21,914 (15.7)	1,129 (40.4)	3,016 (24.7)	9 (1.5)	2,000 (29.8)
1979	55,275 (31.8)	20,904 (16.9)	3,192 (19.9)	24,096 (17.3)	1,558 (48.7)	3,851 (22.6)	10 (1.6)	2,100 (30.0)
1980	r 63,159 (40.0)	20,595 (20.5)	4,073 (25.6)	24,668 (21.1)	1,431 (53.4)	5,141 (33.6)	E15 (E2.0)	E2,100 (E29.7)
p 1981	71,312 (45.9)	23,003 (21.1)	4,770 (32.2)	27,773 (22.5)	1,244 (49.0)	4,816 (36.4)	E15 (E2.3)	E2,100 (E29.7)

Note: — sign indicates data which is not available.

Table B-4 (cont'd.)

Country / Year	Latin America	USSR & Eastern Europe					
	(4)	Czechoslovakia	German Dem. Rep	Hungary	Poland	Romania	USSR
1975	1,744 (10.7)	69 (0.5)	525 (6.1)	775 (21.1)	332 (2.2)	- (-)	9,729 (6.9)
1976	2,477 (14.2)	107 (0.7)	566 (8.4)	1,019 (27.9)	297 (1.9)	- (-)	11,729 (8.1)
1977	4,320 (21.5)	110 (0.7)	625 (9.1)	1,054 (28.3)	446 (2.5)	- (-)	12,200 (8.6)
1978	6,154 (27.6)	58 (0.4)	677 (9.7)	1,151 (30.5)	539 (2.8)	- (-)	14,400 (9.5)
1979	7,499 (30.3)	140 (0.9)	738 (10.5)	1,281 (32.8)	691 (3.6)	- (-)	15,300 (10.2)
1980	8,687 (33.6)	E140 (E0.9)	E750 (E10.3)	E1,350 (E35.8)	E772 (E4.0)	E2,379 (E13.1)	E16,000 (E10.8)
p 1981	8,175 (34.0)	... (...)	... (...)	... (...)	... (...)	... (...)	... (...)

Country / Year	Total USSR & Eastern Europe	Others					Grand Total
		Australia	Japan	Korea, Rep. of	Taiwan	South Africa	
1975	11,450 (6.3)	47 (0.6)	31,814 (31.1)	393 (19.7)	... (...)	1,393 (19.7)	85,314 (14.5)
1976	13,718 (7.0)	(-)	37,629 (35.0)	770 (21.9)	... (...)	1,861 (26.2)	104,288 (16.7)
1977	14,435 (7.2)	- (-)	41,807 (40.8)	1,376 (31.7)	420 (23.7)	2,739 (38.1)	122,214 (19.4)
1978	16,825 (8.1)	53 (0.4)	47,159 (46.2)	1,829 (36.8)	1,341 (39.1)	3,431 (45.4)	147,212 (28.1)
1979	18,150 (8.8)	441 (5.4)	58,116 (52.0)	2,525 (50.6)	1,910 (44.9)	4,374 (49.3)	172,186 (31.3)
1980	E21,391 (E10.4)	779 (10.3)	66,271 (59.5)	2,769 (52.4)	1,845 (43.7)	4,709 (51.9)	194,250 (36.3)
p 1981	... (...)	992 (13.2)	71,843 (70.7)	4,765 (44.3)	1,848 (53.8)	4,970 (55.6)	... (...)

Notes : 1) Figure in ( ) shows C.C. ratio.
2) - sign indicates data which is not available.
... sign indicates data which is unreliable and excluded in this study.

Source: IISI

Table B-5 U.S. Imports of Steel Mill Products

(1,000 ST)

	Shipment	Export	Import (A)	Apparent consumption (B)	(A)/(B) (%)
1959	69,377	1,677	4,396	72,096	6.1
1960	71,149	2,977	3,359	71,531	4.7
1965	92,666	2,496	10,383	100,553	10.3
1970	90,798	7,062	13,364	97,100	13.8
1971	87,038	2,827	18,304	102,515	17.9
1972	91,805	2,873	17,681	106,613	16.6
1973	111,430	4,052	15,150	122,528	12.4
1974	109,472	5,833	15,970	119,609	13.4
1975	79,957	2,953	12,012	89,016	13.5
1976	89,447	2,654	14,285	101,078	14.1
1977	91,147	2,003	19,307	108,451	17.8
1978	97,935	2,422	21,135	116,648	18.1
1979	100,262	2,818	17,518	114,962	15.2
1980	83,853	4,101	15,495	95,247	16.3
1981	87,014	2,904	19,898	104,008	19.1
1982 1~9	47,166	1,503	13,168	58,831	22.4

Source: 1) AISI Annual Statistical Report each year
2) Selected Steel Industry Data, AISI.

(with annual crude steel capacity of 4.1 million tonnes) and Sparrows Point (7.3 million tonnes) of Bethlehem Steel and Fairless Works (4 million tonnes) of U.S. Steel, their combined capacity accounting for only about 10% of the total national capacity. As seen in Table B-6, the production facilities of the U.S. steel industry were constructed years ago, and their age structure averages about 18 years.

However, fatally unfortunate to the U.S. steel industry is the fact that it was in the 1960s that modern iron and steel making technologies including soft ware such as computer control came into full blossom as a result of technological research and development undertaken in peace time after the war. By then, the

Table B-6 Age Structure of Production Facilities in the U.S. Steel Industry

	Average age*	Distribution by age (years) 30 or more (%)	25 or more (%)	20 or more (%)
Coke ovens	17.3	14.2	25.5	46.9
Open hearth furnaces	33.2	43.0	78.5	100.0
BOFs	11.0	0.0	0.0	2.3
Electric arc furnaces	14.3	6.1	13.8	25.3
Plate mills	25.6	40.8	45.1	53.6
Wire rod mills	13.7	12.6	17.3	17.6
Hot strip mills	19.0	11.6	16.1	31.5
Cold strip mills	21.2	14.7	29.2	54.1
Galvanizing lines	18.8	4.4	8.9	40.1
Total	17.5	12.5	20.4	33.3

* As of Jan. 1, 1979

Original Source: The World Industry Data Handbook Vol. 1, USA and AISI

Source: AISI, Steel at the Crossroads: The American Steel Industry in the 1980's, January 1980

industry in the United States had almost completed their capital investments, and their technologies and facilities were then already relatively outdated when compared with those of European and Japanese steel industry who could absorb advanced technologies. This fact should not be ignored.

At any rate, such relative obsoleteness and consequent low physical productivity of facilities of the U.S. steel industry makes its efforts to lower production cost even harder and, rather, is one of cost push factors. As a result, some of those facilities are of marginal quality; that is, their operation is possible economically only at the time of boom and high demand when steel prices are at least higher than production costs of products made on those outdated facilities. Once their demand slows and their prices drops, their economic operation becomes difficult even after considering that they are already depreciated in full. In fact, this is one of the structural reasons for constant raise of steel prices, and import of foreign steel at low prices must be restricted as hindrance to the remedy. Therefore, it may be considered that such drop of weekly operating rate of

Table B-7 Some Technical Comparisons between U.S. and Japanese Steel Industry

	Japan	USA
Capacity of steel mills with deep-water ports in % of that of all steel mills	82%	10%
Ave. annual capacity of 10 largest mills (in crude steel)	10.4 mil. tons	5.4 mil. tons
Production by capacity built in 1967 and after in % of total production	60% or more	5% or less
Units of large blast furnaces (As of June 1979)		
Under 2,000 m^3	20	174
2,000 m^3 & more	38	7
3,000 m^3 & more	21	1
4,000 m^3 & more	13	0
Energy consumption/ton of steel in terms of coal (1978), figure in ( ) in 1976	681kg (718kg)	894kg (945kg)
C.C. ratio (1978)	46.2%	14.2%

Source: Kiyoshi Kawahito, Anatomy of Conflicts in the U.S.-Japan Steel Trade, pp.30-31; Conference Papers Series: No. 60, Business and Economic Research Center, Middle Tennessee State University, April, 1980.

steelmaking in the United States to a lowest level in its history as recorded in December 1982 represents concentration of production to facilities with relatively high productivity through closure of outdated facilities as well as slowdown in demands from consuming sectors, among others from automobile sector.

1.2 Economic Disadvantage from Age Structure and Scale of Facilities

As already mentioned, the U.S. steel industry did not suffer from the damages during World War II and could expand production immediately after the war termination to satisfy steel demand from hungry industries at home and abroad. In the United States, historically steel mills were built mostly inland and those located close to waterways are Burns Harbor and Sparrows Point of Bethlehem Steel and Fairless of U.S. Steel. Annual crude steel

capacity of each steel mill is 7 million tonnes at most. U.S. Steel had a plan to construct a new integrated steel mill at Lake Erie, but its initial capacity was about 4 million tonnes of crude steel a year. This plan did not come out of the stage of study. In fact, excepting Bethlehem Steel's Burns Harbor works, there was no new construction of integrated steel mills for the past 20 years or so. Recent capital investments are centered on minor improvement by partial replacement or rounding-out of facilities built in prewar days, but those facilities, being outdated and poorly laid out, cannot enjoy in most cases economies of scale particular to capital-intensive industries.

1.2.1 Blast furnaces

No.7 blast furnace with inner volume of 3,560 cubic meters and hearth diameter of 45 feet was blown in at Indiana Harbor works of Inland Steel in autumn 1980. This marked the first time of blowing-in of a large furnace in years. With this, Indiana Harbor was completed as an integrated steel mill having capacity of 8.7 million tonnes of crude steel a year at the investment expenditure of $1.8 billion for 10 years. However, blowing-in of such large furnace is not frequent and very rare in recent years.

In fact, none of existing blast furnaces in the United States are large enough to be enumerated in the list of 20 largest blast furnaces throughout the world. Of 157 units operatable as of 1978 in the United States, large furnaces having inner volume of 2,000 cubic meters or more numbered only five as compared with Japan where there are 39 units with inner volume of 2,000 cubic meters or more and 15 units of 4,000 cubic meters or more in existing 66 units. In terms of average pig iron output per day per unit, Japan is 3,470 tonnes while the United States is about 1,600 tonnes in 1979. Pig ratio, or output of pig iron in tonne per unit of inner volume in cubic meter, is generally more than 1.9 in Japan in 1979 though oil injection has been curtailed. Pig ratio of the U.S. furnaces is mostly below 1.5. Coke ratio in the United States is also inferior to that in Japan. Table C-4 shows distribution of blast furnaces by size in three major steelmaking states. Majority is less than 1,500 cubic meters, smaller sizes accounting for 80% of the total.

1.2.2 Steelmaking furnaces

Basic oxygen furnaces (B.O.F.) with top blowing which came into full blossom in the 1960s as most advanced steelmaking technology were introduced into the United States rather belatedly. The process accounted for 60.5% of the total crude steel production in 1980 and 60.6% in 1981, considerably lower than in Japan

where the figure was 75.5% and 75.2%, respectively. In Japan, open hearth furnaces, which are less efficient than B.O.F., have disappeared from the scene, the last one being closed in December 1977. In the United States, however, the O.H. furnaces still produced about 11.7% of the total crude steel in 1980 and 11.1% in 1981.

On the other hand, to compensate shortage of blast furnace pig iron due to the environmental problems of coke ovens and with growth of mini-mills favored by their unique conditions, crude steel produced by electric arc furnace (E.A.F.) process has increased in the United States, and its share rose from 17.4% in 1971 to 28.0% in 1980 and 28.3% in 1981. In Japan as well, about 24.8% of national crude steel production came from E.A.F. process in 1981.

The number of B.O.F. as of the end of June 1982 was 90 units in Japan and 78 units in the United States. At No.4 Steelmaking Shop at Indiana Harbor works of Inland Steel, there are two 230-B.O.F.'s which are said most efficient, and steelmaking time at the shop is 30 minutes or so per heat. In Japan, the steelmaking time has extended somewhat because kinds of steel product in B.O.F.'s have increased, but is still within 40 minutes per heat at longest. If confined to ordinary carbon steel only, Japan's operation efficiency is better than the United States.

The number of heats tapped a day is 57 at the highest, producing 3.7 million tonnes a year in the above the U.S. shop. In Japan, with two units of similar scale, the number of heats is larger and about 5.5 million tonnes of crude steel is tapped a year. The United States is also inferior to Japan in terms of steel yield. Incidentally, the shortage of blast furnace iron due to the capacity of coke ovens as well as a certain advantage of mini-mill operation help promote shift to E.A.F. process.

1.2.3 Continuous casting machines

Continuous casting machines are the fruit of the second phase iron and steel technological development in the period after the 1960s and yield of this process is considerably better than that of conventional blooming/slabbing process, the difference being about 10%. Continuous casting (C.C.) ratio in 1981 was 70.7% in Japan and 21.1% in the United States. The number of units in use at the end of 1979 was 137 in Japan, overwhelming the United States.

1.2.4 Rolling facilities

Generally, basic factors required of rolling facilities are

good product quality and high productivity and are determined by continuous operation, high speed, mechanization and automation of rolling mills and size of charged materials and technology of reheating furnaces. Typical is so-called strip mills. The number of hot strip mills installed as at May 1979 was 23 in Japan and 48 in the United States and that of cold strip mills was 72 and 139, respectively. However, construction of those mills in Japan is relatively recent, and they fully incorporate the results of technological developments and constitute an integrated and organic flow of production with large blast furnaces and B.O.F.'s. In Japan, even electric furnace steelmakers employ modern continuous and high speed rolling mills whereas a number of outdated mills are still used in the United States. Japan also leads the United States in the development of soft ware of computer control which is now an important factor in the operation of rolling mills.

As seen from the above overall consideration, a considerable difference in iron and steelmaking facilities exists between Japan and the United States. Further, in Japan almost all of the facilities are arranged in ideal layout through rational planning of the mills as integrated steel mills. In the United States, in the meantime, modern facilities are more often introduced as rounding-out or replacement of existing facilities and it can be hardly said that the U.S. mills enjoy economies of scale which is possible with integration of production processes. The United States steel industry made capital investments amounting to 2 to 3 billion dollars annually in recent years, but about 15 to 20% of the investments in iron and steel sectors was expended for pollution prevention. In addition, expenditures for technological research and development are not implemented as planned, which will constitute a negative factor in the effort of revitalization of the steel industry. It was reported in the September 17, 1982, issue of Business Week magazine that U.S. Steel's capital investment in its less profitable steel department would be limited to rationalization projects. Also the September 3, 1979, issue of Iron Age magazine reported that Bethlehem Steel would place emphasis on capacity increase of existing facilities through better utilization and avoid investment in large projects with possible investments in addition of electric furnaces. Thus, almost no steel companies in the United States intend to invest actively in blast furnace department or R&D for iron and steelmaking technologies.

As for layout of steel mills, in the United States, the mills are mainly those built prewar days, and there are cases where steel mills do not have adequate space for installation of anti-pollution facilities, which makes it difficult for them to increase, or even continue, production because they cannot meet environmental regulations. Incidentally, the paper titled

"Environmental Cost in U.S. Steel Industry" (co-authored by Stanley U. Margolin and Bruce S. Old) IISI SECSI-2 reports that about 18% in average of capital investments from 1978 to 1985 will be made in this field, with emphasis on water quality.

Table B-8 The U.S. and Japan's Capital Investments in Steel Industry

($ million)

	Japan (A)	USA (B)	A/B
1961	767	904	0.85
1965	508	1,823	0.28
1970	1,855	1,736	1.07
1971	2,429	1,425	1.70
1972	2,407	1,174	2.05
1973	2,059	1,400	1.47
1974	2,844	2,115	1.34
1975	3,683	3,179	1.16
1976	3,507	3,253	1.08
1977	3,612	2,850	1.27
1978	4,293	2,538	1.69
1979	3,040	3,200	1.01
1980	2,807	3,390	0.83
1981	3,585	3,451	1.04

Note : Exchange rate (yen for a dollar)

1972	¥302	1977	¥224.4
1973	¥272.2	1978	¥201.4
1974	¥291.5	1979	¥229.8
1975	¥299.7	1980	¥217.3
1976	¥277.3	1981	¥227.5

Source: AISI and JISF

1.3 Results of Diversification and Agglomerated Management

Historically, there was a time after mid-1960s when the U.S. steel companies were very enthusiastic in expanding their operation into non-steel fields or diversification and this behavior was observed from time to time in the 1970s. U.S. Steel, the leader of steel industry in the United States, was the forerunner to advocate this strategy. In the background was low profitability of steel operation and the diversification was the result of efforts to cover it. Because steel companies did not exert full

Table B-9 Costs of Replacement or Expansion of Steel Facilities in the United States

Facilities	Dollars/ST of steel produced
Total replacement of facilities	
Integrated steel mill	
Raw materials transportation	190
Coke ovens, B.F., steelmaking & rolling mills	800
Subtotal	990
E.A.F. shop (incl. rolling mills)	420
All facilities (E.A.F. accounting for about 25%)	840
Expansion	
Integrated steel mill	630
E.A.F. shop	460
All facilities (E.A.F. accounting for 50%)	545

Note : Estimates by IISI member companies

Source: AISI, Steel at the Crossroads: The American Steel Industry in the 1980s, January 1980

Writer's note: The above figures seem too low at present condition.

energy in their steel proper, the diversification eventually brought about negative effects on the growth of steel industry and its maintenance of competitiveness and became one of the factors to deteriorate its profitability. Unfortunate to U.S. steel industry, indeed, the U.S. steel industry made active investments in the 1950s and was more or less confident of raising profit in the 1960s. But things did not turn out that way due to the factors already mentioned. Though it needs detailed analyses, it may be said that behaviour of financial institutions in providing assistance to industries forced the steel industry to look for more growth industry fields.

Intention of steel company management was to stop decline of profit from steel operation by diversifying into other industries which promise higher growth and are far superior to their own industry in terms of profitability. When the U.S. Steel announced the famous $1.8 billion capital investment plan in August 1965, the plan envisaged investment of 11% of the total in non-steel sectors

--- chemicals, cement, railways, ship transportation, construction, etc. --- for three years beginning in 1966. This investment was at the same level with steel investment. It should be remembered that deterioration of international competitiveness of the U.S. steel industry today have roots in those days when, in contrast with the U.S. steel industry, steel industry in other major countries were making utmost efforts for modernization through introduction of new technologies just then coming into blossom. It may also be pointed out that selection of chemicals as a field of diversification turned out adversely to require repeated investment because there are a number of powerful competitors and technological progress is very fast in the field. Generally, even where diversification proved to be successful, the profit from such diversified fields fails to offset the decrease of profit in steel operations and only helps prevent further deterioration. Only an exception is in the field of resources development and some success has been achieved by using influence. Investment of more than $6 billion for acquisition of Marathon Oil can be cited as an outstanding example.

Reflecting the above situation, there are a little all out efforts in steel operation by the U.S. steel industry and almost no investment efforts for drastic improvement in up-stream iron making department. Rather the steel industry seems to consider to get out of the up-stream field and shift the emphasis of investment into down-stream rolling and fabrication departments.

2. EC

2.1 Steel Demand and Supply in EC, Present and Prospects

Various problems faced by EC steel industry are all of strongly structural nature, and restructuring measures and short-term market measures taken since the latter part of the 1970s failed to lead to a lasting recovery of the industry.

Mandatory production cutback given by EC Commission and voluntary output discipline of Eurofer I, II and III by Eurofer have been extended again and again to narrowly sustain the markets but have failed so far to bring about the basic recovery. In the background is an extremely gloomy picture of steel consuming industries in the Community, and activities of those industries in each quarter have been stagnant at best or declining.

According to the quarterly guide lines issued by ECSC under approval of the Commission, the condition is expected to get worse quarter after quarter and reflects a crisis pattern under man-

Table B-10 Quarterly Guide Lines for Steel by ECSC

(10,000 m/t, converted to crude steel)

	1981 3rd qtr. (Actual)	1981 4th qtr. (Actual)	1982 1st qtr. (Actual)	1982 2nd qtr. (Actual)	1982 3rd qtr. (Target)	1982 4th qtr. (Target)	1983 1st qtr. (Target)
Actual consumption (a)	2,507	2,751	2,816	2,680	2,410	2,410	2,210
Change in stock (b)	-150	-82	+209	-	-100	-100	-120
Export to non-members (c)	830	731	528	700	550	500	550
Import from non-members (d)	177	239	328	230	250	250	270
Production (e)	3,010 (2,930)	3,161 (3,200)	3,225	3,150	2,610	2,560	2,370

Notes : 1) e = a + b + c - d Figures in ( ) shows targets.
2) - sign indicates data which is not available

Source: EC Commission, *Official Journal of the European Communities*

datory and voluntary production curtailment. Mr. Andre Robert of ECSC Council said in December 1981 that rationalization and reduction of capacity are very urgent to steel sector and that close cooperation between the EC Commission and representatives of steel industry is absolutely necessary.

In fact, the proposal made by Eurofer in raising steel prices stepwise in 1981 and after has been almost effected as scheduled though there were some difficult negotiations.

However, there are considerable resistance by small steelmakers in the northern Italy against price increase and also rumor about discount on wire rod and wire, and full implementation of price increase is taking more time in many cases.

"General Objectives" for steel in 1985 finally drafted by the Commission in October 1982 expects a substantial over-capacity in steel demand and supply in the Community and the Commission requests unbending efforts on the part of ECSC steelmakers in capacity readjustment for further restructuring.

According to the EC's projections for 1985, consumption of rolled steel products will increase only at annual rate of 0.5%

Table B-11 ECSC General Objectives for Steel 1985

(Million MT)

	1980 Output	1980 MPP	1985 Output	1985 Necessary MPP*	1985 MPP	Operating rate 1980	Operating rate 1985	Surplus capacity Q'ty	Surplus capacity %
Raw steel	127.7	204.8	120.8	142.1	200.1	62.4	60.4	58.0	29.0
Heavy sections	8.4	15.7	7.2	9.0	15.6	53.5	46.2	6.6	42.3
Light sections	10.9	18.1	9.8	12.3	19.3	60.0	50.8	7.0	36.3
Reinforcing bars	8.7	13.7	7.6	9.5	12.5	63.5	60.8	3.0	24.0
Wire rod	10.8	17.6	11.1	13.9	19.7	61.4	56.3	5.8	29.4
Strip**	6.0	11.5	4.9	6.1	10.7	52.2	45.8	4.6	43.0
of which: from narrow strip mills	(4.3)	(7.9)	(2.5)	(3.1)	(6.5)	(54.8)	(38.5)	(3.4)	(52.3)
HR plate	12.6	27.6	12.7	15.9	27.9	45.7	45.5	12.0	43.0
of which: from 4-hi plate mills	(9.7)	(19.2)	(7.6)	(9.5)	(19.0)	(50.7)	(40.0)	(9.5)	(50.0)
CR sheet	26.2	44.4	28.9	36.1	45.2	59.1	63.9	9.1	20.1
Total finished products***	83.6	148.5	82.1	102.6	150.9	56.3	54.4	48.8	32.0
Wide hot coil	45.3	72.9	52.1	65.1	76.5	62.1	68.1	11.4	14.9
of which: coils as finished products	11.9	17.2	12.5	15.6	19.5	69.4	64.1	3.9	20.0

* Necessary MPP (Maximum Possible Production) calculated assuming operating rate of 85% for crude steel and 80% for rolled products.

** Include narrow strip and sheet from coil.

*** Does not include coils as finished products.

Source: ECSC, Objectifs Generaux Acier 1985 - Final Draft, October 1982

from 1980 to 1985 to 96 million tonnes. This figure is considerably lower than 100.1 million tonnes in 1985 expected in the previous "General objectives" published in 1978.

On the other hand, capacity in terms of crude steel is expected to be 200.1 million tonnes in 1985 (vs 127.7 million tonnes in 1980), which exceeds demand in a wide margin. The Commission considers that the capacity will be less than the 200.1 million tonnes thanks to the reduction of capacity by the restructuring measure under way, but stresses the need of further capacity adjustment in view of the possible surplus capacity of 58 million tonnes over appropriate capacity of 142 million tonnes if things are left as it is.

Steel demand and supply by product category is shown in Table B-11, and capacities for all rolled steel products show overcapacity, which will make it difficult for the Commission to take proper short-term market measures.

Table B-12 Age Structure of Some Steel Facilities in EC

(%)

		Average age (years)	Distribution by age (years) 20 or less	21 - 25	26 - 30	31 or more
EC	Plate mills	22.9	47.7	83.5	95.4	100.0
	Hot strip mills	18.6	69.7	80.6	98.7	100.0
Japan	Plate mills	19.8	57.1	80.2	80.2	100.0
	Hot strip mills	16.4	73.9	86.9	91.3	100.0

Sources: EC - Estimates by JISF
Japan - Estimates by Kawasaki Steel Corp.

2.2 Steel Restructuring Measure in EC

EC proclaimed anti-crisis measures called Simonet Plan and Davignon Plan named after EC industry commissioners after 1976 as long-term restructuring measure to solve the problem of ailing steel industry in ECSC.

The Commission has implemented various measures as short-term market measures to boost the market, but long-term restructuring by drastic rationalization of ailing steel industry is indispensable for making the short-term market measures effective. Main

points lie in reduction of surplus capacity and redundant manpower. Principle is that production capacity of a steel company as a whole be reduced and that no increase be allowed in capacity for products which have no expanding markets.

To achieve such objectives, it was considered necessary for the Commission to exercise influence on plans of individual steel companies and co-ordinate them from overall view at the level of the Commission. To compensate for the sacrifices by the industry, it was decided to provide financial assistance in investments for restructuring and adjustment of work forces during the period. At the same time, work was commenced to set up "General Objectives" in steel in accordance with the provisions of Article 46 of ECSC Treaty, the final draft of which was completed in October 1982 as already mentioned (Such work is undertaken about once in three years). The General Objectives aims at securing the highest level of productivity and most rational distribution of production —— Article 2 of ECSC Treaty and plays a role of criteria for adjustment of steel demand and supply. The Commission also made clear a principle to establish a unified code about state subsidies to steel industry in member countries so as to control their adverse effects in line with interests of EC as a whole.

Closely connected with this restructuring measure is common social measures with EC fund (Aid expenditures of 212 million ECU in 1981 through 1984, the agreed phase-out date of state subsidies and 112 million ECU in 1981). Such expenditures are backed by funds of EC itself as well as of state or public organizations in each country.

2.3 Steel Industry Restructuring in Member Countries and Measures Taken by Individual Steel Companies

Though various measures, short, medium and long range, taken under the auspice of the Commission are being pushed actively, the environment surrounding the EC steel industry is very gloomy and the prospect of success of restructuring planned to be completed by 1985 is not bright.

Restructuring measures caused a considerable financial burden on the EC Commission, states and steel companies. There are limits for the measures by the Commission and states, and steel companies themselves are taking drastic measures including cooperation and amalgamation among companies to slim capacity for survival.

With the restructuring plans of member countries planned to be completed during the period from 1983 to 1985, it is likely that the question whether the EC steel industry can survive

successfully or not will be answered within a few years as the measures of steel companies are coming to the stage of final implementation plans, helped by cooperation from states. Relatively smooth progress has been made in the restructuring plans in the United Kingdom, Luxemburg, Netherlands and the Federal Republic of Germany, but as the plans are implemented, there will certainly be a drastic change in the steel industry.

2.3.1 France

In early June 1982, the French Government approved drastic restructuring plans to improve the condition of French steel industry by 1986.

Main points of the plans is to cut production capacity from the present estimate of 29 million tonnes to 24 million tonnes in terms of crude steel and to reduce the debt by making new investments to Usinor and Sacilor. Expenditures of FFr. 2.4 billion in 1982 and FFr. 3.5 billion in 1983 are envisaged.

In 1982, a state-sponsored working group comprising members from Ministry of Industries, management and labor of steel industry worked on details of the reconstruction plan, with FFr.

Table B-13 Capacity of Société Metallurgique de Normandie (Usinor, Sacilor Group)

Product	1980			1984		
	MPP		Ranking in EC	MPP		Ranking in EC
	million MT	Share in EC (%)		million MT	Share in EC (%)	
Pig iron	27.3	19.7	1	24.3	17.9	1
Crude steel	32.3	15.9	1	27.8	14.1	1
Coils (total production)	14.1	19.3	1	14.4	18.8	1
Heavy sections	2.7	14.5	1	2.3	13.5	2
Light sections	2.6	8.6	2	2.5	7.8	2
Wire rod	3.2	16.9	1	3.2	16.2	1
Hot-rolled strip (rolled on specialized mills)	1.2	14.8	2	1.2	18.0	1
Plates and sheets (rolled on specialized mills)	3.4	18.0	1	3.4	18.1	1
Cold-rolled sheets	7.2	16.3	1	7.0	15.5	1

Note: MPP - Maximum possible production

Source: EC Official Journal, May 19, 1982

26.6 billion to be invested for modernization of the industry from 1981 through 1986. Of the amount, FFr. 15.5 billion is for capital investments, FFr. 2 billion for capital investments to be decided later, and FFr. 3,225 million for projects of Sacilor and Usinor, including FFr. 500 million for diversification investments.

For the industry as a whole, it was aimed to increase share of electric furnace steel (25% at present) and strengthen production of special steels.

Integrated steel works will be limited to Dunkirk and Fos located seashore, and in inland regions where the works are to be closed, FFr. 3 billion will be provided for diversification including industrial conversion projects. These regions are mainly Denain in northern France and Longwy in Lorraine.

As of April 2, 1982, Usinor and Sacilor obtained an approval of the EC Commission to aquire 50% each of the share of newly established Societe Metallurgique Normandie (with transfer of steel department of Societe Metallurgique et Navale Dunkerque Normandie; SMNDN) and have become one of the largest steel production groups in ECSC.

Annual crude steel capacity of the group is 32.3 million tonnes in 1980, having a 15.9% share in ECSC. Usinor and Sacilor were nationalized in 1981 under An Amending Finance Bill and the state holds, directly and indirectly, a 92.6% equity of Usinor and a 86.7% equity of Sacilor.

In autumn 1982, the French Government was studying with managements of Usinor and Sacilor appropriation of the total budget of FFr. 26.6 billion decided in early June 1982. It is expected that FFr. 15.5 billion will be used for modernization and new projects, FFr. 2 billion for supplementary, preliminary investments subject to an agreement at management-labor negotiations, FFr. 3,225 million for subsidiaries of the two companies, FFr. 500 million for industrial conversion projects in the regions which will lose the steel industry, and for grants of FFr. 2.4 billion in 1982 and FFr. 3.5 billion in 1983 to reduce the ratio of capital cost/sales of the companies from 9% now to about 5%.

2.3.2 Italy

For years, Italian economic system is called mixed economy, and indeed the steel industry is under control of nationalized companies. Namely, there is a vertical structure of IRI-Finsider-former Italsider, and this characterizes the major portion of the Italian steel industry.

Restructuring of the nationalized steel companies is based on the plan approved on October 27, 1981, by a planning committee comprising economic cabinet members. It aims at modernization of facilities and redundancies of 8,000 steel workers by 1985 with state assistance of 7 trillion liras for 5 years.

For efficient management and control of nationalized steel companies, the plan included reorganization of the top maker, Italsider and amalgamation of Breda Siderurgica sta Nazionale Cogne under Finsider and Teksid under Fiat, the top car maker.

In such broad transition, the Board of Directors meeting and an extraordinary general stockholders meeting of Italsider in August and September 1981 decided to make the company a holding company and its operations were reorganized into Nouva Italsider and Acciaierie di Piombino.

As a result, Finsider group now comprises 6 operating companies, Nuova Italsider, Acciaierie di Piombino, Dalmine, Acciaierie di Terni, Fucine de Terni and Sias-Cogne-Breda. The reorganization of the group was commenced with the reorganization of Italsider and establishment of Nuova Italsider mid-September 1981, and with this, all flat products production at Genua Cornigliano, Genua-Campi, Novi Ligure, Savona, Bagnoli and Tarant works are transferred to Nuova Italsider.

In the second stage, Nuova Italsider will absorb rolling mills of Laminatoi di Calabria at Gioia Tauro, steelmaking shops of Acciaierie del Tirrento at Millazzo, Sicily, and Rivestubi SpA at Taranto.

In return, San Giovanni Valdarno works and Marghera works of Italsider will be transferred to Acciaierie di Piombino, and thus production of all semi-finished steels of Finsider is concentrated to Piombino.

Dalmine SpA operates pipe-making facilities of Dalmine, Costa Volpino Sabbio Massa, Torre Annunziata and Piombino and keeps its important position as a steel tube maker.

Terni will be divided into Acciaierie di Terni and Fucine di Terni. Acciaierie di Terni, with Terninoss SpA (small equity owned by U.S. Steel) under it, will specialize in production of electric sheets and stainless steel. The target is to boost its domestic share from present 29% to 38% in 5 years. Fucine di Terni will produce castings and forgings at its Terni works and at former Italsider works at Triest and Lovere.

Special steel group of Finsider divorced from Terni will be formed by merger of Sias, Cogne and Breda, and this new company will also absorb Tecnocogne, Sadea and Gerimet.

2.3.3 The Federal Republic of Germany

ECSC is suffering a chronic recession in steel since 1979, and the recession was very harsh in 1982 in particular. In the Federal Republic of Germany, Arbed Saarstahl was on the brink of bankruptcy at the end of 1982, but the company could survive by obtaining emergency financing from the government and reduction of interest rates by banks at the last moment. Entering January 1983, Korf Industrie und Handel and its subsidiary applied for Vergleich but were declared bankrupt later.

Under such severe circumstances, thorough-going restructuring plans were announced on January 25, 1983. The plans were those recommended by three experts who were commissioned to draw up plans to reconstruct the Federal Republic of Germany's steel industry so as to tide over the difficulties faced by the industy. The experts are Marcus Bierich (Director of Allianz Insurance Co. and former financial director of Mannesmann), Alfred Herrhausen (Director of Deutsche Bank and auditor of Klöckner) and Günter Vogelsang (Auditor of Deutsche Bank and former President of Krupp), and they are generally called Stahl Moderators or drei Stahl Weisen.

The gist of the result of the moderators' study concerning restructuring of the steel industry was as follows:

a. Five major steel companies in the Federal Republic of Germany were to be concentrated into two groups, i.e., Rhein group and Ruhr group.

Rhein group would consist of Thyssen and Krupp, who agreed to a merger, while Ruhr group would consist of Hoesch, Peine-Salzgitter and Klöckner, who were also to be merged. The two groups would have almost same capacity in the production of flat products and heavy sections as shown below.

Group	Company	1981 Production (million tons)	
Rhein group	Thyssen	Crude steel	16.54
	Krupp	Flat products	5.59
		Heavy sections	0.78
Ruhr group	Hoesch	Crude steel	13.29
	Peine-Salzgitter	Flat products	5.53
	Klöckner	Heavy sections	1.20

b. Establishment of four joint sales companies

In order to improve steel market and promote rationalization of the industry, following joint steel sales companies were to be established as soon as possible.

Products	Company	Member companies
Flat products & heavy sections	Rhein Joint Sales Co.	Thyssen, Krupp, Stahlwerke Bochum, Rasselstein, Theodor Wuppermann
	Rhur Joint Sales Co.	Hoesch, Peine-Salzgitter, Klöckner, Maxhütte, Arbed Saarstahl
Light sections	Northwest Joint Sales Co.	Thyssen, Hamburger Stahlwerke
	Southwest Joint Sales Co.	Arbed Saarstahl, Badische Stahlwerke, Maxhütte

c. State aids

Implementation of the above restructuring plans would make it possible for the Federal Republic of Germany's steel industry to reduce cost by DM 50-100 per tonne and improve their operation results by DM 2-3 billion a year. To implement it, however, it was said necessary to obtain DM 2-3 billion financial aid from the government.

The response of the industry to the restructuring plans in the above recommendation was not always favorable, and they did not support it wholeheartedly. Both Thyssen and Krupp supported the idea of formation of the Rhein group, but as for the Ruhr group, Hoesch rejected the cooperation with Klöckner, and Hoesch and Peine-Salzgitter agreed to form close cooperation, if possible, including Arbed Saarstahl, but they did not agree to a merger.

At any rate it is noteworthy that the Federal Republic of Germany's steel industry who heretofore coped with the difficulties by themselves on the principle of market economy had to rely on the state aid for its survival.

The state aid for the restructuring of the Federal Republic of Germany's steel industry was approved at a cabinet meeting on June 14 with the upper limit of DM 3 billion by 1985, provided that the regional government will bear the half. The aid will be provided as follows:

a. Of the DM 3 billion of the aid, DM 1.2 billion will be covered by increasing capital investment subsidy from 10 to 20%.

b. The remaining DM 1.8 billion will be covered by 50% subsidy for loss from write-off of surplus capacity and 50% subsidy for social expenses by the companies.

Cited as reasons why the Federal Republic of Germany's steel industry had to rely on the state aid are stagnant steel demand, surplus capacity, entrance of newly developed steelmaking countries into international markets and expansion of state aids in other ECSC countries.

As it was feared that the state aid to the steel industy in ECSC may distort fair competition in ECSC markets, a state aid code for ECSC steel industry was enforced in August 1981; (1) State aid must be related to reorganization of companies who plan to reduce surplus capacity and rationalize operations; (2) State aid must be terminated by the end of 1985; and (3) State aid plan by each state for restructuring of its steel industry must be taken to EC Commission by the end of March 1983 and the Commission make decision by the end of June 1983. With the above approval by the cabinet meeting of the aid plans for restructuring of the Federal Republic of Germany's steel industry, now all of the state aid plans were taken to the EC Commission. According to the Federal Republic of Germany's plan, its steel industry will reduce its annual crude steel capacity by 11 million tonnes from 66 million tonnes to 55 million tonnes and its employees from 177,000 to 144,000.

2.3.4 The Netherlands

The idea of Ruhstahl in the Federal Republic of Germany gave a great impetus to restructuring of steel industry in the Netherlands. In other words, Hoogovens who operated Estel with Hoesch in the Federal Republic of Germany was forced to cultivate its future alone.

Its Ijmuiden Works is one of a few most modern steel mills in Europe and the company is confident that it can resume independent operations with state assistances.

Hoogovens BV submitted to the Ministry of Economics a restructuring plan concerning its own future on June 11, 1982 and proposed a modernization plan (by 1985) with an investment of 2.7 billion guilders, of which 1 billion guilders is state aids. This plan is supported by Hoogovens labor union, and a new history is going to open for the Netherlands' steel industry.

2.3.5 The United Kingdom

British Steel Corporation published the first reconstruction plan in December 1980, according to which, BSC would reduce its work force from 186,000 at the start of 1979 to 92,000 by 1983 and cut capacity from 21.5 million tonnes in 1979 to 14.4 million tonnes in 1981.

A series of restrictive movements on steel import into the United States had a fatal impact on the United Kingdom. In summer 1982, domestic steel order dropped to a low level of 100,000 tonnes a week. BSC's chairman, Ian MacGregor is in a very difficult position with such gloomy pictures at home and abroad. Only a year remains before the first reconstruction plan expires in 1983 and before his three-year term of office terminates. Under the present circumstances, Minister of Industry, Patrick Jenkin, considers that it is almost impossible for BSC to arrive at a break-even point in 1982/1983. Borrowing limit of BSC for 1982/83 has been decided by Ministry of Industry to be £365 million, which is considerably lower than what Mr. MacGregor demanded.

BSC seems to press forward to separate itself from its general operations and transfer them to joint ventures with private companies for "privitization" (Phoenix I, II plan). In this sense, it is rumored that in future BSC will be of nature of a holding company.

On the other hand, it is expected that private steel sector's consultation group will submit a rationalization plan to Ministry of Industry shortly and the government has set aside £22 million for it. Main objectives are adjustment of capacity, for which assistance funds will be provided, and eight companies have applied for the assistances for 14 projects. The state funds are provided with priority for payment of compensation to workers who will lose jobs as a result of the rationalization.

3. USSR

3.1 Present Condition of Russian Steel Industry and Shortage of Pig Iron

The steel industry in the USSR is adversely affected by external factors brought about by poor performance of the national economy in recent years and also is suffering form its own structural problems. It is making efforts to overcome those difficulties and can be said to be in the process of readjustment. As its own structural problems, the following may be cited; delay in construction, poor management of planned economy, slowdown in growth of ore production and pig iron, and conflict between quality improvement and production increase.

a. Ministry of Construction of Heavy Industry Enterprises is responsible for construction projects related with steel industry. But there tends to be delay in projects because the

project design and specification are not perfect or because construction materials and equipment are not available in time.

This means that even if construction plans for iron and steel production are implemented, some have to be postponed or shelved, resulting in delay in the construction of facilities in the steel industry.

b. During the 5-year plan period, 1976-1980, iron and steel production suffered greatly from shortcomings of the planned economy. In the USSR, when production plan is decided, destinations of the products are also decided. If the production fails to achieve the target set up in the plan, the institutions who consume the products are hard hit in their production activities, and the readjustment is not easy.

c. As seen in Table B-15, slowdown in pig iron production in the USSR in the 1976-1980 period is caused mainly by low production of iron ore. Decrease of rich ore production at Krivoy Rog, the largest ore mine in the USSR, was offset to some extent by increase in refined ore production by dressing iron-bearing quartzite open mined.

At Kursk mine, the second largest in the country, planned increase in ore production could not be attained because of insufficient repair capacity for mining equipment and delay in construction of dressing plants.

As shown in Table B-15, average annual growth of iron ore production during the five-year period was only 0.9%. This was a big factor hindering increase in pig iron production.

d. Let us observe the long-term trend of iron and steel production in the USSR shown in Table B-15. The USSR is self-supporting in iron and steel. Thus, to increase steel production calls for increase in pig iron production.

Table B-14 Iron Ore Production in the USSR

(million tonnes)

	1975	1976	1977	1978	1979	1980	Ave. 1976-1980
Production	234.7	241.1	241.9	246.3	241.7	245.0	-
Annual growth rate (%)	-	2.7	0.3	1.8	-1.9	1.4	0.9

Note : - sign indicates data which is not available.

Sources: USSR Statistics of National Economy, 1980
1980 figure from Pravda, Feb. 21, 1981

Table B-15 Tonnage and Rate of Increase in Production of Iron and Steel in Past 5-year Plans

	Pig iron		Crude steel		Finished products		Pipe	
	Million tons	%	Million tons	%	Million tons	%	Million tons	%
(1) Tonnage and rate of increase over previous period								
1961-1965 (Actual)	19.4	41.5	25.7	39.4	17.9	41.2	3.2	55.2
1966-1970 (")	19.7	29.8	24.9	27.4	19.0	30.6	3.4	37.8
1971-1975 (")	17.1	19.9	25.4	21.9	18.1	22.5	3.6	29.0
1976-1980 (Planned)	17.0	16.5	27.2	19.2	18.8	19.0	3.8	23.8
1976-1980 (Actual)	5.3	5.1	6.7	4.7	4.3	4.4	2.2	13.8
(2) Average tonnage and rate of increase								
1961-1965 (Actual)	3.9	7.2	5.1	6.9	3.6	7.1	0.64	9.2
1966-1970 (")	3.9	5.3	5.0	5.0	3.8	5.5	0.68	6.6
1971-1975 (")	3.4	3.7	5.1	4.0	3.6	4.1	0.72	5.2
1976-1980 (Planned)	3.4	3.1	5.4	3.6	3.8	3.6	0.76	4.4
1976-1980 (Actual)	1.1	1.0	1.3	0.9	0.9	0.9	0.44	2.6

Note : 1981/1980 crude steel +0.7%, pig iron +0.5%

Sources: USSR Statistics of National Economy, 1980
1980 plans from Pravda, Oct. 28, 1976
Actual figures from Pravda, Jan. 24, 1981

During the period 1976-1980, pig iron production in the USSR showed very low growth rates in 1976, 1977 and 1978 and declined in 1979 and 1980. Average annual growth rate for the period was only 1%.

In the USSR, it is extremely difficult to increase production of crude steel and rolled steel products unless production of pig iron increases. Therefore, the basic cause for poor performance in steel production in the USSR can be said to lie in poor pig iron production. In the meantime, other members of COMECON are all suffering shortage of pig iron and import pig iron not only from the USSR but also from third countries. Should the USSR have surplus pig iron, they are ready to accept it. Unfortunately, pig iron production in the USSR is too slow. Though an increase of 17 million tonnes was planned in the 1976-1980 period, actual increase was only 5.3 million tonnes.

At any rate, it may be safely said that shortage of B.F. capacity or low iron ore production, or both, contributed to the unsatisfactory pig iron production.

3.2 New 5-year Plan (1981-1985) and Steel Industry

In the new 5-year plan period also, the steel industry in the USSR is unlikely to expand production greatly as the factors such as shortage of pig iron which caused the poor performance in the preceding plan period are expected to continue. In fact, the average annual growth rates of planned production in the new plan are lower than those under the previous plan. Though they are higher than the actual figures in the previous plan in terms of average annual growth rate, they are held low.

Targets for steel industry in the new 5-year plan are:

a. Production of finished products (excluding pipe) in 1985 to be 117 to 120 million tonnes (1980 Production was 103 million tonnes.)

b. Iron and steel products to be improved in quality and diversified in kind

c. Technological development and its introduction to be actively pushed to improve product quality

d. Raw materials base of steel industry to be strengthened and expanded

e. In view of difficulty in expanding production, efforts to be made to improve unit steel consumption (to save steel comsump-

Table B-16 Iron and Steel Plan in New 5-year Plan

	1980 Actual Mil. t.	1981 Actual Mil. t.	1982 Planned Mil. t.	1985 Target Mil. t.	1981-1985 Ave. growth rate %
Pig iron	107.3	107.8	(110.6)	(123.0-126.2)	2.8-3.3
Crude steel	147.9	149.0	(152.4)	(168.1-172.4)	2.8-3.1
Finished products	102.9	103.0	(104.5)	118.0	2.8
Pipe	18.2	18.3	(18.8)	-	-

Note : - sign indicates data which is not available.

Sources: 1980: Pravda, Jan. 24, 1981, 1981: Pravda, Jan. 24, 1982, 1985: Pravda, Mar. 5, 1981

tion) and at the same time to improve yield by expansion of continuous casting facilities (C.C. rate in 1981 is 12.1% in the USSR).

f. To increase crude steel production, emphasis to be placed on B.O.F.s or electric furnaces, in particular, electric furnace steel to be expanded by 60% in 5 years.

Incidentally, 1981 crude steel production consisted of 29.5% B.O.F. steel, 10.9% E.A.F. steel and 59.1% O.H. furnace steel, and so the share of O.H. furnace steel will decline. On the other hand, it may be pointed out that O.H. furnace steel plays an important role to cover the shortage of pig iron because the O.H. furnace process can use more scrap than B.O.F. process.

g. Labor productivity in steel industry to be raised by 12-14% in 5 years.

This policy to increase labor productivity in steel industry by 12-14% during the new 5-year plan period involves various problems. The new plan calls for improvement of labor productivity in all industries by 23-25% and that in agriculture by 22-24% in 5 years. Compared with these figures, the target for steel industry is very low. Certainly, the steel industry in the USSR includes mining industry for iron, manganese and chromium ores, and it is not easy to improve labor productivity in the mining industry. However, the fact that the planned improvement of labor productivity in steel industry is held at 12-14% while that in the industry as a whole is 23-25% needs some interpretation. From various data available, it may be assumed that the steel industry shifted its policy from quantity expansion of products to quality improvement and increased kinds of products but this shift of policy did not progress smoothly, hindering saving of manpower.

As discussed above, it can be said that the steel industry in the USSR is, in short, trying to strengthen its inner structure than expand its production. The new 5-year plan calls for 26-28% increase in industrial production in 5 year by 1985 or average annual growth rate of 4.7-5.1%, but if the increase in steel production is at such low rate as mentioned above, it is doubtful if steel requirements by the industry as a whole can be satisfied.

To this question, Premier Nikolai Tikhonov explains that steel demand and supply can be coordinated by increasing steel production and by saving steel consumption through improvement of quality and increase of kinds of steel, improvement in machine structures and steel processing technologies as well as more use of substitute materials, as planned for the steel industry under

the new 5-year plan. By improving unit consumption of steel, 8 million tonnes of finished steel products could be saved in the machinery industry and 2 million tonnes in the construction industry in 1985 from the level otherwise required.

However, when taking into consideration the difficult factors in achieving the production target and the possibility that steel consumption may not be saved as planned, it is most probable that the steel supply will remain still rather tight during the new 5-year plan. This makes it difficult to make steel coordination with other European COMECON members who are suffering also from shortage of steel. It can be expected that the chance is slight for the USSR steel industry to become a major supplier of pig iron in the near future.

Steel industry in East European bloc also depends largely on iron ore supply from the USSR and the poor record of iron ore production in the USSR has a direct effect on the pig iron production in the COMECON countries in Europe (see Table B-17).

The USSR steel industry during the present 5-year plan period is in the process of preparation for the next jump forward, and after this period, the USSR will certainly embark on steel expansion again while keeping the first place in the world's steel production.

Table B-17 Iron ore Demand and Supply in COMECON Countries and Dependence on the USSR Ore (1978)

(1,000 t, %)

	Production	Import	Export	Apparent consumption**	Self-supply (%)	Import from USSR	Share of USSR (%)
Poland	285	17,179	-	17,464	1.6	11,455	67
Czechoslovakia	1,042	13,273	-	14,315	7.3	10,863	82
Romania	1,119	13,373	•••	14,492	7.7	4,373	33
Germany, FR	70	(2,046)*	•••	•••	•••	2,529	•••
Hungary	283	4,200	•••	4,483	6.3	4,140	99
Bulgaria	1,080	1,646	-	2,726	39.6	1,636	99

* Figures in Fe equivalent
** No export assumed where statistics not available.

Notes : - sign indicates data which is not available.
••• sign indicates data which is unreliable and excluded in this study.

Sources: COMECON Statistics Yearbook 1979
Import from USSR: Trade Statistics Yearbook 1979 of USSR

4. China

Economic readjustments in China had a considerable effect on its steel industry, resulting in a broad revision of plans in the latter half of the 1970s.

After the purge of the so-called Gang of Four, China adopted Four Modernization Programs as the object of new economic policy. At the first session of the 5th National Congress of People Representatives on March 5, 1978, the 10-year National Economy Expansion Plan was declared. One of the key objects was to strengthen and expand basic industries with steel industry as the core and increase steel production to 60 million tonnes in terms of crude steel by 1985. Under the plan to have ten large steelmaking centers, construction of Baoshan Works near Shanghai was commenced as a new integrated steel mill.

However, the ambitious plan of Four Modernization Programs brought about confusion in the national economy because of its vast scale and hastiness in implementation. Acceleration of import of capital goods resulted in deterioration of its balance of payments condition. Chinese economy was subjected to a big readjustment from the end of 1970s until 1981 with revision of the plans.

As the economy expansion plan before such readjustment was of such character as nicknamed "steel-based plan", the reaction on the steel expansion program was substantial. Entering the 1980s, the construction of new integrated steel mills was confined to one, Baoshan works, Shanghai, with eventual capacity of 6 million tonnes of crude steel, and even at the Baoshan works, its second phase projects were postponed. At the same time, the necessity to expand steel production economically through least investment was stressed and efforts were directed to better utilization of existing facilities and potential capacities.

At the People Representatives Congress in autumn 1982, it was unofficially announced that the steel production target in 2000 be twice of the production in 1980. This means that the production of crude steel will be increased from 37 million tonnes in 1980 to 74 million tonnes. In addition, the new 5-year plan announced in autumn 1982 envisages that the crude steel production in 1985 will be not less than 39 million tonnes.

The Chinese steel industry is characterized by its historically inherent structure with unbalanced capacities among ironmaking, steelmaking and rolling processes, though considerable efforts have been made to correct the condition after 1980. Domestic iron ores are mostly of poor quality and there are a few beneficiation facilities. Recently, the percentage of rich, imported iron ore is rising. As for the unbalanced capacities among processes, there is

Table B-18 Iron and Steel Production in China

(10,000 MT)

	Pig iron	Crude steel	Finished products
Highest before liberation	180.1	92.3	68.8
1949	25.0	15.8	12.3
1950	97.8	60.6	37.0
1957	593.6	535.0	447.8
1960	2,750.0	1,845.0	
1977	2,505.0	2,374.0	1,633.0
1978	3,479.0	3,178.0	2,208.0
1979	3,653.0	3,448.0	2,494.0
1980	3,540.0	3,704.0	...
1981	3,400.0	3,560.0	2,670.0
1982	3,550.0	3,700.0	2,900.0
1985 (Planned)	...	3,900.0	...
1990 (Target)	...	5,000.0	...
2000 (Target)	...	Twice 1980 7,400.0-7,500.0	...

Note : ... sign indicates data which is unreliable and excluded in this Study.

Source: Data published by State, but some estimates included.

an excess of ironmaking capacity as compared with capacity of steelmaking and rolling, but steps are being taken for correction. As a result, at major integrated steel mills, the capacity balance has been improved, but pig iron production at other small iron works with small blast furnaces is often directed overseas according to the domestic demand-supply condition and sold at low price in the world markets.

5. Japan

Under the global economic recession, the Japanese steel industry is generally experiencing hard business condition which continued from the latter half of 1970s. During 1981/1982, the drop in sales due to poor domestic demand could be covered by increase in export prices mainly of seamless pipes, which brought about uneven performances among steel companies according to their product mix and business lines.

Under the persisting low operating rate due to the slow growth

of the economy, steel companies stepped up their efforts for rationalization and efficiency improvement including saving of high cost energy. For example, by 1981 almost 100% of blast furnaces in Japan are now operated without injection of oil and the C.C. ratio has exceeded 70%.

However, most noteworthy in 1981/1982 was the fact that Japanese steel industry made active investments in facilities before their replacement becomes necessary in the 1990s. Capital investments in the latter half of 1970s were directed towards rationalization such as saving of energy resources and manpower, but recently there are more new investments, mainly in rolling department, to meet the needs of customers.

Reflecting the deterioration in export market condition and expanding cloud of economic recession at home, steel demand began to decrease from mid-1980, and the situation did not change in 1982 but rather worsened.

Crude steel production in 1982 was 99.5 million tonnes, 2.1% lower than the preceding year, and it was the first time in 10 years that steel production fell below the 100 million tonne mark. Steel production dropped in two consecutive years.

C.C. ratio in production of rolling materials in October 1982 rose to 84.1%, a 11.9% increase over 72.2% a year age.

Pig iron production in 1982 was 77.6 million tonnes, a decrease of 2.45 million tonnes or 3.1% from that in 1981 and the lowest next to 74.05 million tonnes in 1972.

Energy saving efforts by the steel industry are not limited to saving of oil but extend to saving and efficient use of all types of energy consumed at the steel mills. This is reflected in unit consumption of energy per tonne of crude steel produced; taking 1973 fiscal year as 100, the index is 88.5 in 1980 and 86 in 1981.

In Japan, capital investments by the steel industry are made principally in facilities for energy saving and rationalization and as a rule with retained capital. However, from around fiscal 1980, steel companies have taken more active attitude towards facilities investments with the background of the existing facilities becoming outdated sooner or later. In fiscal 1982, the steel industry as a whole made capital investments totalling ¥1,092.4 billion, 36.1% more than the preceding year's ¥802.5 billion. It is expected that the investments in 1983 will be ¥1,033.4 billion, still a very high level.

The investments in 1982 were, in addition to those for rationalization through saving of energy and manpower, for construction and

addition of rolling facilities to meet the increasing demand for O.C.T.G.'s and high quality automotive sheets, thus replacing some old facilities to keep international competitiveness.

The capital investments for energy saving in the steel industry in 1982 fiscal year totalled ¥224.3 billion, 6.5% more than ¥210.7 billion spent in 1981. The investments accounts for 21.0% of the total investments by the steel industry, and the steel industry is one of industries with higher percentage of the investment in energy saving.

A long-range forecast of steel demand in Japan is as given below. There are many unknown factors in forecasting Japan's steel

Table B-19 Long-range Steel Demand Forecast in Japan (1985 and 1990, F.Y)

(Million tonnes)

	1978 (F.Y)	1980 (F.Y)	1985 (F.Y) A	1985 (F.Y) B High	1985 (F.Y) B Low	1990 (F.Y) A	1990 (F.Y) B High	1990 (F.Y) B Low
Domestic consumption:								
Ordinary steel	55.2	60.0	66.6	69.9	62.2	73.9	77.3	66.0
Special steel	7.2	8.2	8.9	9.7	8.6	9.7	11.0	9.3
Total	62.4	68.2	75.5	79.5	70.8	83.6	88.3	75.4
Apparent crude steel consumption	70.4	75.8	82.2	86.6	77.2	90.6	95.8	82.0

(Million tonnes)

	Ave. annual growth rate (%) 1985/1980 A	1985/1980 B High	1985/1980 B Low	1990/1985 A	1990/1985 B High	1990/1985 B Low	1990/1980 A	1990/1980 B High	1990/1980 B Low
Domestic consumption:									
Ordinary steel	2.1	6.1	0.7	2.1	2.0	1.2	2.1	2.6	1.0
Special steel	1.7	3.4	1.0	1.6	2.7	1.7	1.7	3.0	1.3
Total	2.0	3.1	0.7	2.1	2.1	1.3	2.0	2.6	1.0
Apparent crude steel consumption	1.6	2.7	0.4	2.0	2.0	1.2	1.8	2.4	0.8

Notes : A: Forecast by end use approach
B: Forecast by macro-economic method

Source: Forecast by JISF, October 1981

trade, and this demand forecast was made assuming that the ratio of net export/production in 1980 fiscal year can be held during the 1980s.

Macro-economic forecast expects that the total crude steel demand will be 110 - 119 million tonnes in fiscal 1985 and 118 - 132 million tonnes in fiscal 1990. Forecast based on end use approach expects that it will be 115 million tonnes in fiscal 1985 and 127 million tonnes in fiscal 1990. Average annual growth rate for 1990/1980 (fiscal) is 0.9% to 2.1%.

Against such demand, the capacity of Japan's steel industry will be adequate through the 1980s, and the investment for modernization and replacement of facilities incorporating technological innovation is a big task for the industry.

Table B-20 Steel Demand and Supply in Japan
(Apparent Crude Steel Consumption)

(1,000 MT, %)

Year	Production (A)	Import (B)	Export (C)	(C)/(A) (%)	Apparent Consumption (A)+(B)-(C)	% change over a year ago	per capita (kg)
1971	88,557	58	28,302	32.0	60,313	84.8	568
1972	96,900	116	26,008	26.8	71,008	117.7	660
1973	119,332	244	30,247	25.3	89,319	125.8	819
1974	117,131	254	38,409	32.8	78,976	88.4	714
1975	102,313	120	34,353	33.6	68,080	86.2	608
1976	107,599	176	42,355	39.4	65,220	95.8	577
1977	102,405	249	39,449	38.5	63,205	96.9	554
1978	102,105	410	35,863	35.1	66,652	105.5	579
1979	111,748	1,612	35,197	31.5	78,163	117.3	675
1980	111,395	1,273	33,661	30.2	79,007	101.1	675
1981	101,676	1,646	32,186	31.7	71,136	90.0	605
1982	99,550	1,970	32,280	32.4	69,240	97.3	587

Notes: 1) Steel products included in Export and Import are: ingots semis, ordinary steel products, special steel products, wires, cold-rolled bars, barded wire, rope, woven wire, fabric, nail, welding rod, tin can, wood screw, bolts & nuts.
2) 1982 Preliminary
3) All tonnages are in terms of crude steel.

Source: JISF

6. Other Countries (India, Australia and South Africa)

Brief description will be made of the steel industry in three iron ore producing countries, India, Australia and South Africa.

Australia is known as one of three major iron ore producers, the other two being Brazil and India. Steel production in this country is almost monopolized by BHP and its group companies, and in 1980 BHP had annual capacity of about 10 million tonnes in terms of crude steel. Under the present plan, BHP capacity will be kept at the above level with no major expansion expected.

Steel demand in Australia is subjected to wide fluctuation according to business cycles; in recession there is a strong impetus for steel export while a big amount of steel is imported in good economy. When export pressure is high in recession, main items are semi-finished products, which are exported to the former Commonwealth nations in Asia as well as New Zealand who has a close economic connection with Australia.

In the early 1970s, there was a very ambitious plan to construct an integrated steel mill at western Australia, but the plan was postponed after careful consideration on a detailed feasibility study. Though western Australia is a main region to produce iron ore, coal used for ironmaking is only available in the eastern part of the country, and there is possibility of production cost being too high to implement the plan because of unevitable transportation cost involved. But the decisive factors to cause shelving of the plan were slow down of world steel demand due to the oil crisis in 1973 and a gloomy picture for its early recovery as well as skyrocketing of construction costs of steel works.

It should be mentioned that the above construction plan in western Australia was studied by an international consortium and in part planned as a steel mill specializing in export of semi-finished products.

South Africa is also an iron ore producer but known more as an exporter of pig iron. ISCOR, the top steelmaker in the country, has annual crude steel capacity of 8 million tonnes in 1980 and is at present implementing an expansion program to increase the capacity to 12.5 million tonnes or more by 1990. This country is already self-supplying almost all of steel products and even exporting some products actively, but the main export is pig iron and includes ingots and semis in some cases.

Under its modernization program, ISCOR intends to shift weights of steelmaking to electric furnace process and reduce steelmaking capacity at Pretoria Works. Of the 4 blast furnaces built at New Castle Works in the 1970s, 2 are stopped temporarily.

Incidentally, an international consortium made in the 1970s for the South African Government a plan to construct an integrated steel mill in the country and a study was made for its implementation, but the plan was given up due to the slowdown of world demand for steel.

In India, steel production was stagnant for many a year, but recently began to rise reflecting increased domestic demand.

At present, construction of medium-sized steel mills is under way for the purpose of producing product mix to better satisfy domestic demand. With the increase of domestic demand, steel export from India has declined year after year while steel import increased considerably. But steel import is made mainly through SAIL for control.

There are a great numbers of small electric furnace steelmakers and rerollers, and SAIL supplies pig iron and semis to those mills. Thus integrated steel mills under the control of SAIL play also a role of steel mills to provide semis. India, being a major iron ore producing country, once made efforts to export pig iron and semis, but at present only a few of those items are exported due to cost consideration as well as the increase of domestic demand.

Table B-21 Steel Expansion Plans in India
(Crude Steel)

(10,000 MT)

Company	Works	1980	1985
Steel Authority of India Ltd. (SAIL)	Bokaro	250	400
	Rourkela	180	180
	Bhilai	250	325
	Durgapur	160	
IISCO		100	100
TISCO		200	216
Others			
Total capacity (Nominal)		1,480	1,730

Notes: 1) *Based on expansion plans announced.*
2) New integrated steel mills are either at final planning or under construction, their capacity unlikely to be realized before 1985.

C. SUPPLY OF PIG IRON AND SEMI-FINISHED STEELS

I. Present Pig Iron Production Capacity and Expansion Plans

1. Outline of World Capacity - Trend Characteristics

World pig iron production is outlined in Section B. Though the discussion here is confined to pig iron, the world patten of its production is, needless to say, closely related with the trend and change in the world steel industry.

Change in pig iron production reflected in the steel industry structure involves various complicated factors including emergence of integrated steel mills based on DR process and change in the pattern of scrap demand and supply mainly in industrialized countries — an increase in scrap generation.

The change in the steel industry in industrialized countries is especially noticeable in pig iron production area. Improvement of the industry's structure through restructuring plans is centered in the up-stream ironmaking department, and in the United States in particular, reduction and closure of blast furnaces is under way. In recent years, scrap supply seems increasing mainly in developed countries reflecting increased recycling, and so it has become possible in some countries to make stable use of scrap, which in the past was subjected to unstable supply and wide fluctnation in prices. As a result, small-sized economic steel mills represented by so-called mini-mills came to attract attention, which are based on electric furnace steelmaking using scrap and can compete in cost with integrated steel mills based on blast furnace - B.O.F. process.

This development has made it necessary and imperative to take a very careful attitude in the study and selection of conventional B.F. - B.O.F. route for construction and operation of an integrated steel mill. Economic comparison of the two routes of steelmaking, E.A.F. route and B.F. - B.O.F. route, has become the subject for much discussion.

In this respect, success of economic operation of DR process has made it a new important subject for economic consideration by developing countries, in particular those having abundant supply of energy such as natural gas.

As already mentioned, the restructuring of steel industry in developed countries is represented in part by stoppage, closure or

replacement of non-economical, smaller blast furnaces. In case of replacement also, construction of larger blast furnaces has often delayed or given up in planning stage. As a result, as seen in Table C-1, pig iron making capacity has not shown any increase or has declined in recent years mainly in European countries and the United States though actual figures for the United States are not available. Even in Japan where there are many blast furnaces, larger in the world standard, iron production is characterized by concentration to more efficient and larger blast furnaces. The capacity and number of blast furnaces in operation has showed a considerable change in 1982 as shown in Table C-13.

There have been instances where blast furnaces with size and efficiency comparative to those in developed steelmaking countries were built in newly industrializing countries. But in those countries also, such construction has slowed its pace in the 1980s. This is especially true after the oil crisis in 1973. Construction cost of an integrated steel mill based on B.F. - B.O.F. route in developing countries sky-rocketed and one such project after another was stopped or postponed in the first half of the 1970s. In some countries, including natural gas producing developing countries in particular, the number of construction of integrated steel mills based on DR process has increased and in recent years exceeds that of conventional integrated steel mills, a characteristic phenomenon of these days.

As observed in Section B, in the USSR, shortage of pig iron resulting mainly from poor record of iron ore production and relative shortage of pig iron capacity compared with steelmaking and rolling capacities is restricting growth of overall iron and steel production in the country, and much efforts are being given to correct the condition as the subject to be solved in the 1980s though it is the matter of the industry structure and may require many years for the correction. In COMECON countries in Europe, because of large dependence on the USSR iron ore (see Table B-14), poor iron ore production in the USSR affected adversely steel production in those countries through shortage of pig iron. Progress of this condition in future needs attention.

2. Structural Change and Trend of World Pig Iron Production

Recent pattern of world pig iron production is characterized by slowdown in developed countries and growth in developing countries, in particular newly industrializing countries, and stagnation in the USSR and countries in Eastern Europe. As already mentioned in Section A, it is very difficult in some aspects to forecast a future pattern of world pig iron production, but qualitative forecast of production patterns by region may be possible. However, such fore-

Table C-1 Pig Iron Capacity and Operating Rate in Major Countries

(1,000 MT)

Year	Capacity	Production	Operating rate	Capacity	Production	Operating rate	Capacity	Production	Operating rate
	Japan			Germany, FR			France		
1974	113,608	90,437	79.6	46,095	40,221	87.3	25,160	22,517	89.5
1975	120,308	86,877	72.2	47,313	30,074	63.6	27,484	17,921	65.2
1976	132,469	86,576	65.4	49,472	31,849	64.4	27,525	19,024	69.1
1977	132,727	85,886	64.7	50,900	28,965	56.9	27,300	18,257	66.9
1978	131,110	78,589	59.9	51,927	30,148	58.1	27,164	18,497	68.1
1979	136,229	83,825	61.5	52,365	35,167	67.2	26,118	19,415	74.3
1980	136,245	87,041	63.9	51,031	33,873	66.4	25,024	19,159	76.6
1981	136,245	80,048	58.5	(52,231)	31,657	(60.6)	(e 24,100)	16,962	(70.4)
1982	...	...	...	(e 50,461)	...	...	(e 24,300)	...	...
1983	...	...	...	(e 50,807)	...	...	(e 24,400)	...	...
	Italy			Belgium			Luxemburg		
1974	13,755	11,761	85.5	14,390	13,152	91.4	5,730	5,468	95.4
1975	16,793	11,412	68.0	15,530	9,180	59.1	6,280	3,889	61.9
1976	17,190	11,696	68.0	15,930	9,961	62.5	6,860	3,756	54.8
1977	17,200	11,474	66.7	15,800	8,979	56.8	6,400	3,568	55.8
1978	16,965	11,405	67.2	16,048	10,206	63.6	5,430	3,721	68.5
1979	17,140	11,398	66.5	15,808	10,875	68.8	5,440	3,801	69.9
1980	17,435	12,219	70.1	15,808	9,905	62.7	5,260	3,568	67.8
1981	(e 17,400)	12,259	(70.5)	(15,250)	9,788	(64.2)	(e 5,400)	2,888	(53.5)
1982	(e 17,100)	...	...	(e 15,200)	...	...	(e 5,400)	...	...
1983	(e 17,200)	...	...	(e 15,200)	...	...	(e 5,400)	...	...
	Netherlands			E C (6)			UK		
1974	5,000	4,804	96.1	110,130	97,923	88.9	17,650	14,155	80.2
1975	5,000	3,970	79.4	118,400	76,446	64.6	18,382	12,138	66.0
1976	6,250	4,265	68.2	123,227	80,551	65.4	18,780	14,099	75.1
1977	7,000	3,922	56.0	124,600	75,165	60.3	17,600	12,399	70.4
1978	7,000	4,613	65.9	124,534	78,590	63.1	16,599	11,600	69.9
1979	7,000	4,814	68.8	123,871	85,470	69.0	16,676	13,030	78.1
1980	7,000	4,328	61.8	121,558	83,052	68.3	16,613	6,412	38.6
1981	(e 7,000)	4,600	(65.7)	(e121,381)	78,154	(64.4)	(e 16,000)	9,336	(58.4)
1982	(e 7,000)	...	...	(e119,461)	...	...	(e 16,000)	...	...
1983	(e 7,000)	...	...	(e120,007)	...	...	(e 16,000)	...	...

Table C-1 (cont'd.)

Year	Capacity	Production	Operating rate	Capacity	Production	Operating rate	Capacity	Production	Operating rate
	Spain			Canada			Australia		
1974	7,000	6,900	98.6	10,320	9,422	91.3	8,400	7,257	86.4
1975	7,000	6,842	97.7	11,400	9,150	80.3	8,000	7,664	95.8
1976	7,400	6,626	89.5	13,000	9,801	75.4	8,000	7,419	92.7
1977	8,400	6,705	79.8	8,791	9,661	109.9	7,100	6,753	95.1
1978	8,400	6,253	74.4	10,668	10,338	96.9	7,700	7,337	95.5
1979	8,400	6,454	76.8	11,807	10,906	92.4	8,150	7,811	95.8
1980	9,100	6,379	70.1	12,336	10,893	88.3	8,200	6,960	84.9
1981	9,025	6,558	72.7	12,432	9,743	77.9	7,920	6,827	86.2
1982	9,025	...	...	12,510	...	...	8,060	...	...
1983	9,025	...	...	12,542	...	...	8,470	...	...

Notes : ... sign indicates data which is unreliable and excluded in this Study.
1) Japan - Capacity at year end (New calculation from 1978)
EC - Max. capacity at start of a year
OECD - Effective capacity
2) USA - Not available from OECD statistics

Sources: Japan - MITI, Monthly Steel Statistics
EC - EC Statistical Office, Iron and Steel Yearbook
Figures in ( ) from OECD, The Iron and Steel Industry
Spain, Canada, Australia - OECD, The Iron and Steel Industry

cast may not be so simple due to complicated factors such as change in relative supply condition and prices of sponge iron and steel scrap as substitutes of pig iron and change in pattern of steel production facilities in relation with electric arc furnaces using sponge iron and steel scrap. Of the world iron and steel production capacities, the steel capacity is relatively easy to know, and a long-range forecast of the world capacity based on replacement or expansion projects known in the world is shown Table C-2.

Usually, announced capacity is nominal or engineering capacity which is physically designed capacity of the equipment proper. In this forecast, such nominal capacity was revised to actual effective capacity by taking into account the condition of its up-stream and down-stream processes and the percentage of projects successfully completed in various regions. As seen from Table C-2, the share of

Table C-2 Forecast of World Steelmaking Capacity by Region

(million MT)

	Nominal capacity			Effective capacity						Increment in effective capacity			
	1980	1985	1990	1980		1985		1990		1980-1985		1985-1990	
	Esti-mate	Fore-cast	Fore-cast	Esti-mate	%	Fore-cast	%	Fore-cast	%	Fore-cast	%*	Fore-cast	%*
Developed countries	598	607	637	543	62.6	560	58.5	590	55.5	17	18.7	30	28.8
Planned economy countries	325	370	420	260	30.0	300	31.3	340	32.1	40	43.9	40	38.5
Developing countries	81	120	159	64	7.4	98	10.2	132	12.4	34	37.4	34	32.7
Latin America	39	55	73	33	3.8	48	5.1	65	6.1	15	16.5	17	17.3
Middle East	4	8	12	3	0.4	6	0.5	9	0.8	3	3.3	3	2.9
Africa (excl. S. Africa)	3	7	11	2	0.2	5	0.5	8	0.8	3	3.3	3	2.9
Asia (excl. Japan)	35	50	63	26	3.0	39	4.1	50	4.7	13	14.3	10	9.6
World Total	1,004	1,097	1,216	867	100.0	958	100.0	1,062	100.0	91	100.0	104	100.0

* The percentage of their contribution to the increase in the world capacity, or their share in the world increment.

Note : Developed countries include Japan, S. Africa & Oceania. China & Democratic Republic of Korea are included in the centrally planned economies, but not in Asia. With capacity cut in progress in 1982 and 1983, capacity of developed countries in Table may be considered as maximum possible capacity.

Sources: Known expansion projects in the world

Reference Table

		1980	1985	1990
Apparent steel consumption	World	717 (Production)	749	800
Steelmaking operating rate	World	82.7%	78.2%	75.3%

Notes: Apparent steel consumption: IISI forecast
Operating rate: ASP/Effective capacity in Table above

developed countries in the world steelmaking capacity will decline and that of the centrally planned economies will show a little increase whereas the share of developing countries will increase considerably. Assuming that the restructuring efforts by the United States and European countries are unbending to be successful despite the gloomy prospects, the percentage of their contribution to the increase in the world capacity, or their share in the world increment, will be higher in 1985-1990 than 1980-1985, but it will be lower than that of developing countries and planned economy countries in the both periods.

The expansion in developing countries will gain momentum in those periods and, among others, Latin America will account for nearly 20% of the increase in the world steelmaking capacity.

This provides a suggestion to future pig iron production in terms of supply capacity of pig iron and enables a calculation of Standard Reference Production (SRP).

Table C-3 Standard Reference Production of Pig Iron in the World (1985 - 1990)

(million MT)

		Steel-making capacity	Apparent steel consumption	Necessary production	Pig ratio	Pig iron production	Share by region
Developed countries	1985	560	361	370	77.0	285	50.8
	1990	590	372	380	75.0	285	48.2
Communist countries	1985	300	262	265	72.0	191	34.0
	1990	340	277	280	70.5	197	33.3
Developing countries	1985	98	126	130	65.0	85	15.2
	1990	132	151	155	70.0	109	18.5
World Total	1985	965	749	760	73.8	561	100.0
	1990	1,062	800	815	72.4	591	100.0

Note: Iron/steel ratio was first estimated on the basis of qualitative data of the ratio in each country in 1971-1981 period and revised to reflect such factors as DR process, E.A.F. process and change in pig ratio, etc. in future.

Sources: Steelmaking capacity from Table C-2
App. steel consumption from IISI Forecast (Tokyo 1982) with some revisions

3. Study of Major Countries and Regions

3.1 The United States

Though both the U.S. Government and private companies are tackling the structural improvement of the steel industry, the measures of revitalization or restructuring have not been very successful as observed in Section B.

From the latter part of 1970s to the early 1980s, various study reports were published by both official and private circles on the condition of the U.S. steel industry.

Those reports varied in their nuance and policy patterns proposed, but they all suggested replacement or modernization of outdated portions of ironmaking facilities or even outright closure of those outdated facilities. In fact, coke ovens which supply metallurgical coke to blast furnaces have average age of 17.3 years in the United States, those of 30 years or older comprising 14.2%, 25 years or older 25.5% and 20 years or older 46.9% (AISI, Steel at Crossroads: The American Steel Industry in 1980's, January 1980), and their replacement has been hindered by the restrictions from stringent environmental regulations. Therefore, there are cases where operation of blast furnaces is restricted by inadequate coke supply and has to depend on supplemental supply from import.

As regards blast furnaces also, the majority of the U.S. blast furnaces are small in the world standard, with inner volume of less than $1,000m^3$. The largest in the United States is the $3,800m^3$ furnace at Indiana Harbor works of Inland Steel. Even this furnace is smaller than some of those built in newly industrializing countries in recent years. Consequently, efforts are directed to modernize those blast furnaces as well as coke ovens. In the United States, however, there are always discussions concerning the comparative advantage of electric furnace steelmaking based on scrap, and in a number of cases, E.A.F.s are installed alongside B.O.F.s in integrated steel mills principally based on B.F.s.

In addition, recent revitalization efforts place emphasis on rolling and fabricating departments, and the blast furnace department has made little progress in modernization and rather its closure is being planned in some cases. In other developed countries, blast furnaces are closed usually for replacement by new and larger ones, but in the United States the blast furnaces are closed for good, reducing ironmaking capacity.

A typical example is the case of Kaiser Steel which has an integrated steel mill on the West Coast.

Table C-4 Size Distribution of Blast Furnaces in Major Steelmaking States in the United States

(Number of units)

	Indiana		Pennsylvania		Ohio	
	1973	1978	1973	1978	1973	1978
500-1,000 m^3	10 (38%)	5 (23%)	17 (45%)	15 (48%)	14 (41%)	13 (52%)
1,000-1,500 m^3	13 (50%)	13 (59%)	14 (37%)	9 (29%)	15 (44%)	8 (32%)
1,500-2,000 m^3	1 (4%)	1 (5%)	7 (18%)	7 (23%)	5 (15%)	4 (16%)
2,000-	2 (8%)	3 (14%)	0	0	0	0
Total	26(100%)	22(100%)	38(100%)	31(100 %)	34(100%)	25(100%)

Note: Include all furnaces operated, even once, in respective years. Pig iron production by three States accounted for about 50% of the national production in 1978.

Source: American Iron Ore Association

According to the December 12, 1981, issue of the Montan, a trade paper, the Kaiser Steel's President James will said reportedly that Kaiser Steel would close all of ironmaking and steelmaking facilities in 1983 but keep rolling and fabricating departments by running them with semi-finished products purchased from other steelmakers. However, the October 5, 1982, issue of Metal Bulletin magazine reported that because of large stock of slabs, Kaiser began to cut import of slabs, main suppliers of which were BSC in the United Kingdom and SSAB in Sweden (This indicates difficulty in securing stable markets for semi-finished products). Another example is Bethlehem Steel. An E.A.F. steelmaking shop was started up in October 1981 with investment of $110 million at its Johnstone Works, but this shop is replacement of B.F.s and O.H. furnace shop closed in August 1981, meaning shifting sources of iron to scrap.

3.2 EC

In EC steel industry, anti-crisis measures, called Davignon Plan, are under way, including short-term market measures and restructuring measures.

The final draft of "General Objectives" for steel 1985 announced by EC Commission on October 28, 1982, pointed out that unless the over-capacity revealed in 1980 is cut significantly within the frame of the policies of restructuring and state aid

Table C-5 U.S. Production of Pig Iron and Ferro-alloys

(1,000 MT)

Year & quarter	Total	Uses			Process		E.A.F. Ferro-alloys
		Steel-making	Found-ries*	Spiege-leisen**	B.F.	E.A.F.	
1975	72,506	70,515	1,991		72,506	-	...
1976	78,808	76,810	1,998		78,808	-	...
1977	73,799	72,264	1,535		73,799	-	...
1978	79,549	77,902	1,647		79,549	-	...
1979	78,901	77,083	1,818		78,901	-	...
1980	62,362	61,269	1,093		62,362	-	...
1981	66,560	...	...		...	-	...
1981 I	18,055	...	...		...	...	...
II	18,235	17,884	351		18,235	-	...
III	16,707	16,334	373		16,707	-	...
IV	13,563	...	...		...	...	...
1982	12,047	...	...		...	...	...

* Includes blast furnace ferro-alloys (excluding ferro-manganese
** Includes blast furnace ferro-manganese

Notes : - sign indicates data which is not available.
... sign indicates data which is unreliable and excluded in this Study.

Source: ECE, Annual (Quarterly) Bulletin of Steel Statistics for Europe

Table C-6 Canada's Production of Pig Iron

(1,000 MT)

Year & quarter	Uses			
	Total	Steelmaking	Foundries	Ferro-alloys
1975	9,311	8,588	563	160
1976	10,033	9,167	634	248
1977	9,809	9,099	562	193
1978	10,579	9,513	825	240
1979	11,080	10,401	505	175
1980	10,892	10,016	877	289
1980 IV	2,739	2,521	219	81
1981 I	2,856	2,670	186	76
II	2,977	2,786	192	77
III	1,994	...	...	...

Note : ... sign indicates data which is unreliable and excluded in this Study.

Source: Primary Iron & Steel, Canada

Table C-7 Number and Operation of Blast Furnaces in the USA

Year	Qtr	No. of B.F.s installed	No. of B. F.s operated	Total inner volume of B. F.s operated (1,000 m^3)	Pig iron production (1,000 MT)	Pig ratio (ton/m^3)
1973	1	214	157	68,030	93,522	1.375
	2	214	161			
	3	214	159			
	4	214	160			
1974	1	204	161	67,044	87,008	1.300
	2	204	161			
	3	204	159			
	4	204	138			
1975	1	194	148	53,508	72,506	1.355
	2	193	118			
	3	193	117			
	4	191	110			
1976	1	187	129	54,619	78,808	1.443
	2	184	138			
	3	184	118			
	4	184	100			
1977	1	184	118	51,571	73,780	1.431
	2	183	123			
	3	183	113			
	4	183	110			
1978	1	174	122	54,931	79,541	1.448
	2	172	127			
	3	171	125			
	4	172	119			

Note: No. of BF - As of end of period

Source: American Iron Ore Association

Table C-8 The U.S. Blast Furnaces Closed Recently

U.S. Steel	Clairton Gary Lorain South	№1 Blast Furnace №9 Blast Furnace №5 Blast Furnace №10 Blast Furnace	1978 1982 1980 1981
Bethlehem Steel	Johnstone Lackawana	Blast Furnace Four Blast Furnaces	1981 1977
J & Laughlin	Aliqueppa Pittsburgh	A-5 Blast Furnace Blast Furnace	1980 1979
Kaiser Steel	Fontana	Four Blast Furnaces 2.5 Million tons of Pigiron	1983 (Proposed)
Republic Steel	Gadsden	Blast Furnace (Closed Tentatively)	1982
National Steel	Weirton	Blast Furnace №4 №2	1979 1981

code, the over-capacity will further expand in 1985 in view of sluggish demand prospect, and suggested that the EC will step up fight on reduction of capacity. In can be said that the road of restructuring the EC steel industry by 1985 is not easy.

Present condition of the EC steel industry as a whole is given in Section B. Another face of the restructuring is an adaptation policy which forces vast expenditures in employment measures and compensation for redundancies brought about by the restructuring.

Entering into the 1980s, the EC steel industry is experiencing drastic transition period of various marriages or divorces among companies or groups of companies, and this also results in separation or reunion of production facilities.

Pig iron capacity in nine EC countries published by EC Commission is shown in Table C-10, which shows that the capacity hit the peak in 1977 and then declined. No major expansion is expected in the near future.

Table C-9 EC Pig Iron Production by Use and Process

(1,000 MT)

Year	Total	Uses					Process						
		Steel making	Foundries	Fe-Mn	Spiege-leisen	Others	B.F.	No. of B.F.		E.F.	No. of E.F.		Others
								Installed	Operated		Installed	Operated	
1972	83,293	77,154	5,183	754	60	245	81,060	269	220	253	21	11	-
73	106,934	101,079	4,547	1,066	61	302	104,594	352	263	264	24	13	-
74	113,079	106,145	4,415	1,112	58	351	111,774	324	262	305	25	16	-
75	88,552	83,579	3,815	871	17	269	88,355	322	175	247	24	13	-
76	94,650	89,928	3,508	845	13	280	94,458	315	185	280	26	10	-
77	87,564	82,206	3,344	749	15	254	...	...	...	155	...	...	...
78	90,190	86,099	3,041	785	20	245	...	...	...	...	...	...	...
79	98,499	94,068	3,236	976	18	211	...	...	...	...	...	...	...
80	88,468	...	...	...	...	...	...	...	...	...	...	...	...
81	88,272	...	...	...	...	...	...	...	...	...	...	...	...

Notes : 1) No. of B.F. & E.F. at year end
2) Prior to Jan. 1973, 6 EC countries; From Jan. 1973, 9 EC countries; From Jan. 1981, 10 EC countries
3) - sign indicates data which is not available.
... sign indicates data which is unreliable and excluded in this study.

Source: EC Statistical Office, Iron and Steel Yearbook

In respect of regional distribution of the capacity also, as a result of the restructuring, pig iron production seems to be concentrated to integrated steel mills on the seaside built during the 1960s and 1970s and relatively modern in EC while the production by the inland, old mills will be curtailed. As seen from Table C-11, the measures are very drastic and blast furnaces with annual capacity of million tonne-level have been put out of service or planned to be closed.

Table C-10 Pig Iron Capacity in ECSC (9 countries)

	Capacity (Million m/t)	Production (Million m/t)	Operating rate (%)
1973	126.5	106.8	84.4
74	127.7	111.8	87.5
75	136.8	88.7	64.8
76	142.0	94.6	66.6
77	142.2	87.5	61.5
78	141.1	90.2	63.9
79	140.5	98.5	70.1
80	138.2	89.5	64.8
81 (Est.)	136.5	88.2	64.6
82 (Assumed)	134.8	...	...
83 (")	135.7	...	...
84 (")	135.8	...	...

Notes : ... sign indicates data which is unreliable and excluded in this Study.
1) In June 1980, 52 of 80 units in the Federal Republic of Germany and at end of 1979, 43 of 52 units in France were in operation.

Source: EC Commission

3.3 Japan

Sluggish steel demand in recent years resulted necessarily in slowdown of steel production and also of pig iron production as observed in Section A. At the end of November 1982, about 30% of blast furnaces are out of service, the percentage increasing month after month in 1982. Thus, even the normal operation of two blast furnaces at a time which is considered as a must for smooth mill operation has become impossible, and some integrated steel mills are operated with only one blast furnace in commission.

Table C-11 ECSC Blast Furnaces Closed Recently

Company and Works			Date closed	Remarks
Germany, FR				
Arbed Saarstahl				
Neunkirchen		B.F. 4 units	July 1982	Closed for joint production by Rogesa (established Apr. 1981) in Saar region.
Volklingen		B.F. 6 units	1983	
Burbach		B.F. 4 units	1983	
Dillinger				
Dillingen		B.F. 3 units	1988	
Total 6 million tonnes				
France				
Usinor				
Thionville		B.F. 1 unit	1977	
Longwy		B.F. 2 units	1979	
Denain		B.F. 2 units	1979	
Rehon	No.3	B.F. 1 unit	1980	
Sacilor				
Hagondange		B.F. 5 units	Nov. 1980	
Belgium				
Cockerill-Sambre				Closed in view of modernization of "B" furnace and construction of "C" furnace of Ougree
Seraing (formerly Cockerill)		B.F. 2 units	1981	
Seraing (formerly Esperance)		B.F. 3 units	1981	
Ougree		B.F. 1 unit	1981	
Total 3.25 million tonnes				
UK				
BSC				
Corby		B.F. 4 units	Apr. 1980	
Consett		B.F. 3 units	Apr. 1980	
Shotton		B.F. 2 units	May 1980	
Workington	No.4	B.F. 1 unit	Dec. 1980	
Normandy Park		B.F. 2 units	Feb. 1981	

Sources: Trade magazines and papers

Table C-12 Japan's Pig Iron Capacity

(Unit of capacity: MT/year)

	End of 1979	End of 1980	End of 1981	May 1982	June 1982	July 1982
Total Capacity	136,228,860	136,244,860	136,244,860	136,767,860	136,767,860	136,767,860
Blast furnaces						
No. of B.F.s	65	65	65	65	65	65
Capacity	135,943,000	135,959,000	135,959,000	136,482,000	136,482,000	136,482,000
Electric furnaces						
No. of E.F.s	10	10	10	10	10	10
Capacity	93,960	93,960	93,960	93,960	93,960	93,960
Others						
No.	2	2	2	2	2	2
Capacity	191,900	191,900	191,900	191,900	191,900	191,900

Note : Capacity shown in this Table represents nominal, physically designed capacity of the furnaces and differs from effective capacity. Effective capacity of pig iron in Japan is therefore lower than that shown in this Table.

Source: Ministry of International Trade and Industry

Table C-13 Blast Furnace Operation in Japan

		End of 1981			End of Oct. 1982		End of Nov. 1982	
		Total	Operated	Stopped	Operated	Stopped	Operated	Stopped
Major 5 companies	No. of BF	59	38	21	36	23	34	25
	Total volume (m^3)	161,792	116,589	45,203	113,310	48,482	110,374	51,418
Other 4 companies	No. of BF	6	6	-	6	-	-	-
	Total volume (m^3)	6,110	6,110	-	6,110	-	-	-
Grand total	No. of BF	65	44	21	42	23	40	25
	Total volume (m^3)	167,902	122,699	45,203	119,420	48,482	116,484	51,418
	% in total	100%	73%	27%	71%	29%	69%	31%

Note : - sign indicates data which is not available.

Source: The Japan Iron & Steel Federation

In Japan 75% or more of steel is produced by B.O.F.s and stable supply of molten iron is indispensable, but the decrease in steel production has given a big impact on blast furnace operation.

In 1982, Japan's crude steel production dropped below the 100 million tonne mark, and the production in fiscal 1983 is forecasted to fall further to 93 million tonnes. Increased generation of scrap and its price decline tends to induce a change of pig ratio for steelmaking charges, and the ratio is lowered also from the consideration of operation cost of blast furnaces in some cases, further affecting pig iron production.

Improvement of steel production depends basically on recovery of domestic steel demand, but the demand is expected to be only 65.8 million tonnes in terms of crude steel in fiscal 1982 and as low as 63.1 million tonnes in fiscal 1983. A long-range forecast of apparent crude steel consumption says that the consumption will be 77.2 to 86.6 million tonnes in 1985 and 82 to 95.8 million tonnes in 1990. A big expansion of steel demand cannot be expected for almost 10 years. With such slow growth of steel production, there will be surplus pig iron capacity for years.

Table C-14 Japan's Pig Iron Production by Process

(1,000 MT)

	Pig Iron						
	Total			Steelmaking		Foundries	
	Total	B.F.	(%)	Total	B.F.	Total	B.F.
1971	72,745	72,249	(99.3)	70,814	70,699	1,931	1,557
1972	74,055	73,679	(99.5)	72,433	72,338	1,622	1,340
1973	90,007	89,676	(99.6)	87,872	87,780	2,136	1,896
1974	90,437	90,119	(99.6)	88,208	88,134	2,229	1,985
1975	86,877	86,622	(99.7)	84,870	84,821	2,007	1,801
1976	86,576	86,366	(99.8)	85,051	85,014	1,525	1,352
1977	85,886	85,699	(99.8)	84,654	84,629	1,232	1,070
1978	78,589	78,427	(99.8)	77,603	77,587	986	840
1979	83,825	83,673	(99.8)	82,831	82,819	994	854
1980	87,041	86,842	(99.8)	85,763	85,750	1,278	1,092
1981	80,048	79,884	(99.8)	79,067	79,055	981	829

Note : Figures in ( ) show % produced by B.F.

Source: MITI, Monthly Iron and Steel Statistics

3.4 USSR

As observed in Section B, poor condition of pig iron production in the USSR is clear, and slow iron ore production together with a small number of large-sized blast furnaces form the bottleneck for expansion of steel production.

Annual average growth of iron ore production from 1976 to 1980 was only 0.9% and this constituted one factor to bring about slow growth of pig iron production in the USSR and also in Eastern European countries which depend largely on iron ore imported from the USSR. As a result, Eastern European countries are suffering from shortage of pig iron and have to import a considerable amount of pig iron from the third countries.

Under the new 5-year plan of the USSR, pig iron production is planned to increase at a rate of 2.1% to 3.1% per annum and the shortage is not expected to be solved fundamentally. Thus, in the 1980s, the USSR is not expected to be a major pig iron supplier in the world markets in competition with Brazil excepting the extraordinary cases where the USSR decides to export pig iron for some political or other reasons.

In Eastern European countries, the shortage of pig iron is expected to persist at least up to 1985, and the basic improvement of the condition by 1990 depends on the structural improvement — increase in pig iron supply — in the USSR steel industry.

Table C-15 Iron Ore Production and Increase of Pig Iron in the USSR

	Iron ore		Pig iron		
	Production (million MT)	Growth over preceding year (%)	5-year plan	Ave. annual increase (million MT)	Ave. annual growth rate (%)
1975	234.7	-	1961-1965	3.9	7.2
76	241.1	2.7	1966-1970	3.9	5.3
77	241.9	0.3	1971-1975	3.4	3.7
78	246.3	1.8	1976-1980 (Planned)	3.4	3.1
79	241.7	-1.9	1976-1980 (Actual)	1.1	1.0
80	245.0	1.4			
Annual ave. 1976-80	241.8	0.9			

Sources: Iron ore - Statistics Books of National Economy and Pravda, Feb. 24, 1981
Pig iron - Statistics Books of National Economy and Pravda, Oct. 28, 1976 & Jan. 24, 1981

Table C-16 The USSR Pig Iron and Ferro-alloys Production

(1,000 MT)

Year & quarter			Uses				Process		
			Steel-making	Found-ries	Spiege-leisen	B.F. Ferro-alloys	B.F.	E.F.	Others
1974		99,868	90,167	8,709	107	859	99,863	-	5
1975		102,968	93,803	8,156	104	905	102,963	-	5
1976		105,300	96,600	7,800	900		...	...	...
1977		107,400	98,700	7,800	900		...	...	...
1978		110,700	102,500	7,500	700		...	...	...
1979		109,000	101,300	7,000	700		...	...	...
1980		107,282	...	...	...		...	...	...
1980	IV	26,235	...	...	...		...	...	...
1981	I	27,304	...	...	...		...	...	...
	II	27,694	...	...	...		...	...	...
	III	26,306	...	...	...		...	...	...

Note : - sign indicates data which is not available.
... sign indicates data which is unreliable and excluded in this Study.

Source: ECE, Annual (Quarterly) Bulletin of Steel Statistics for Europe

II. Supply of Semi-finished Steels

1. Difficulty of Grasping Actual Situation and Reasons

As discussed in Section A-V, semi-finished steels are not traded usually or regularly in the open market. When sold in the market, their trade takes various patterns according to certain factors involved.

International trade statitistics on semi-finished steels are few, and their concepts and definitions are not necessarily standardized, making it difficult to study or compare their trade statistics. Their unification for international comparison can be found only in the steel trade statistics issued by IISI and UN ECE Steel Committee, and some arbitrary selection is necessary for picking their trade from national external trade statistics.

When a steel company sells or buys semi-finished steels, there may be conceived following case patterns.

a. Necessity to sell surplus semis in cases where unbalance occurs among capacities of related production processes (Sales not regularly made).

b. Sales of semis in cases where their production capacity is high as compared with limited level of domestic demand and in addition foreign steelmakers or trading companies have agreed to accept the surplus products for their own consumption or reselling. Such case applies to an international joint venture whose partners buy the products according to their respective equity holdings (sales regularly made).

c. Purchase of semis by an electric furnace steelmaker whose rolling capacity is designed larger than steelmaking capacity from the beginning so that shortage of semis is covered by purchase from outside. This case applies mainly to billets for round and reinforcing bars purchased from steelmakers at home or abroad.

d. Purchase of semis in cases where such purchase is more advantageous than own production in view of availability of scrap supply and unstable price of scrap. This case is only possible when overall cost comparison favors such purchase.

e. Sales of semis in cases where, in a developing country whose existing steel industry comprises mainly small EAF steelmakers and rerollers, an integrated steel mill is constructed —— often as a state-owned company —— to produce semis for its own use as well as regularly supply them to the existing small steel companies. In this case, semis are sold as a matter of course.

f. Purchase of semis in cases where a new integrated steel mill is constructed by so-called backward integration method which means that the construction of the mill begins with installation of rolling and finishing facilities, necessitating purchase of semis for those facilities before ironmaking and steelmaking facilities are installed subsequently. This case calls for regular purchase of necessary semis from others for some time.

g. Purchase of semis in cases where some troubles at an integrated steel mill caused interruption in production, especially at upstream processes, necessitating temporary purchase of semis.

h. Purchase of semis by rerollers in cases where scrap from shipbreakers or special grade scrap cannot be obtained and prices of semis are acceptable costwise.

i. Supply of semis within a group, i.e. cases where an integrated

steel mill in a group supplies semis to other mills in the same group.

Cases as above are reasons for purchasing or selling of semis, but in international trades it is inherently difficult to have regular buyers for semis excepting some special cases and the sellers of semis have to approach many, unspecified users. In such case, merchandizing strategy is extremely difficult and the sales is possible only by finding users suited to the semis to be sold.

From the end of 1960s to early 1970s, there were a number of projects to construct an integrated steel mill specializing in production of semis, but to sell low value-added semis profitable is more difficult than to produce and almost all of the projects were suspended, postponed or abandoned.

Recently, studies have been made on the idea of projects to construct an integrated steel mill through joint efforts in a region and supply semis from this steel mill to companies in the region or sub-region (An example is joint industrial projects in ASEAN group). But none of such idea has been realized so far.

At any rate, because of their low added-value, production of semis for sale is econoically feasible only where such semis are produced under exceptionally favorable raw materials condition (meaning advantages of low production cost) or such semis can be sold to regular customers under certain agreements. The price of semis is to be calculated backward from the prices of final products made from the semis, such prices being general domestic or export market prices. For example, price of slabs used for making plates is determined by market price of plates and price of billets by that of round bars, and it is usually difficult to set prices of semis independent of the prices of final products.

2. General Condition of Shipment and Consumption of Semis

An overwhelmingly large part of semis is consumed in subsequent processes in the production flow of a steel mill, and only a very limited statistics are available of semis because it is difficult to obtain independent statistics of semis.

In other words, statistics of semis is that kept by users which is one of the most difficult to obtain of the iron and steel statistics; namely, it is statistics concerning flow and consumption between processes. Available statistics in various countries are those on semis sold (including export) or on apparent consumption of semis based on domestic shipment and external trades (export and import).

Sale of semis by steel companies is made in those cases which were observed in the preceding section. There may be other different cases according to the level of prices of scrap as substitute of semis. Sale of semis is eventually governed by judgement from business management at each time of sale, and the statistics of semis sold which appear in a year or month tend to be irregular.

To plan production of semis for sale from the start necessitates a very difficult judgement so long as the feasibility study is to be made on the basis of past data.

Table C-17 Production of Molten Steel for Castings, Ingots & Semis for Sale and Finished Products in EC (1974 through 1981 and 1985)

(million MT)

	1974	1975	1976	1977	1978	1979	1980	1981	1985
Molten steel(1) for castings	2.1	2.0	1.8	1.6	1.6	1.6	1.6	1.4	1.4
Ingots & semis(2) for sale	10.5	11.0	9.7	9.1	11.3	11.5	11.2(*)	...	9.1
Finished products:									
Coil (final product)	8.4	7.2	8.6	10.0	12.0	12.6	11.9	14.1	12.5
Heavy sections	10.5	8.9	9.0	8.7	9.5	8.8	8.4	8.5	7.2
Light sections	25.5	19.8	20.6	19.0	19.4	21.1	19.6	17.0	17.4
Round & reinforcing bars	(9.9)	(7.9)	(8.6)	(7.7)	(7.7)	(8.8)	(8.7)	(7.4)	(7.6)
Wire rod	12.8	9.2	10.4	10.2	11.1	12.1	10.8	10.5	11.1
Strip-skelp	8.2	5.5	7.1	6.4	6.6	7.1	6.0	5.2	4.9
Plate & medium plate	17.6	14.5	12.5	12.3	12.6	13.0	12.5	12.8	12.5
Sheets	29.3	21.7	26.8	27.4	28.0	29.2	26.3	26.1	29.1
Sub-total	112.4	86.9	95.0	94.0	99.0	104.0	95.5	94.2	94.6
Total	124.9	100.0	106.5	104.7	111.9	117.0	108.3	...	105.1

* Includes estimate for the Federal Republic of Germany.

Notes: 1) Includes production by independent casting plants.
2) Exludes that for rolling or rerolling in EC, but includes ingots & semis for tubes.

Source: Objectifs Generaux 1985.
Commission des Communautes Europeennes, 1982

D. PRESENT CONDITION AND TREND OF IRON AND STEEL CONSUMPTION IN THE WORLD

I. World Steel Consumption (Crude Steel)

As the statistics of current iron and steel consumption in the world, short-range statistics on apparent steel consumption published twice a year, in spring and autumn, by International Iron and Steel Institute (IISI) can be said most authoritative.

This statistics is prepared by IISI secretariate on the basis of suggestions provided by experts to IISI Committee on Economic Studies and its own estimates for certain regions.

According to the latest statistics made public in October 1982, the world apparent steel consumption in terms of crude steel for 1982 was estimated to be 671.8 million tonnes, about 5% lower than that in 1981.

By regions, industrialized countries as a whole showed about 10% derease while developing countries as a group showed a slight increase. Especially notable are decrease of about 22.8% in the Untied States, 2.4% in EC and 2.4% in Japan, and the total of free world showed a decrease of 8%.

Communist bloc showed a slight increase of 0.6% reflecting a small increase in Eastern Europe.

In short, the world steel demand in 1982 did not show any sign of recovery basically from the bad shape resulted from the impact of the 1973 oil price increase on the world economy, and the steel consumption in 1981 was lower than that in 1978, five years earlier.

IISI reported that the world economy in 1982 experienced the worst recession since the world crisis in the 1930s and estimated that the world apparent steel consumption would be short of 672 million tonnes, a decrease of 5% from 707 million tonnes in the preceding year.

Of this world total, the steel consumption in Western World would be 421 million tonnes, an 8% drop from the year before, that of COMECON countries would be 204 million tonnes, almost same level in 1981 and that of China and the Democratic Republic of Korea would be 47 million tonnes, showing 1% increase.

Reasons behind the 8% decrease in the consumption in Western World are decrease of actual consumption of steel and substantial liquidation of inventories at steel distributors as well as steel

users. The decrease in the apparent steel consumption was experienced in both developed and developing countries, but the most drastic decrease occurred in the United States, where the consumption was 23% lower than that in the preceding year and at the lowest in the past 20 years.

Table D-1 World Apparent Steel Consumption in 1982

(million MT)

	1981	1982	% change
Western World	457	421	-7.9
USA	128	99	-22.7
ECSC	99	96	-3.0
Japan	72	71	-1.4
Other developed countries	60	58	-3.3
Developing countries	98	97	-1.0
COMECON	203	204	+0.5
China & Korea, Dem. Rep.	47	47	±0
World total	707	672	-5.0

Source: IISI

Forecast of the world apparent steel consumption in 1983 may be summarized as follows:

The prospects of steel consumption for 1983 is very uncertain and an increase, if any, will be small. It will reflect the completion of inventory liquidation rather than an increase in actual consumption. It is forecasted that the world apparent steel consumption in 1983 will be 689 million tonnes, 2.5% higher than the 1982 figure. The consumption in Western World will increase by 3%, that in COMECON by 2%, but that in China and the Democratic Republic of Korea will show no increase.

Developed countries as a whole will show a 3% increase. The United States and ECSC will show increases of 10% and 2%, respectively, but Japan will show a decrease of 2% again.

Table D-2 Forecast of World Apparent Steel Consumption in 1983

(million MT)

	1982	1983	% change
Western World	421	435	+3
Developed countries	324	334	+3
ECSC	96	98	+2
Other European countries	32	33	+1
USA	99	108	+10
Japan	71	69	-2
Others	26	26	-
Developing countries	97	101	+3
COMECON	204	207	+2
China & Korea, Dem. Rep.	47	47	-
World total	672	689	+2.5

Source: IISI

II. Outline and Nature of Pig Iron Consumption

At present, the major part of pig iron produced in the world is consumed for steelmaking at the steel mills where it is produced. Namely, hot metal from blast furnaces is charged into B.O.F.s or similar converters for producing steel. As seen in Table D-7, hot metal comprises 60 to 75% of a charge to B.O.F.s. Pig iron is used also in open hearth furnaces, but the pig ratio varies according to price of scrap, competing material of pig iron, within certain limits. Only small amount of pig iron is used in electric arc furnaces.

This indicates the importance of scrap price when pig iron is produced for sale; i.e. scrap price is determining factor for price of pig iron to be sold.

Table D-6 shows unit consumption of scrap per tonne of crude steel produced in the United States and Table D-7 shows consumption of pig iron and scrap for steelmaking in major countries.

Table D-3 Apparent Steel Consumption by Country

(million MT, Crude Steel equivalent)

	1978	1979	1980	1981	1982 Forecast	1983 Forecast
Belgium & Luxembourg	3.8	3.9	3.4	3.0	3.1	3.2
Denmark	1.6	1.7	1.6	1.6	1.5	1.5
Germany, Fed. Rep.	33.8	37.2	35.4	33.8	30.6	32.0
France	20.0	21.1	20.0	18.0	17.9	17.5
Greece	1.6	1.6E	2.0E	1.5E	1.7E	1.7E
Ireland	0.4	0.7E	0.4E	0.4E	0.4E	0.5E
Italy	19.3	23.2	25.6	21.2	21.0	21.5
Netherlands	4.6	4.5	4.6	4.1	4.2	4.6
UK	20.0	20.5	15.1	15.2	16.0	16.0
Total EC (10)	105.1	114.4E	108.1E	98.8E	96.4E	98.5E
Austria	2.7	2.5	2.7	2.5	2.5	2.5
Finland	1.5	1.8	2.2	1.9	2.1	2.1
Norway	1.4	1.4	1.7	1.3	1.5	1.4
Portugal	1.4	1.2	1.5	1.5	1.7	1.8
Spain	8.4	8.0	8.6	8.4	8.4	8.4
Sweden	3.9	4.2	4.2	4.0	4.0	4.1
Switzerland	2.3	2.1	2.2	2.4	2.2	2.2
Turkey	4.5	4.0	3.1E	3.1	3.4	3.4E
Yugoslavia	5.4	5.5	5.7	6.2	6.6	6.9
Total Western Europe	136.6	145.1E	140.0E	130.1E	128.8	131.3E
USA	145.2	142.6	118.4	128.2	98.9	108.4
Canada	13.6	14.9	13.8	14.4	11.5	12.1
Total North America	158.8	157.5	132.2	142.6	110.4	120.5
Argentina	2.9	3.8	3.2	2.5	2.3	2.5
Brazil	12.4	13.3	14.6	12.4	12.3	13.0
Chile	0.6	0.7	0.7	0.7	0.5E	0.6E
Mexico	8.1	9.2	10.9	12.1	9.3	9.8
Venezuela	3.2	2.6	3.1	3.0	3.3E	3.5E
Panama and Others	2.9	2.9	3.9	3.6	4.0E	4.4E
Total Latin America	30.3	32.5	36.4	34.3	31.7	33.8E
South Africa	5.1	6.0	6.9	7.0	6.7	6.8
Tunisia	0.4	0.6	0.7E	0.7E	0.7E	0.8E
Zimbabwe	0.3	0.3	0.3	0.3	0.3E	0.3E
Other Africa	7.4E	6.4E	7.6E	7.6E	7.6E	7.5E
Total Africa	13.2E	13.3E	15.5E	15.6E	15.3E	15.4E

Table D-3 (cont'd.)

	1978	1979	1980	1981	1982 Forecast	1985 Forecast
Egypt	1.3	1.4E	1.6	1.7	1.9	2.0
Iran	7.0E	3.4E	3.8E	3.7E	3.7E	3.7E
Israel	1.0	1.2	1.0	1.0	0.9E	0.9E
Qatar	0.1	0.1	0.1E	0.1E	0.1	0.1
Other Middle East	6.8E	10.6E	9.6E	9.6	9.5E	9.4E
Total Middle East	16.2E	16.7E	16.1E	16.1E	16.1E	16.1E
Japan	67.9	78.5	78.8	72.3	70.6	69.0
India	10.1	11.7	10.9	12.3	13.3E	13.8E
Republic of Korea	7.0	7.5	6.1	7.5	7.7	8.1
Philippines	1.5	1.6	1.6E	1.6E	1.6E	1.6E
Singapore	1.5	1.6	1.9	2.5	2.4	2.5
Taiwan	5.0	5.3	6.3	5.6	6.1	6.7
Other Asia	8.6E	8.8E	9.7E	9.1E	9.2E	9.2E
Total Asia	101.6E	115.0E	115.5E	111.4E	111.4E	110.9
Australia	5.1	6.5	6.4	6.6	6.3	5.9
New Zealand	0.6	0.7	0.7	0.3	0.8	0.3
Total Oceania	5.7	7.2	7.1	7.4	7.1	6.7
Total Western World	462.4E	487.3E	462.6E	457.5E	420.8E	434.7E
USSR, Eastern Europe (COMECON)	212.8E	211.6E	207.0E	203.0E	204.0E	207.0E
China, Korea, DR, & Others	47.7E	50.5E	49.0E	46.5E	47.0E	47.0E
TOTAL WORLD	722.9E	749.4E	718.6E	707.0E	671.8E	688.7E
Balancing Items	−5.7	−1.9	−1.5	−0.6		
WORLD CRUDE STEEL PRODUCTION	717.2	747.5	717.1	707.6	..	..

Notes: 1) The approach adopted for the Short Range Outlook is to allow each country to choose the most appropriate method of estimating apparent steel consumption in crude steel equivalents. The methods therefore vary between countries and in particular some countries use constant yield coefficients over time whilst others adjust for improvements in yields from, for example, the introduction of continuous casting.

2) Excluding Cuba

3) E = Secretariat Estimate

Source: IISI, Oct. 1982

Table D-4 Development of Apparent Steel Consumption 1980-1983

(million MT, crude steel equivalent)

	1980 (Actual)	1981 (Actual)	1982 (Estimate)	1983 (Forecast)	82/81	83/82
USA	118.4	128.2	98.9	108.4	−22.8	+ 9.6
Canada	13.8	14.4	11.5	12.1	−20.1	+ 5.2
EC (10)	108.1	98.8	96.4	98.5	− 2.4	+ 2.2
Other Western Europe	31.9	31.3	32.4	32.8	+ 3.5	+ 1.2
Latin America	36.4	34.1	31.7	33.8	− 7.0	+ 6.6
Oceania	7.1	7.4	7.1	6.7	− 4.1	− 5.6
Japan	78.8	72.3	70.6	69.0	− 2.4	− 2.3
Other Asia	36.5	39.1	40.8	41.9	+ 4.3	+ 2.7
Total :						
- Industrialized	365.0	359.4	325.6	334.3	−10.0	+ 3.5
- Developing	97.6	98.1	97.2	100.4	+ 0.9	+ 3.3
- Western World	462.6	457.5	420.8	434.7	− 8.0	+ 3.3

Source: IISI, 1982 Survey of the Short Range Outlook, Oct. 1982

Table D-5 Estimated Steel Consumption of Socialist Countries

(million MT)

	1977	1978	1979	1980	1981	1982	1983
USSR and Eastern Europe	203.4	212.8	211.6	207.0	203.0	204.0	207.0
China and Korea, DR	34.3	47.7	50.5	49.0	46.5	47.0	47.0
	—	—	—	—	—	—	—
Total	237.7	260.5	262.1	256.0	249.5	251.0	254.0

Source: IISI, 1982 Survey of the Short Range Outlook, Oct. 1982

Table D-6 Consumption of Pig Iron & Scrap per Tonne of Crude Steel Produced in the USA

(kg/MT)

Year	O.H. Furnace		E.A.F.		B.O.F.		Steelmaking	
	Pig iron	Scrap	Pig iron	Scrap	Pig iron	Scrap	Pig iron	Scrap
1955	...	...	...	...	...	...	...	...
56	...	...	...	...	...	...	...	...
57	...	...	...	...	...	...	...	...
58	640	444	173	883	...	...	605	478
59	629	460	44	992	844	311	589	497
1960	640	459	41	1,164	877	344	621	531
61	646	448	30	1,145	895	346	633	525
62	655	443	20	1,188	899	332	637	525
63	651	448	14	1,029	829	321	609	489
64	663	437	24	1,016	803	354	625	477
1965	652	454	25	1,005	811	340	622	485
66	649	453	15	1,009	825	337	631	479
67	656	467	22	1,174	809	336	633	507
68	607	478	27	1,115	808	332	609	504
69	615	504	13	1,106	771	329	596	514
1970	656	464	16	1,064	776	334	617	492
71	675	522	21	962	773	314	616	488
72	640	533	33	1,049	808	324	626	508
73	640	513	33	1,031	817	328	626	506
74	634	535	32	1,036	817	326	617	518
1975	656	527	34	1,015	825	326	639	498
76	661	522	17	1,016	828	328	640	497
77	625	553	26	1,030	825	325	618	537
78	631	548	34	1,014	827	312	610	514
79	672	545	16	1,025	823	319	601	526
1980	645	566	24	1,065	835	323	587	558
81								

Note : ... sign indicates data which is unreliable and excluded in this Study.

Source: Calculated based on ECE, Annual Bulletin of Steel Statistics for Europe

Table D-7 Consumption of Pig Iron & Scrap for Steelmaking in Major Countries

(1,000 MT)

		Pig Iron						Scrap						Pig ratio***
		Thomas bessemer	O.H. furnace	E.A.F.	Others	of which B.O.F.	Total	Thomas bessemer	O.H. furnace	E.A.F.	Others	of which B.O.F.	Total	
Japan	1975	—	497	442	80,997	80,997	81,936	—	803	17,655	10,381	10,381	28,839	74.0
	1976	—	91	455	85,450	85,450	85,974	—	500	21,087	10,640	10,640	32,227	72.3
	1977	—	88	397	82,009	82,009	82,492	—	567	20,561	7,413	7,413	28,541	74.4
	1978	—	—	458	77,726	77,726	78,165	—	—	23,559	9,025	9,025	32,584	70.6
	1979	—	—	620	82,459	82,459	85,059	—	—	27,645	10,490	10,490	38,135	68.5
	1980	—	—	685	83,983	83,983	84,668	—	—	28,458	7,732	7,732	36,190	70.1
USA	1975	—	14,203	766	53,715	53,715	67,654	—	10,667	23,426	21,221	21,221	55,334	55.0
	1976	—	13,980	579	60,000	60,000	74,559	—	11,192	25,140	23,772	23,772	60,104	55.5
	1977	—	11,968	653	57,949	57,949	69,970	—	10,058	22,979	22,711	22,711	60,748	53.5
	1978	—	12,196	1,040	62,622	62,622	75,858	—	10,676	32,184	23,592	23,592	66,452	53.3
	1979	—	...	...	...	...	...	...	...	...	...	...	...	...
	1980	—	...	...	...	...	...	...	...	...	...	...	...	...
Germany, FR	1975	575	2,214	95	24,629	24,629	27,511	75	4,832	5,052	6,348	6,348	16,287	62.8
	1976	572	2,179	89	26,744	26,744	29,584	78	4,168	5,158	7,157	7,157	16,560	64.1
	1977	—	1,694	84	25,276	25,276	27,054	—	3,474	5,124	6,882	6,882	15,479	63.6
	1978	—	1,471	85	24,506	24,506	26,061	—	3,504	5,894	7,400	7,400	16,598	62.8
	1979	—	1,700	43	31,077	31,077	32,819	—	3,146	6,275	7,578	7,578	16,999	65.9
	1980	—	1,080	50	30,539	30,539	31,670	—	2,031	6,426	7,235	7,235	15,692	66.9
France	1975	3,514	567	6	12,251	12,251	16,138	272	1,260	2,676	5,166	5,166	7,344	68.7
	1976	2,961	287	51	14,513	14,513	17,592	198	1,077	2,932	3,759	3,759	7,966	68.8
	1977	2,106	69	15	14,721	14,721	16,911	162	640	2,878	3,697	3,697	7,377	69.6
	1978	1,100	51	6	16,057	16,057	17,194	155	391	3,170	4,259	4,259	7,975	68.3
	1979	791	53	18	16,984	16,984	17,846	125	324	3,270	4,213	4,213	7,930	69.2
	1980	308	42	23	17,300	17,300	17,673	49	174	3,380	4,184	4,184	7,787	69.4
Italy	1975	—	1,659	167	8,989	8,989	10,815	—	1,070	10,231	2,237	2,237	13,538	44.4
	1976	—	1,432	159	9,337	9,337	10,928	—	740	11,690	2,274	2,274	14,704	42.6
	1977	—	1,195	181	9,687	9,687	11,061	—	577	12,346	2,064	2,057	14,984	42.5
	1978	—	1,087	157	9,779	9,779	11,025	—	626	13,475	2,014	2,014	16,115	40.6
	1979	—	913	249	9,381	9,381	10,543	—	425	13,773	1,924	1,924	16,122	39.5
	1980	—	...	...	...	...	...	...	...	...	...	...	...	...
Belgium*	1975	816	5	1	8,221	...	9,043	116	155	608	2,763	...	3,642	71.5
	1976	733	3	1	8,526	...	9,765	54	120	514	2,918	...	3,586	73.1
	1977	—	1	—	8,957	...	8,958	—	37	491	2,816	2,499	3,344	72.8
	1978	—	—	—	10,068	...	10,070	—	—	584	3,157	...	3,741	72.9
	1979	—	—	—	10,740	...	10,740	—	—	605	3,405	...	4,010	72.8
	1980	—	—	—	9,832	...	9,832	—	—	684	2,974	...	3,658	72.9
Luxemburg	1975	1,202	—	—	2,654	2,320	4,856	507	—	28	946	855	1,281	75.1
	1976	499	—	—	3,221	2,850	3,720	149	—	26	1,162	1,020	1,357	73.6
	1977	—	—	—	3,501	3,118	3,501	—	—	17	1,288	1,150	1,305	71.5
	1978	—	—	—	3,682	3,298	3,682	—	—	8	1,634	1,463	1,642	69.2
	1979	—	—	—	2,779	2,526	2,779	—	—	—	1,720	1,605	1,720	68.7
	1980	—	—	—	3,555	3,555	3,555	—	—	—	1,542	1,542	1,542	69.6
Netherlands	1975	—	0	0	5,846	5,846	5,846	—	45	366	1,011	1,011	1,419	73.2
	1976	—	0	0	4,097	4,097	4,097	—	17	394	1,192	1,192	1,602	71.9
	1977	—	—	0	3,885	3,885	3,885	—	—	350	1,172	1,172	1,522	71.8
	1978	—	—	0	4,445	4,445	4,445	—	—	348	1,344	1,344	1,692	72.4
	1979	—	—	0	4,617	4,617	4,617	—	—	550	1,467	1,467	1,816	71.8
	1980	—	—	0	4,171	4,171	4,171	—	—	545	1,336	1,336	1,661	71.3

Table D-7 (cont'd.)

(1,000 MT)

		Pig iron						Scrap						Pig ratio***
		Thomas bessemer	O.H. furnace	E.A.F.	Others	of which B.O.F.	Total	Thomas bessemer	O.H. furnace	E.A.F.	Others	of which B.O.F.	Total	
UK	1975	1	2,169	558	8,759	8,637	11,507	27	2,880	5,622	2,679	2,697	11,208	50.7
	1976	1	2,210	766	9,856	9,738	12,833	27	3,295	6,746	5,151	5,079	15,219	54.2
	1977	1	1,919	536	9,297	9,090	11,753	25	3,874	6,445	2,888	2,781	13,232	54.2
	1978	—	954	594	9,624	9,752	11,172	—	3,026	7,465	3,051	3,009	13,542	49.1
	1979	—	786	501	11,205	11,205	12,492	—	483	7,627	3,422	3,422	11,552	52.0
	1980	—	—	220	5,843	5,843	6,063	—	—	4,986	1,747	1,747	6,733	47.4
Sweden**	1975	...	...	...	...	...	2,877	...	...	...	...	...	3,369	46.1
	1976	...	...	...	...	...	2,691	...	...	...	...	...	3,093	46.5
	1977	...	...	...	...	...	2,106	...	...	...	...	...	2,384	46.9
	1978	...	...	...	...	...	2,266	...	...	...	...	...	2,569	46.7
	1979	...	...	...	...	...	2,628	...	...	...	...	...	2,695	49.4
	1980	...	...	...	...	...	...	...	...	...	...	...	...	...
Austria	1975	—	112	8	2,922	2,922	3,043	—	184	459	782	782	1,425	68.1
	1976	—	72	4	3,250	3,250	3,326	—	225	469	850	850	1,544	68.3
	1977	—	53	5	2,947	2,947	3,005	—	112	542	856	856	1,510	66.6
	1978	—	60	5	3,051	3,051	3,096	—	145	549	940	940	1,634	65.5
	1979	—	62	14	3,628	3,628	3,704	—	115	610	1,014	1,014	1,736	68.1
	1980	—	...	...	...	...	...	—	...	...	...	...	...	...
Spain	1975	—	565	291	5,648	5,648	6,414	—	741	4,105	1,377	1,377	6,223	50.6
	1976	—	512	14	5,501	5,501	6,027	—	595	4,780	1,565	1,565	6,939	46.5
	1977	—	557	17	5,504	5,504	6,078	—	470	5,178	1,440	1,440	7,088	46.2
	1978	—	524	15	5,447	5,447	5,986	—	394	5,794	1,357	1,357	7,545	44.2
	1979	—	508	83	5,588	5,588	5,979	—	548	5,436	1,276	1,276	7,060	45.9
	1980	—	...	...	...	...	...	—	...	...	...	...	...	...
Yugoslavia	1975	—	1,295	67	282	282	1,654	—	696	806	124	124	1,624	50.2
	1976	—	1,245	75	246	246	1,586	—	650	764	95	95	1,490	51.6
	1977	—	1,295	67	586	586	1,748	—	706	815	135	135	1,656	51.3
	1978	—	915	66	1,002	1,002	1,983	—	753	907	277	277	1,930	50.7
	1979	—	989	74	1,040	1,040	2,103	—	554	995	256	256	1,805	53.8
	1980	—	988	49	1,145	1,145	2,180	—	629	1,046	256	256	1,931	53.0
Poland	1975	—	...	...	...	...	...	—	...	...	...	...	...	...
	1976	—	4,058	68	5,864	1,056	9,970	—	5,268	2,545	1,648	405	9,061	46.8
	1977	—	5,228	94	5,549	1,061	9,571	—	5,514	2,602	1,957	415	9,905	46.1
	1978	—	5,752	152	7,115	1,061	11,019	—	6,017	2,651	2,553	405	11,181	46.3
	1979	—	5,282	150	7,485	982	10,856	—	5,069	2,701	2,587	391	10,357	51.2
	1980	—	5,229	141	5,718	1,038	11,088	—	5,124	2,796	2,655	430	10,575	51.2
German DR	1975	—	1,458	58	566	—	2,082	—	3,115	1,015	97	—	4,230	...
	1976	—	1,424	46	601	—	2,075	—	3,281	1,055	113	—	4,447	...
	1977	—	1,462	26	615	—	2,123	—	3,291	759	117	—	4,117	...
	1978	—	1,517	32	653	—	2,202	—	3,151	1,160	119	—	4,429	...
	1979	—	1,555	79	628	—	2,260	—	3,485	1,277	120	—	4,882	...
	1980	—	1,529	181	645	—	2,275	—	3,435	1,558	118	—	5,121	...
Hungary	1975	—	2,194	2	—	—	2,196	—	3,422	356	—	—	3,780	55.2
	1976	—	2,177	2	—	—	2,179	—	3,423	355	—	—	3,778	55.1
	1977	—	2,255	3	—	—	2,256	—	3,464	353	—	—	3,817	55.2
	1978	—	2,316	3	—	—	2,319	—	3,580	358	—	—	3,937	54.5
	1979	—	2,491	2	—	—	2,493	—	3,886	341	—	—	4,228	55.4
	1980	—	2,250	3	4	4	2,257	—	3,537	352	1	1	3,891	54.2

* Does not include independent casting firms.
** Pig iron does not include sponge iron.
*** Pig ratio = Pig iron/Pig iron + scrap

Notes : ~ sign indicates data which is not available.
... sign indicates data which is unreliable and excluded in this Study.

Source: ECE, Annual Bulletin of Steel Statistics for Europe

III. Outline and Nature of Consumption of Semi-finished Steels

As mentioned in C-II-1, it is very difficult to grasp the consumption of semi-finished steels or semis, but the domestic shipment and export of semis for sale are known and given in IISI statistics as shown in Table D-9. Apparent consumption of semis is also known for some major countries as given in Table D-8.

Table D-8 Apparent Consumption of Semis in Major Countries (Carbon Steel)

(1,000 MT)

	1973	1974	1975	1976	1977	1978	1979	1980
USA		2,137	1,323	1,239	1,059	1,298	1,391	1,676
Germany, FR	1,012	1,139	943	904	821	858	1,036	···
France	182	241	229	178	329	232	···	···
Italy	···	314	124	235	205	199	191	262
Belgium-Luxemburg	···	68	102	···	···	···	···	···
UK	···	356	347	333	314	318	299	198
Austria	···	151	148	219	294	194	356	341
Spain	···	50	49	74	34	25	30	···
Canada	280	355	410	256	227	212	127	···
S. Africa	···	···	···	···	74	36	80	64
Australia*	···	46	612	24	18	41	29	44

* Australia in years ending June 30

Notes : ··· sign indicates data which is unreliable and excluded in this Study.

Source: IISI (IISI - 141)

Table D-9 Domestic Shipment & Export of Ingots & Semis in Major Countries

(1,000 MT)

-Japan-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1979 Ⅳ	78	3	81
1980 Ⅰ	72	3	75
Ⅱ	72	3	75
Ⅲ	62	3	65
Ⅳ	59	3	62
1981年Ⅰ	60	3	63

-USA-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1980 Ⅰ	353	97	450
Ⅱ	299	100	399
Ⅲ	159	186	345
Ⅳ	306	155	461
1981 Ⅰ	368	76	444
Ⅱ	390	91	481

-UK-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1979 Ⅳ	125	41	166
1980 Ⅰ	50	4	54
Ⅱ	116	29	145
Ⅲ	79	19	98
Ⅳ	63	27	90
1981年Ⅰ	74	38	112

-Luxembourg-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1980 Ⅰ	92	125	217
Ⅱ	122	155	277
Ⅲ	88	114	202
Ⅳ	145	164	309
1981 Ⅰ	142	155	297
Ⅱ	259	289	548

-Germany, FR-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1979 Ⅳ	201	274	475
1980 Ⅰ	241	295	536
Ⅱ	271	295	566
Ⅲ	261	345	606
Ⅳ	262	341	603
1980年Ⅰ	278	371	649

-France-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1979 Ⅳ	47	9	56
1980 Ⅰ	47	82	129
Ⅱ	46	45	91
Ⅲ	50	8	58
Ⅳ	53	13	66
1981 Ⅰ	46	5	51

-Australia-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1979 Ⅲ	5	140	145
Ⅳ	5	611	616
1980 Ⅰ	10	94	104
Ⅱ	11	75	86
Ⅲ	15	91	106
Ⅳ	10	14	24

-S. Africa-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1979 Ⅳ	11	48	59
1980 Ⅰ	18	48	66
Ⅱ	18	30	48
Ⅲ	19	29	47
Ⅳ	10	8	18
1981 Ⅰ	13	5	18

-Italy-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1980 Ⅰ	75	25	98
Ⅱ	69	34	103
Ⅲ	52	32	84
Ⅳ	87	46	133
1981年Ⅰ	110	18	128
Ⅱ	125	39	164

-Belgium-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1980 Ⅰ	27	104	131
Ⅱ	42	115	157
Ⅲ	27	63	90
Ⅳ	32	60	92
1981 Ⅰ	25	46	70
Ⅱ	21	86	107

-Canada-

Qtr.	Ingots & Semis		
	Domestic	Export	Total
1980 Ⅰ	33	41	74
Ⅱ	31	49	80
Ⅲ	15	126	141
Ⅳ	23	111	134
1981 Ⅰ	29	242	271
Ⅱ	34	302	421

Note: Includes ingots, blooms, billets, slabs, sheet bars, crude forgings.

Source: IISI IISI - 131

Problem in this respect is that, as seen from the statistics, the consumption of semis shows a wide fluctuation yearly or quarterly, making it difficult to grasp a general trend. But, as far as export of semis from EC countries is concerned, the export is in many cases directed to other EC countries for use by selected users. Similarly, domestic shipment in EC is destined to affiliated companies or companies in the same capital group, and so the customers are fixed. Therefore, there are very few examples of production of semis for sale to many unspecified users from the start, and this is one of characteristics of semis.

Table D-10 Steel Consumption by Product in EC

(million MT)

	1974	1975	1977	1978	1979	1980	1985	Ave. growth rate (%)	
								85/78	85/80
Molten steel	2.0	2.0	1.7	1.6	1.6	1.6	1.4	− 1.33	− 2.05
Ingots & semis:									
Ingots for tubes	2.4	2.3	2.7	1.5	1.4	1.3	1.2	− 3.48	− 2.46
Other ingots & semis	8.9	8.0	8.3	8.4	9.8	8.7	8.4	− 0.01	− 0.75
Sub-total	11.3	10.3	11.0	9.9	11.2	10.1	9.6	− 0.49	− 0.97
Finished products:									
Heavy sections	7.1	5.9	6.1	6.5	6.8	6.6	5.7	− 2.06	− 2.92
Merchant bars	19.5	17.0	17.6	16.2	17.2	17.8	15.5	− 0.67	− 2.77
Wire rod	10.6	8.2	9.6	9.8	10.9	10.2	10.3	+ 0.62	+ 0.14
Hot-rolled strip	7.7	5.3	6.1	6.4	6.4	5.4	4.6	− 4.47	− 3.11
Sheet (3 mm or more)	19.3		17.1	16.9	17.9	17.5	17.4	+ 0.47	− 0.10
Sheet (less than 3 mm)	18.2		18.3	19.1	19.3	17.4	19.0	− 0.02	+ 1.84
Coated sheet	6.3		6.9	7.4	8.1	8.0	9.5	+ 3.58	+ 3.36
Subtotal	88.6	73.0	81.6	82.4	86.7	83.0	82.0	− 0.06	− 0.23
Total	102.0	85.4	94.2	93.8	99.5	94.6	93.0	− 0.13	− 0.34

Source: Commission Des Communautes Europeennes, Objectifs Generaux Acier 1985, 28 October 1982

IV. Medium- and Long-Range Forecast of World Steel Consumption

It involves a great difficulty to prepare a medium- and long-range forecast (say, up to 1985 or 1990) or a very long-range forecast of iron and steel in the world. In the past, several international organizations made efforts for such forecast but the results were not necessarily very successful.

There have been many works by organizations such as OECD, IISI, UN ECE and UNIDO to forecast iron and steel demand throughout the world, but their results have room for improvement and have been mostly kept unpublished. But the long-range forecast of UNIDO and IISI's Projection '85 made in 1970 were published. Projection '85, however, is now considered too optimistic because the world economy has since undergone drastic changes due to the oil price increase in 1973 and 1979.

The newest data available at present is an informal forecast presented by Secretary General of IISI at IISI-16 meeting in Tokyo in October 1982.

As the steel demand forecast for the present Study, the IISI forecast of October 1982 is used, and no new forecast of the world steel consumption was tried.

The IISI forecast reflects directly or indirectly the results of research efforts made by IISI Committee on Economic Studies since its publication of Projection '85 in 1970. It was published as informal but can be considered to be of significance and authority.

Figures for 1985 and 1990 given in Table D-11 are those of the IISI forecast. The forecast is based on the scenario that the economy in developed countries as a whole will continue sluggish and consequently the growth in steel consumption will be slow.

World apparent steel consumption in 1985, 1990 and 2000 will be 749 million tonnes, 800 million tonnes and 880 million tonnes, respectively. Of the total, the free world will account for 487, 523 and 590 million tonnes in 1985, 1990 and 2000, respectively. And ECSC will consume 102, 102 and 100 million tonnes and the United States 120, 120 and 115 million tonnes in those years.

While no real growth is expected up to 1990 in steel consumption in developed countries, steel demand in developing countries is expected to increase at an annual rate of 3.7% after 1985 to hit 151 million tonnes in 1990. Forecast based on macro-model (SRD) for 2000 is shown in Table D-11.

Table D-11 Medium- and Long-Range Forecast of Apparent Steel Consumption

(million MT crude steel equivalent)

	Average 1977-1981	1985	1990	2000
Developed countries	373	361	372	380
of which EC 10	(107)	(102)	(102)	(100)
USA	(134)	(120)	(120)	(115)
Japan	(73)	(74)	(79)	(•••)
Developing countries	93	126	151	220
Communist bloc	253	262	277	300
World total	719	749	800	900

Note : ••• sign indicates data which is unreliable and excluded in this Study.

Sources:

1) 1985, 1990: Annual Report of the Secretary General to the Sixteenth IISI Annual Conference, Oct. 1982
2) 2000: Forecast based on 1985 figures with real economic growth rate during 1985-2000 to be 2.6% for the world, 2.5% for communist bloc and 2.64% for free world. This should be called Standard Reference Demand (SRD), based on which this Study is made. As a forecast, it must be revised by dynamic analysis of various factors which change as years go.

1. Some Keys Provided by Forecast of Steel Consumption for Forecast of Pig Iron Consumption

If steel consumption in 1985 and 1990 is given and if change in inventory and tonnages in transit are disregarded, then the steel consumption can be taken as steel production required in respective years.

If it is considered that apparent steel consumption equals required production (as revised to reflect tonnages in transit and inventory), the required production is the target for steel production.

The next item to be studied is how this steel production will be related with pig iron production.

Table D-12 shows steelmaking capacity in developed countries, centrally planned economies and developing countries with the world total in 1980, 1985 and 1990. The capacity was calculated based on informations concerning changes in steelmaking capacity such as plans to expand, replace or construct production facilities in every country in the world. In the table, BF and DR denote the steelmaking capacity of integrated mills using pig iron produced by their blast furnaces or direct reduction plants.

From the apparent steel consumption as above, required production of crude steel can be derived, and from this crude steel production can be derived required production of pig iron in 1985 and 1990 by applying pig ratio in steelmaking processes.

In this calculation, needless to say, the pattern of steelmaking capacity by process in Table D-12 is taken into full consideration. It was assumed that crude steel would be produced by the processes in the same percentage as the pattern of future steelmaking capacity by process. But the pig ratio can vary according to changes in generation and price of scrap as well as in the pattern of steelmaking processes, and the required pig iron production obtained is usuable only as reference, i.e. Standard Reference Production (SRP) or Standard Reference Demand (SRD). Such reference is prepared as a clue in the study of this kind and the forecast is basically subject to some revision according to changes in dynamic factors involved.

The above calculation led to the required production of pig iron in the world in the amount of 545 to 593 million tonnes in 1990 and in the amount of 522 million tonnes in 1985 (see Table D-13). The forecast for 2000 was omitted because it is too risky due to many uncertain factors involved.

World pig iron production was 540 million tonnes in 1980 and 497.7 million tonnes in 1981. Compared with those figures, the production in 1990 shows a very small increase, 17.7% in case of the upper figure, 593 million tonnes, and 8% in case of the lower figure, 545 million tonnes.

Giving an impetus to such slow growth is the expansion of production of sponge iron brought about by successful commercial operation of direct reduction (DR) process. There are a considerable number of construction projects of integrated steel mills based on DR process.

Table D-12 Long-range Forecast of Steelmaking Capacity in the World

		1980					1985					1990				
		BF	DR	Sub-total	O.H. Fce & E.A.F.	Total	BF	DR	Sub-total	O.H. Fce & E.A.F.	Total	BF	DR	Sub-total	O.H. Fce & E.A.F.	Total
Developed countries	Million M.T	450	5	455	108	563	436	8	444	116	560	463	12	475	115	590
	%	79.9	1.2	80.2	19.8	100.0	77.8	1.5	79.3	20.7	100.0	78.5	2.0	80.5	19.5	100.0
Centrally planned economies	Million M.T	245	1	244	16	260	280	2	282	18	300	318	3	321	19	340
	%	93.4	0.5	93.8	6.4	100.0	93.2	0.7	93.9	6.1	100.0	93.4	1.0	94.5	5.5	100.0
Developing countries	Million M.T	39	7	46	18	64	62	15	77	21	98	86	22	108	24	132
	%	60.6	11.9	72.5	27.5	100.0	62.9	15.3	78.3	21.7	100.0	65.4	16.8	82.1	17.9	100.0
World total	Million M.T	734	13	745	142	887	778	25	803	155	958	867	37	904	158	1062
	%	82.8	1.5	83.6	16.4	100.0	81.2	2.6	83.8	16.2	100.0	81.6	3.5	85.1	14.9	100.0

Note: BF and DR denote steelmaking capacity of integrated steel mills producing steel by using pig iron from own blast furnaces and direct reduction plants.

Source: Various informations including company's report, trade magazines and papers

Table D-13 Required Production of Pig Iron in the World

		Unit	1985	1990	
Developed countries	Steel consumption	Million MT	361	372	
	Steel production required	Million MT	370	380	
	Pig ratio	%	77	75	80
	Pig iron production required	Million MT	285	285	304
Centrally planned economies	Steel consumption	Million MT	262	277	
	Steel production required	Million MT	265	280	
	Pig ratio	%	65	65	70
	Pig iron production required	Million MT	172	182	196
Developing countries	Steel consumption	Million MT	126	151	
	Steel production required	Million MT	130	155	
	Pig ratio	% T	50	50	60
	Pig iron production required	Million MT	65	78	93
World total	Steel consumption	Million MT	749	800	
	Steel production required	Million MT	760	815	
	Pig ratio	%	68.7	71.7	72.8
	Pig iron production required	Million MT	522	545	593

Note : Two cases used for pig ratio in 1990

Source: 1) Estimated by experts group in this occasion.
2) IISI for steel consumption

2. Some Keys Provided by Forecast of Steel Consumption for Forecast of Consumption of Semi-finished Steels (Semis)

As already discussed, semis are of nature which makes it difficult for the products to become merchandise regularly traded. It may be said that the consumption of semis parallels the trend of steel consumption. This is true, for example, in case of the consumption of semis in the production flow in an integrated steel mill, but such trend cannot be found in the consumption of semis which appear for sale in the open market.

There are various circumstances when semis are sold as discussed in C-II and D-III. It is difficult to forecast the sale of semis which involve factors as above. In reality, occurrence of cases of conditions discussed in D-III is judged on case-by-case basis in view of business management. Consequently, as far as the forecast of semis is concerned, the forecast of steel consumption should be considered to provide only one means, or a background picture, for judgement to be made in the forecast of semis.

E. PRESENT CONDITION AND TREND OF WORLD TRADE IN STEEL

I. Kinds and Characteristics of Statistics of World Trade in Steel

There are various statistics and data concerning steel trade in the world as listed below. The most extensive in the coverage of iron and steel products is Statistics of World Trade in Steel issued every year by Steel Committee, Economic Commission for Europe of United Nations. This statistics contains export of 12 kinds of steel products from 29 countries by importing country and region. In addition, Japan Iron and Steel Federation (JISF) and IISI prepare iron and steel trade statistics with a fairly good coverage; JISF statistics gives details of the export by 11 major countries and IISI statistics follows that formerly published by British Iron & Steel Federation.

In the above ECE statistics, ingots and semis are shown as one group and include the following:

SITC Rev. 1960
672 Ingots & Semis
Ingots and other primary forms (including blanks for tubes and pipes) of iron or steel

BTN Rev. 1961
73.06A, 73.06B, 73.07, 73.08, 73.15A, 73.15B, 73.15C, 73.15D, 73.15E, 73.15F, 73.18A

SIIC Rev. 2 1974 672
Ingots and other primary forms of iron & steel, excluding blanks for seamless tubes and pipes

1. The United Nations

1.1 Monthly Bulletin of Statistics
issued by Statistical Office of the United Nations

1.2 Statistical Yearbook
issued by Statistical Office of the United Nations

1.3 Quarterly Bulletin of Steel Statistics for Europe
issued by Economic Commision for Europe, UN, Geneva

1.4 Statistics of World Trade in Steel
issued by ECE, UN, Geneva

1.5 Statistical Yearbook for Asia and Pacific
issued by Economic and Social Commision for Asia and Pacific, Bangkok

2. Organization for Economic Cooperation and Development (OECD)

2.1 The Iron and Steel Industry in (X year) and Trends in (X+1 year)
issued by OECD

3. European Community (EC)

3.1 Eisen und Stahl (Siderurgie)
issued by Statistical Office, EC

3.2 Quarterly Iron and Steel Bulletin
issued by Statistical Office, EC

4. The United States

4.1 Annual Statistical Report
issued by American Iron and Steel Institute (AISI)

4.2 AIS Reports (Monthly)
issued by AISI

AIS-7 Blast Furnace and Steel
AIS-7A Production of Alloy Steel
AIS-10 Shipment of Steel Products by Market Classification
AIS-16 Shipment of Steel Products by Market
AIS-Imports: Imports of Iron and Steel Products
AIS Exports: Exports of Iron and Steel Products
Selected Industry Data: Foreign Trade-Steel Mill Products

5. The United Kingdom

5.1 Iron and Steel Industry - Annual Statistics for United Kingdom
issued by British Steel Corporation - BSC -

5.2 Iron and Steel Industry - Monthly Statistics
issued by BSC

5.3 Statistical Handbook
issued by BSC

6. The Federal Republic of Germany

6.1 Eisen und Stahl (Quarterly)
issued by Statistisches Bundesamt

6.2 Eisen und Stahl (Monthly)
issued by Statistisches Bundesamt

6.3 Statistisches Jahrbuch der Eisen- und Stahl-industrie für (X Jahr)
issued by Wirtschaftvereinigung Eisen und Stahlindustrie

7. France

7.1 Bulletin de la Chambre Syndicale de la Sidérurgie Française
issued by Chambre Syndicale de la Sidérurgie Française

7.2 Bulletin de la Chambre Syndicale de la Sidérurgie Française - Production Sidérurgie
issued by Chambre Syndicale de la Sidérurgie Française

8. IISI

8.1 *Steel Statistical Yearbook X year*
(formerly A Handbook of World Steel Statistics)

9. SEAISI

9.1 Steel Statistics for Member Countries
- Production, Consumption, Export & Import -

10. Japan

10.1 Tekko Tokei Yoran (Yearly)
issued by JISF

10.2 Tekko Gekkan Tokei (Monthly Report of the Iron & Steel Statistics)
issued by JISF

10.3 Tekko Tokei Geppo
issued by Research & Statistics Dept., Minister's Secretariat, Ministry of International Trade and Industry

10.4 Tekko Tokei Nenpo (Yearbook of Iron & Steel Statistics)
issued by Research & Statistics Dept., Minister's Secretariat, MITI

10.5 World Trade of Iron & Steel Raw Materials and Products (Quarterly and Yearly)
issued by JISF

10.6 World Trade of Special Steel Products (Quarterly & Yearly)
issued by JISF

II. Present Condition and Trend of World Trade in Steel

According to the ECE, Statistics of World Trade in Steel, about 132.3 million tonnes of steel products was exported by the 29 countries in 1981. The steel export was kept at about 130 million tonne-level since 1978. In 1981, the export from 10 EC countries accounted for 46.2% of the total and that from Japan 21.5%, but Japan's share showed a decline since 1975. Changes in the world steel trade, 1971 to 1981, are summarized in Table E-1.

In the ECE statistics, Belgium-Luxemburg's export does not include that traded within the union. The world trade in steel shows different patterns depending on whether it includes the trade within EC and that within COMECON or not. In particular, steel trades of EC with non-EC member countries are under some controls of the Community, and in studying the trade data, it is customary to distinguish the EC trades within the group from those with the others.

1. Exporting Countries

Table E-1 shows steel export from major countries compiled from the ECE statistics and others. As this table includes the Republic of Korea and Taiwan which are not included in the ECE statistics, the world total increases to 132.3 million tonnes in 1981. As seen in this table, the world total hit a peak of a little more than 140 million tonnes in 1979 and since declined. The figure of 1981 is about 4% lower than that of 1980. In 1981, Japan had share of 21.5%, EC 10 46.2% and the United States 2.1%.

Recently some newly industrializing countries are expanding steel export, and the most outstanding are the Republic of Korea, Taiwan, Spain and Brazil.

Classification of steel products given in the ECE statistics is as shown in Table E-2. "Ingots and semis" used in the ECE statistics include hot-rolled wide strip, trade of which is much larger than billets, slabs and sheet bars. As a result, the export of ingots and semis is large and the world total in 1980 was a little more than 21.83 million tonnes.

2. Importing Countries

Destinations of the export by exporting countries seen in the preceding section I are importing countries. Table E-4 shows steel imports by product of some regions of developing countries and shares of major exporting countries in those imports. The figures are of 1980 and the developing countries imported 7,837,000 tonnes of ingots and semis (including hot-rolled wide strip or hot coil). Compared with the import of ingots and semis by developed countries, the import by developing countries is less than 60% of the former, and it has decreased recently in some countries as their domestic steel industry was established to replace the import.

3. Exporting Country-Importing Country Matrix of Pig Iron, Ingots & Semis (see Appendix Tables as attached)

Table E-1 World Steel Export by Major Countries

(1,000 MT, %)

	Japan	Korea, Rep. of	Taiwan	USA	EC(10)	of which outside EC	Germany, FR	Benelux	Sweden	Spain	USSR	Czecho-slovakia	Canada	Brazil	Aust-ralia	World total
1971	23,194	185	542	2590	44,747	22099	13,205	12,147	1,443	918	7,444	2746	1,528	269	533	95216
72	20,922	640	548	2,631	49,050	25,044	13,890	14,245	1,647	1,463	7,395	3,040	1,341	420	819	100,639
73	24,805	939	248	2,708	53,888	26,031	17,264	15,968	1,932	1,712	7,087	2899	1,529	434	1,396	111,887
74	32,220	1,292	188	5,344	61,831	32,530	22,324	16,608	2,036	800	6,889	3,044	1,778	256	1,238	128,252
75	28,942	984	245	2779	50,590	27,411	16,272	12,624	1,681	1,561	7,825	3,218	1,265	149	1,727	111,686
76	36,016	1,438	278	2439	50,610	22,939	15,071	12,676	1,683	2,443	7,503	3,362	1,650	263	3,260	125,647
77	53,628	1,354	312	1,857	53,199	27,134	15,438	12070	1885	2678	...	3,413	2,103	364	2,482	126,900
78	30,925	1,78	899	2361	60,588	32,900	18,517	13,262	2,230	4,117	...	3,596	2,738	899	2,573	136,600
79	30,697	3,150	1,486	2660	61,690	31,193	19,286	14292	2,373	4235	...	3,494	2,635	1,492	2,350	140,400
P80	29,705	4,654	767	3,846	58,793	28,391	19,059	13,657	2,127	4533	...	3,446	3,522	1,508	1,667	137,600
P81	28,455	5,372	1,193	2,736	e 61,100	e 32,100	19,189	12,623	2008	5,024	...	3,383	3,526	1,875	1,134	132,300
Share (%) 1971	24.4	2	0.4	2.7	47.0	23.2	13.9	12.8	1.5	1.0	7.8	2.9	1.6	0.3	0.6	100.0
Share (%) 76	28.7	1.1	0.2	2.1	40.3	18.3	12.0	10.1	1.3	1.9	6.0	2.7	1.3	0.2	2.6	100.0
Share (%) 81	21.5	4.1	0.9	2.1	46.2	24.3	14.5	9.5	1.5	3.8	...	2.6	2.7	1.4	0.9	100.0
% change 81/80	− 4.2	+15.4	+55.5	−28.9	+ 3.9	+13.1	+ 0.7	− 7.6	− 5.6	+10.8	...	− 1.8	+ 1.1	+24.3	−32.0	− 3.9
% change 81/71	+22.7	29.0 times	3.5 times	+ 5.6	+36.5	+45.3	+45.3	+ 3.9	+39.2	5.5 times	...	+23.2	2.3 times	7.0 times	2.1 times	+38.9

Notes: ... sign indicates data which is unreliable and excluded in this study.
1) World total shows the exports from 37 nations including those not included in ECE statistics. From 1977, it includes estimate for the USSR (7.5 million tonnes as realized in 1976).

Sources: ECE, Statistics of World Trade in Steel, and export statistics of certain nations

Table E-2 World Steel Export by Product by Major Countries

(1,000 MT)

		Ingots & semis	Heavy sections	Light sections	Plates	Sheets	Strip	Tin plate	Railway truck material	Wire rod	Wire	Steel tubes & fittings	Wheels, tyres & axles	Total	% change over year ago	Share (%)
Japan	1979	4,564	1,358	5,792	2,434	8,253	704	834	159	2,053	502	6,186	80	30,697	− 2.7	24.5
	80	3,947	1,615	5,934	1,842	7,769	692	890	144	2,050	291	6,456	74	29,705	− 3.2	24.0
	81	2,847	1,945	5,544	1,958	7,264	596	764	144	1,319	275	7,780	59	28,455	− 4.2	22.8
Korea, Rep. of	1979	896	−	297	671	593	17	−	2	120	52	494	6	3,150	+ 76.1	2.5
	80	1,209	3	868	937	589	22	4	4	161	76	447	13	4,654	+ 47.7	3.8
	81	1,560	5	976	879	722	72	6	9	166	95	1,084	...	5,372	+ 15.4	4.3
Taiwan	1979	420	2	458	256	11	2	−	11	184	12	129	−	1,486	+ 65.3	1.2
	80	120	1	205	146	14	3	−	3	84	11	179	−	767	− 48.4	0.6
	81	205	5	420	194	18	2	−	1	126	7	215	−	1,193	+ 55.5	1.0
E C (10)	1979	12,697	7,077	6,133	8,302	11,951	2,602	1,815	651	3,659	1,289	7,476	59	a 1,690	+ 1.8	49.5
	80	11,948	4,582	7,918	5,642	11,708	2,746	1,950	649	3,385	1,217	7,198	69	58,793	− 4.7	47.6
	81															
Within EC	1979	4,804	4,141	5,121	2,844	6,559	1,116	977	367	1,597	629	5,191	46	31,193	− 5.2	24.9
	80	4,642	2,085	4,916	2,423	5,909	1,254	1,022	377	1,555	550	4,843	54	28,391	− 9.0	23.0
	81															
Outside EC	1979	7,893	2,936	5,012	5,458	5,572	1,486	838	284	2,062	660	2,285	13	30,497	− 10.1	24.3
	80	7,306	2,497	4,002	5,219	5,799	1,512	928	272	2,050	667	2,355	15	30,402	− 0.3	24.6
	81															
Germany, FR	1979	5,554	985	1,869	2,071	4,107	1,304	402	267	1,010	535	5,390	22	19,286	+ 4.2	15.4
	80	5,581	1,105	1,755	2,091	4,060	1,492	503	217	924	314	5,036	25	19,059	− 1.2	15.4
	81	5,414	1,009	1,512	2,227	4,753	1,450	593	300	854	310	5,945	27	19,189	+ 0.7	15.4
France	1979	2,523	505	1,025	456	2,445	241	498	171	1,251	206	1,176	−	10,495	+ 0.2	8.4
	80	2,664	482	989	560	2,404	255	564	207	1,209	196	1,185	−	10,707	+ 2.0	8.7
	81	3,016	475	1,019	498	2,556	212	453	177	1,141	193	1,521	−	10,861	+ 1.4	8.7
Italy	1979	675	205	2,987	408	765	112	55	20	92	84	1,504	18	6,901	− 16.3	5.5
	80	695	252	2,750	598	761	106	34	11	96	80	1,604	21	6,767	− 1.9	5.5
	81	968	521	2,542	570	1,019	87	57	18	101	96	2,451	16	8,251	+ 21.8	6.6
Benelux	1979	5,218	1,904	1,692	1,619	5,452	647	256	84	575	475	566	4	14,292	+ 7.8	11.4
	80	2,889	1,841	1,626	1,755	5,117	655	252	79	608	471	559	5	13,657	− 4.4	11.0
	81	2,729	1,729	1,181	1,916	2,859	482	241	57	609	462	556	2	12,623	− 7.6	10.1
UK	1979	483	929	588	460	552	135	244	105	452	117	449	13	4,527	+ 3.4	3.6
	80	245	549	487	228	269	79	160	183	279	90	359	16	2,782	− 38.5	2.3
	81	289	552	995	359	641	87	286	97	157	107	495	26	4,071	+ 46.3	3.5

Table E-2 (cont'd.)

(1,000 MT)

		Ingots & semis	Heavy sections	Light sections	Plates	Sheets	Strip	Tin plate	Railway truck material	Wire rod	Wire	Steel tubes & fittings	Wheels, tyres & axles	Total	% change over year ago	Share (%)
Sweden	1979	560	124	495	457	180	103	1	30	54	70	210	1	2,287	− 2.6	1.8
	80	424	100	448	449	215	97	5	37	51	65	232	1	2,127	− 7.0	1.7
	81	303	654		466	175	86	5	28	47	63	235	...	2,006	− 5.6	1.6
Austria	1979	511	19	186	293	277	105	2	119	167	66	188	—	2,504	+ 162	2.0
	80	410	46	175	514	541	73	—	85	176	61	196	—	2,382	− 4.9	1.9
	81	407	15	186	425	951	101	—	81	219	58	275	—	2,701	+ 13.4	2.2
Spain	1979	238	656	1,813	406	510	25	90	12	75	58	564	—	4,235	+ 2.9	3.4
	80	545	990	1,705	382	201	30	65	4	104	43	467	—	4,533	+ 7.0	4.7
	81													5,024	+ 10.8	4.0
USA	1979	525	152	256	169	474	56	582	98	24	29	712	2	2,660	− 12.7	2.1
	80	830	140	594	189	677	75	628	196	193	33	488	4	3,846	− 44.6	3.1
	81	490	126	506	181	478	79	330	123	92	52	492	7	2,756	− 28.9	2.2
Canada	1979	121	536	167	922		—	—	233	354	79	423	—	2,655	− 5.8	2.1
	80	527	302	507	1,314		—	—	254	542	87	389	—	3,522	+ 35.7	2.8
	81	895	268	286	985		—	—	192	526	96	476	—	3,526	+ 0.1	2.8
Brazil	1979	480	16	340	548	81	5	17	4	29	52	141	—	1,492	+ 66.0	1.2
	80	285	1	202	618	110	26	16	5	13	16	220	—	1,508	+ 1.1	1.2
	81													1,875	+ 24.3	1.5
Poland	1979	579	50	952	572	56	146	15	56	209	44	42	5	1,986	+ 5.4	1.6
	80	91	55	844	342	40	167	4	132	174	52	50	5	1,936	− 2.6	1.6
	81	23	29	668	302	27	179	—	147	141	37	44	7	1,654	− 14.6	1.3
Czecho-slovakia	1979	485	262	618	515	402	213	6	16	313	117	529	19	3,494	− 2.8	2.8
	80	403	242	681	466	430	225	6	22	331	114	525	20	3,446	− 1.4	2.8
	81	306	265	682	531	423	207	4	37	287	109	529	23	3,383	− 1.8	2.7
Australia	1979	1,254	61	51	505		53	67	51	227	23	80	—	2,350	− 8.7	1.9
	80	654	79	55	482		43	90	21	166	20	87	—	1,667	− 29.1	1.3
	81													1,134	− 32.0	0.9
(29 nations)	1979	25,591	11,136	15,697	13,279	25,131	4,034	5,546	1,417	3,866	2,201	17,510	182	125,249	− 5.0	100.0
Total (29 nations)	80	21,834	8,684	18,410	11,987	25,213	4,535	5,749	1,570	3,605	2,296	17,726	201	125,600	− 1.5	100.0
(29 nations)	81													e124,800	− 1.0	100.0

Notes: - sign indicates data which is not available.
... sign indicates data which is unrealibale and exluded in this Study.
1) Ingots & semis includes hot coils.

Source: ECE, Statistics of World Trade in Steel, Quarterly Bulletin of Steel Statistics for Europe and export statistics of the Republic of Korea, Taiwan and Brazil

Table E-3 Pig Iron Exports by Country 1971-1980

(1,000 MT)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Belgium-Luxembourg	16	10	17	11	12	35	56	57	22	7	86
Germany, FR	192	545	1,190	1,588	785	680	750	796	988	1,046	782.0
France	145	172	186	359	221	227	192	128	560	286	195.7
Italy	6	8	11	12	7	9	12	17	22	9	0.2
Netherlands	7	162	58	7	0	0	0	2	24	12	4.6
United Kingdom	41	37	34	62	45	38	66	56	45	56	...
EC	1,007	1,174	1,496	1,859	1,070	1,231	1,078	1,056	1,461	1,416	
Austria	12	0	20	21	1	4	4	2	4	5	—
Finland	193	162	135	172	95	85	65	0	17	18	
Norway	104	140	121	101	96	96	89	107	145	104	
Spain	12	16	0	0	1	1	0	64	81	31	
Sweden	73	83	140	315	283	158	256	610	269	160	45.1
Yugoslavia	1	107	322	354	108	51	75	23	62	51	
OTHER WESTERN EUROPE	395	508	758	961	584	395	492	806	578	387	
TOTAL WESTERN EUROPE	1,402	1,682	2234	2,500	1,654	1,626	1,570	1,841	2,039	1,803	
Bulgaria	0	0	0	0	50	27	67	48	12	34	
Czechoslovakia	26	94	157	40	21	22	28	0	0	0	
Hungary	129	157	207	281	99	156	116	48	16	2	
Poland	96	19	0	1	0	0	0	0	0	0	
Romania	0	0	41	82	246	0	0	0	0	1	
USSR	5,049	5,100	5,208	4,910	4,739	4,527	4,000E	4,000E	3,500E	3,500E	
EASTERN EUROPE	5,290	5,550	5,593	5,514	5,145	4,712	4,181	4,096	3,528	3,537	
Canada	499	651	620	570	441	685	557	602	394	178	14.8
United States	44	27	52	140	68	75	61	61	114	90	
NORTH AMERICA	543	678	652	710	509	460	618	663	508	268	
Brazil	113	226	428	252	511	775	851	1,027	969	641	
LATIN AMERICA	113	226	428	252	511	775	851	1,027	969	641	
South Africa	572	495	442	179	1	0	5	55	117	117	
AFRICA	572	495	442	179	1	0	5	55	117	117	
Japan	459	590	115	81	29	156	43	61	15	0	1.5
ASIA	459	590	115	81	29	156	43	61	15	0	
Australia	589	528	687	955	559	595	765	519	642	600E	
OCEANIA	589	528	687	955	559	595	765	519	642	600	
TOTAL	8,548	9,529	10,151	10,271	8,408	8,522	8,029	8,240	7,858	7,166	...

Source: 1971—1980 ; IISI 1981 ; JISF

Table E-4 Developing Countries' Imports by Product and Shares of Major Exporting Countries

(2,000 MT, %)

		Total import		Japan		Korea, Rep. of		Taiwan		USA		EC (9)		Other Western European countries	
		1980	%	1980	Share	1980	Share	1980	Share	1980	Share	1980	Share	1980	Share
East Asia	Ingots & semis	4,512	21.9	2,415	56.0	494	11.5	111	25.7	145	3.4	472	10.9	122	2.8
	Heavy sections	1,040	5.3	802	77.1	1	0.1	1	0.1	8	7.7	138	13.3	16	1.5
	Light sections	1,926	9.8	1,269	65.9	130	6.7	111	5.8	13	0.7	258	13.4	95	4.9
	Plates	1,452	7.4	859	59.2	188	12.9	80	5.5	34	2.3	195	13.4	11	0.8
	Sheets	5,096	25.9	3,641	71.4	250	4.9	2	-	207	4.1	430	8.4	19	0.4
	Strip	545	2.8	419	76.9	14	2.6	2	0.4	6	1.1	53	9.7	5	0.9
	Tin plate	806	4.1	449	55.7	4	0.5	-	-	91	11.3	167	20.7	18	2.2
	Railway truck material	154	0.8	42	27.3	3	1.9	3	1.9	7	4.5	82	53.2	3	1.9
	Wire rod	2,230	11.3	1,444	64.8	27	1.2	62	2.8	108	4.8	199	8.9	1	-
	Wire	140	0.7	88	62.9	13	9.3	7	5.0	2	1.4	20	14.3	3	2.1
	Steel tubes & fittings	1,951	9.9	1,513	77.5	26	1.3	14	0.7	39	2.0	209	10.7	34	1.7
	Wheels, tyres & axles	40	2.0	19	47.5	11	27.5	-	-	-	-	5	12.5	-	-
	Total	19,689	100.0	12,959	65.8	1,160	5.9	392	2.0	659	3.6	2,227	11.3	324	1.6
Middle East	Ingots & semis	1,131	10.0	361	31.9	-	-	-	-	14	1.2	538	47.6	145	12.8
	Heavy sections	1,150	10.3	173	15.0	2	0.2	-	-	7	0.6	390	33.9	411	35.7
	Light sections	4,422	39.2	1,644	37.2	636	14.4	78	1.8	81	1.8	790	17.9	641	14.5
	Plates	505	4.5	168	33.3	32	6.3	5	1.0	5	1.0	151	29.9	35	6.9
	Sheets	1,197	10.6	581	48.5	28	2.3	9	0.8	11	0.9	353	29.5	73	6.1
	Strip	129	1.1	48	37.2	-	-	1	0.8	2	1.6	44	34.1	17	13.2
	Tin plate	206	1.8	38	18.4	-	-	-	-	47	22.8	95	46.1	21	10.2
	Railway truck material	75	0.7	5	6.7	-	-	-	-	1	1.3	23	30.7	3	4.0
	Wire rod	423	3.8	31	7.3	55	13.0	15	3.5	15	3.5	206	48.7	44	10.4
	Wire	160	1.4	35	21.9	38	23.8	2	1.3	1	0.6	47	29.4	7	4.4
	Steel tubes & fittings	1,866	16.6	911	48.8	127	6.8	57	3.1	73	3.9	583	31.2	85	4.6
	Wheels, tyres & axles	3	-	2	66.7	-	-	-	-	-	-	1	33.3	-	-
	Total	11,275	100.0	3,998	35.5	918	8.1	167	1.5	257	2.3	3,222	28.6	1,482	13.1
Africa	Ingots & semis	696	11.2	116	16.7	-	-	-	-	4	0.6	468	67.2	71	10.2
	Heavy sections	321	5.2	7	2.2	-	-	-	-	2	0.6	260	81.0	44	13.7
	Light sections	1,859	29.6	50	2.7	20	1.1	6	0.3	10	0.5	1,191	64.8	435	23.7
	Plates	266	4.3	25	9.4	1	0.4	-	-	3	1.1	205	77.1	22	8.3
	Sheets	1,154	18.6	731	63.3	2	0.2	-	-	8	0.7	353	30.6	24	2.1
	Strip	87	1.4	19	21.8	-	-	-	-	3	3.4	54	62.1	2	2.3
	Tin plate	216	3.5	77	35.6	-	-	-	-	3	1.4	121	56.0	13	6.0
	Railway truck material	117	1.9	-	-	-	-	-	-	1	0.9	112	95.7	4	3.4
	Wire rod	221	3.6	44	19.9	-	-	1	0.5	1	0.5	106	48.0	53	24.0
	Wire	158	2.5	5	3.2	5	3.2	1	0.6	-	-	115	72.8	19	12.0
	Steel tubes & fittings	1,127	18.2	268	23.8	1	0.1	5	0.4	57	5.1	727	64.5	60	5.3
	Wheels, tyres & axles	6	0.1	-	-	1	16.7	-	-	-	-	5	83.3	-	-
	Total	6,209	100.0	1,342	21.6	29	0.5	13	0.2	91	1.5	3,717	59.9	745	12.0

Table II-4 (cont'd.)

(1,000 MT, %)

		Total Import		Japan		Korea, Rep. of		Taiwan		USA		EC (9)		Other Western European countries	
		1980	%	1980	Share	1980	Share	1980	Share	1980	Share	1980	Share	1980	Share
Latin America	Ingots & semis	1,698	21.0	361	21.3	2	0.1	—	—	564	33.2	502	29.6	110	6.5
	Heavy sections	338	4.2	54	16.0	—	—	—	—	60	17.8	111	32.8	93	27.5
	Light sections	799	9.9	102	12.8	29	3.6	5	0.6	218	27.3	152	19.0	146	18.3
	Plates	1,009	12.5	386	38.3	29	2.9	4	0.4	71	7.0	290	28.7	59	5.8
	Sheets	1,779	22.0	889	50.0	39	2.2	1	0.1	274	15.4	385	21.6	17	1.0
	Strip	109	1.4	29	26.6	1	0.9	—	—	20	18.3	33	30.3	7	6.4
	Tin plate	449	5.5	78	17.4	—	—	—	—	203	45.2	151	33.6	5	1.1
	Railway truck material	348	4.3	29	8.3	—	—	—	—	167	48.0	22	6.3	14	4.0
	Wire rod	258	3.2	59	22.9	21	8.1	5	1.9	49	19.0	67	26.0	1	0.4
	Wire	93	1.1	27	29.0	4	4.3	1	1.1	20	21.5	22	23.7	7	7.5
	Steel tubes & fittings	1,211	14.9	533	44.0	—	—	8	0.7	189	15.6	372	30.7	30	2.5
	Wheels, tyres & axles	13	0.2	9	69.2	—	—	—	—	2	15.4	1	7.7	—	—
	Total	8,104	100.0	2,558	31.6	124	1.5	23	0.3	1,858	22.7	2,108	26.0	488	6.0
Total of Developing Countries	Ingots & semis	7,837	17.3	3,251	41.5	496	6.3	111	1.4	727	9.3	1,980	25.3	448	5.7
	Heavy sections	2,849	6.3	1,036	36.4	5	0.1	1	•	77	2.7	899	31.6	564	19.8
	Light sections	8,986	19.8	3,065	34.1	815	9.1	200	2.2	322	3.6	2,391	26.6	1,317	14.7
	Plates	3,232	7.1	1,438	44.5	250	7.7	89	2.8	115	3.5	841	26.0	127	3.9
	Sheets	9,226	20.4	5,842	63.3	319	3.5	12	0.1	500	5.4	1,521	16.5	133	1.4
	Strip	870	1.9	295	33.7	15	1.7	5	0.5	31	3.6	184	21.1	31	3.6
	Tin plate	1,677	3.7	642	38.3	4	0.2	—	—	344	20.5	534	31.8	57	3.4
	Railway truck material	694	1.5	76	11.0	3	0.4	3	0.4	176	25.4	239	34.4	24	3.5
	Wire rod	3,132	6.9	1,578	50.4	105	3.3	83	2.7	175	5.5	578	18.5	99	3.2
	Wire	551	1.2	155	28.1	60	10.9	11	2.0	23	4.2	204	37.0	51	9.3
	Steel tubes & fittings	6,155	13.6	3,225	52.4	154	2.5	84	1.4	358	5.8	1,891	30.7	209	3.4
	Wheels, tyres & axles	62	0.1	30	48.4	12	19.4	—	—	2	3.2	12	19.4	—	—
	Total	45,277	100.0	20,857	46.1	2,231	4.9	595	1.3	2,845	6.3	11,274	24.9	3,059	6.7
(Reference) Developed countries	Ingots & semis	13,997	17.9	696	5.0	713	5.1	9	0.1	103	0.7	9,899	70.7	1,374	9.8
	Heavy sections	5,835	7.4	579	9.9	—	—	—	—	65	1.1	3,483	59.7	989	16.9
	Light sections	9,424	12.0	870	9.2	46	0.5	5	0.1	72	0.8	5,392	57.2	1,514	16.1
	Plates	8,755	11.2	404	4.6	687	7.8	57	0.7	76	0.9	4,801	54.8	1,328	15.2
	Sheets	15,987	20.4	1,927	12.1	270	1.7	2	•	177	1.1	10,071	63.0	1,577	9.9
	Strip	3,465	4.4	399	11.5	7	0.2	—	—	44	1.3	2,551	73.6	274	7.9
	Tin plate	2,062	2.6	3,097	150.2	—	—	—	—	284	13.8	1,339	64.9	248	12.0
	Railway truck material	876	1.1	68	7.8	1	0.1	—	—	20	2.3	410	46.8	119	13.6
	Wire rod	4,473	5.7	472	10.6	58	1.3	1	•	20	0.4	2,775	62.0	343	7.7
	Wire	1,745	2.2	136	7.8	16	0.9	—	—	10	0.6	1,009	57.8	159	9.1
	Steel tubes & fittings	11,571	14.8	3,231	27.9	620	5.4	95	0.8	130	1.1	5,211	45.0	1,121	9.7
	Wheels, tyres & axles	139	0.2	44	31.7	1	0.7	—	—	2	1.4	57	41.0	12	8.6
	Total	78,323	100.0	9,428	12.0	2,234	3.1	172	0.2	1,001	1.3	46,998	60.0	8,986	11.5

Notes: – sign indicates data which is not available.
••• sign indicates data which is unreliable and excluded in this Study.
1) Total Import is the total of imports from 29 countries.
2) Ingots & semis include hot coil.

Source: ECE, Statistics of World Trade in Steel, and export statistics of the Republic of Korea and Taiwan.

Table E-5 U.S. Import of Steel Mill Products by Countries of Origin, 1981

(1,000 MT)

	Total	%	Japan	Europe							Canada	Latin America	Austra-lia, Oceania	Asia, Africa (excl. Japan)	
				EC total	EC Countries					Total					Korea, Rep. of
					Germany, FR	France	Italy	Belgium-Luxemburg	Nether-lands	UK						
Steel Mill Products:															
Ingots & semis	717	4.0	6	102	31	·	17	2	·	50	172	526	13	—	·	—
Wire rod	806	4.5	200	188	20	105	4	22	10	27	211	299	79	·	17	·
Structural shapes	1,885	10.4	596	717	111	70	·	388	2	145	949	218	18	1	100	1
Plate	2,221	12.3	137	799	202	125	55	310	55	56	1,342	240	304	10	188	120
Concrete bars	48	0.3	7	8	·	7	—	·	—	·	15	5	9	—	11	5
Bar shapes under 3"	96	0.5	54	19	1	1	·	15	·	2	21	31	1	·	10	4
H.R. bars	539	3.0	117	187	18	42	1	13	·	112	285	153	8	—	26	12
C.F. bars	212	1.2	70	83	6	42	4	1	·	29	116	16	5	·	4	3
Welded pipe	2,486	13.8	916	427	98	80	200	5	16	15	465	174	140	19	772	602
Other pipe	3,473	19.2	1,631	1,189	665	58	293	68	2	59	1,416	267	88	1	70	56
Wire	335	1.9	97	113	14	55	4	40	4	16	126	97	1	4	10	7
Wire nails	275	1.5	30	1	·	·	·	·	·	·	30	62	·	·	131	105
Wire, others	47	0.3	4	17	1	3	·	12	·	1	24	5	5	·	9	9
Tin plate	850	1.9	225	60	30	28	·	1	11	1	60	43	·	1	1	1
Sheets - H.R.	1,477	8.2	690	795	197	319	59	60	179	1	857	137	14	5	74	49
Sheets - C.R.	1,475	8.2	564	775	561	151	52	42	135	15	842	94	19	25	130	94
Sheets - Coated	1,182	6.5	687	226	115	58	28	13	10	3	243	135	·	49	68	56
Strip	90	0.5	21	36	28	2	·	3	·	4	42	22	2	·	2	2
Others	340	1.9	114	118	67	36	·	11	·	4	120	104	1	·	1	1
Total	18,052	100.0	5,645	5,881	1,964	1,170	697	1,006	420	520	7,328	2,630	710	117	1,625	1,105
(Share by Origin %)	100.0		31.3	32.6	10.9	6.5	3.9	5.6	2.3	2.9	40.6	14.6	3.9	0.6	9.0	6.1
Other steel mill products	980		396	116	23	25	25	18	8	16	161	152	20	5	248	116
Steel Mill Products Total	19,032		6,039	5,997	1,986	1,195	721	1,024	428	536	7,489	2,782	730	120	1,873	1,221
(Share by Origin %)	100.0		31.7	31.5	10.4	6.3	3.8	5.4	2.2	2.8	39.3	14.6	4.1	0.6	9.8	6.4
Pig iron, ferro-alloys, others	1,497		21	220	12	152	29	·	·	24	365	343	278	21	470	4
Grand total	20,529		6,060	6,216	1,998	1,347	750	1,024	428	562	7,854	3,125	1,007	141	2,343	1,225
(Share by Origin %)	100.0		29.5	30.3	9.7	6.6	3.7	5.0	2.1	2.7	38.3	15.2	4.9	0.7	11.4	6.0

Notes : · sign indicates negligible amount.
- sign indicates data which is not available.
1) Net tons used in the original report converted to metric tonnes.

Source: AISI, Annual Statistical Report, 1981

Table E-6 Pig Iron Imports by Selected Countries, 1971-1980

(1,000 MT)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Belgium-Luxemburg	160	159	233	233	161	203	167	119	105	97
Denmark	17	48	79	71	77	36	29	25	24	44
Germany, FR	171	228	265	229	208	331	349	339	316	317
France	239	375	386	290	298	404	459	407	446	452
Ireland	22	25	16	7	2	1	2	2	3	0
Italy	751	1,178	1,022	1,050	670	806	704	455	656	733
Netherlands	76	55	54	173	57	48	50	50	76	64
United Kingdom	162	199	148	138	87	222	181	169	175	192
EC	1,598	2,267	2,203	2,191	1,560	2,051	1,941	1,564	1,779	1,899
Austria	88	92	163	87	13	107	95	144	95	108
Finland	5	5	18	38	57	5	4	7	20	45
Greece	18	18	25	25	16	16	18	15	40	40E
Norway	11	12	15	17	13	15	14	8	13	15
Portugal	20	21	37	41	33	32	25	34	47	45E
Spain	43	41	43	59	35	54	36	34	41	54
Sweden	359	353	344	216	232	235	89	47	58	46
Switzerland	56	83	81	61	65	69	84	99	99	0
Turkey	15	4	7	50E	109	269	15	5	1	0
Yugoslavia	205	98	37	65	108	142	19	85	102	49
OTHER WESTERN EUROPE	820	727	768	657	681	944	599	478	516	597
TOTAL WESTERN EUROPE	2,418	2,994	2,971	2,848	2,241	2,995	2,540	2,042	2,295	2,296
Bulgaria	250	250	268	340	330	336	366	410	356	415
Czechoslovakia	745	802	839	895	1,015	858	912	919	592	809
German DR	886	753	867	868	792	658	631	804	669	700E
Hungary	198	193	229	257	254	269	228	253	226	257
Poland	1,299	1,246	1,507	1,498	1,695	1,815	1,740	1,709	1,463	1,874
Romania	608	528	490	540	583	560	646	513	561	655
USSR	72	158	333	139	135	229	213E	176E	37E	0E
EASTERN EUROPE	4,058	3,930	4,353	4,537	4,804	4,745	4,736	4,784	3,904	4,186
Canada	608	3,742	1,862	2,245	4,078	8,836	11,913	2,556	9,915	2
United States	294	603	447	263	478	489	465	683	527	423
NORTH AMERICA	902	4,345	2,309	2,506	4,556	9,325	12,378	3,239	10,440	425
Argentina	45E	40E	42E	38E	157E	71E	113E	7E	0E	0E
Brazil	6	9	0	0	0	20	10	0	0	0
Mexico	5	12	0	0	0	110	23	0	0	0
LATIN AMERICA	53	52	42	38	157	201	146	7	0	0
South Africa	3	0	0	0	56	79	0	0	21	0
AFRICA	5	0	0	0	56	79	0	0	21	0
China	0	0	345	415	524	420	756	466	417	430E
Japan	1,198	1,017	1,562	1,353	408	593	550	646	564	781
Philippines	19	53	23	46	28	63	53	36	46	50E
Taiwan ROC	18	15	71	54	8	71	105	73	74	75E
Thailand	1	0	0	2	2	1	21	1	23	20E
ASIA	1,236	1,065	1,999	1,870	770	1,148	1,485	1,222	1,124	1,526
TOTAL	8,670	12,586	11,654	11,799	12,544	18,493	21,085	11,294	17,784	8,233

Source : IISI

III. Government Control in World Trade in Steel and Patterns of the Control

1. U.S. Restriction on Steel Import and Its Characteristics

The U.S. steel industry is a less competitive industry internationally as it could not gain a position of comparative advantage anticipated in the years after World War II and is described as subjected to a dangerous vulnerability. It is characterized by its being at a certain distance from the subject of domestic industrial readjustment policy of the U.S. Government. This can be imagined from the U.S. strategic consideration in the domestic industrial policy —— for example, the viewpoint of the nation's economic security constantly expressed by the American Iron and Steel Institute is one of the factors —— and in turn this is reflected in trade problems with other nations.

Foreign steel products began an increasing inflow into the U.S. market on the occasion of 116-day general steel strike in 1959 and the steel import to the United States continued to increase ever since. The U.S. steel industry took fixed measures to press for the protection from foreign steels.

As seen in Table E-7, various study reports on the problem of the U.S. steel industry were submitted by official and private circles within a year or so recently. Common to all of those reports is persisting demand for restriction of steel import.

At present, Trigger Price Mechanism (TPM) which fixed the lowest prices for steels that can be imported into the United States without restriction is suspended, but instead the steel industry resorted to proceedings under every U.S. trade law including anti-dumping laws and Section 301 of the 1974 Trade Act, which could be used for restrictions of the import from all other countries, developed and developing, in the world. As a result, study of U.S. trade laws is indispensable if one wishes to export steels to the U.S. markets. After lengthy negotiation, the U.S. government and EC entered into an agreement in November 1982, by which EC agreed to set voluntary quotas for its members' exports to the United States, thus limiting the total export to the United States within fixed ranges.

2. EC Restriction on Steel Import and Its Characteristics

EC's restriction on steel import from the third countries was effected in steps, Phase I in Jan.-Mar., 1978 and Phase II after April 1, 1978 and at present under so-called negotiated system or

Table E-7 Suggestions concerning Steel Import and Trade Policy in Various Reports on the U.S. Steel Industry

Name of Report	Summary
AISI White Paper, Steel at the Crossroads: The American Steel Industry in the 1980s, January 1981	1. It is necessary to incorporate following 7 fundamental factors in sound U.S. steel trade policy. 1) Fast and perfect application of U.S. trade laws 2) Continuation of TPM for imported steels 3) Conclusion of effective international safeguard agreements 4) Utilization of OECD Steel Committee 5) Unified policies among developed countries for steel trades with developing countries (a. Observation of GATT rules on subsidies and countervailing duties to be enforced on developing countries; b. Abolition of governmental subsidies for export of steel plants) 6) Policies for steel trades with Communist bloc (Various agencies of the U.S. Government to attend detailed analysis of problems such as government subsidies) 7) Trade policies for natural resources (A country must first satisfy domestic demand for raw materials and then supply them to the world markets on the most favored nation basis.)
Steel Tripartite Advisory Committee, Report to the President by the Steel Tripartite Advisory Committee on the United States Steel Industry, September, 1980	1. Import of foreign steels increased as the U.S. steel industry's cost advantages deteriorated. But there are other reasons for increase of steel imports. Many foreign governments provided their steel industries with privileges and took measures to prevent competition from imported steel. It is an undeniable fact that a substantial part of steel trades is being conducted through government subsidies or dumping not based on market principles. Revitalization program for the U.S. steel industry should be so designed that steel trades will be conducted on the basis of economic cost (not under government guidance) and not subjected to injuries from dumping and government subsidies. 2. Proposals for trade policy are following three: 1) Perfect and prompt implementation of U.S. trade laws 2) Effective use of OECD Steel Committee 3) More flexible trade adjustment programs

Table E-7 (cont'd.)

Name of Report	Summary
OTA Report Technology and Steel Industry Competitiveness, June 1980	1. Some changes in strategies of the steel industry in developed countries are observed that production capacity is adjusted to meet normal demand level and satisfy domestic demand, thereby raising average operating rate. In future, in the United States also, it may be expected that domestic capacity will be short at the time of high domestic demand making it necessary to depend more on steel imported from newly industrializing countries where energy cost and labor cost are low. 2. TPM is highly evaluated by Treasury Department, but the U.S. steel industry thinks that the effect of TPM is doubtful and that a new multilateral trade agreement be effected centering about rules prohibiting direct export subsidies. They consider the government implementation of existing trade laws too loose and expect the government to strengthen trade controls by transferring the role of trade controls to another branch of the government. In addition, the scope of prohibited dumping actions should be expanded and made statute laws by giving new definition to "injuries". 3. Governmental measures about a new multilateral trade agreement is necessary to exclude import at unfair prices and establish fair trade in export markets. If those measures are effected properly, the U.S. industry can expand export of technology-intensive steels, special steels, in which the United States has advantages.
GAO Report New Strategy Required for Aiding Distressed Steel Industry, January 1981	1. For capital formation, securing of company profit is essential, and for this, import restrictions may be justified as a means to increase market shares of domestic producers. However, their implementation should be made with due consideration to the risks involved and after the fund requirements of the steel industry and the necessary measures are confirmed and agreed. 2. Criterions for concrete import restricting measures are: a. foreseeability of their effect on import volume and price; b. acceptability of exporting countries; c. difficulty of their implementation; and d. optimal period.

Table E-7 (cont'd.)

Name of Report	Summary
(GAO Report - cont'd.)	3. As options for import restrictions, a. dumping and countervailing duties on dumping and subsidized export, b. tariff adjustments, c. import quota, and d. OMA (orderly marketing agreement) are considered.
Crandall Report The U.S. Steel Industry in Recurrent Crisis, July 1981	1. Import of foreign steels increased rapidly since 1959 when there was a long strike in the U.S. steel industry, and the U.S. Government took two protective trade measures, conclusion of agreement for voluntary restraints of steel export to the United States and introduction of TPM. 2. By voluntary restraint agreements, import prices of major steel products rose by 6.3 to 8.3% and prices of domestic makers by 1.2 to 3.5%, and the share of imports dropped from 17 to 13%. But this price rise was not so effective as to accelerate capital investments by the U.S. steel industry. 3. When TPM was implemented, the prices of imported steels rose by 5% and those of domestic products by 0.8 to 1.1%. On the other hand, raw material and labor costs increased more than 10% and it is not clear how TPM contributed to the price rise. Under TPM the share of imports dropped from 18 to 15%, but this is 2% higher than the rate forecasted by a model.

trade arrangement system, or bilateral trade agreements of Phase II. A brief description of the measures will be given below.

2.1 Import Restriction by Basic Price System (Phase I)

The basic price system decided at a EC Council of foreign ministers in 1977 was approved by a majority at ECSC Consutative Committee and ECSC Council (59 "yes" votes and 3 "no" votes consisting 2 votes from users and one from French trade union) and enforced from January 1 to March 31, 1978.

Table E-8 Change in TPM Prices (Base Prices by Product)

		Year	1978			1979				1980				1981				1982	Remarks
		Quarter	Apr.-Jun.	Jul.-Sep.	Oct.-Dec.	Jan.-Mar.	Apr.-Jun.	Jul.-Sep.	Oct.-Dec.	Jan.-Mar.	Apr.-Jun.	Jul.-Sep.	Oct.-Dec.	Jan.-Mar.	Apr.-Jun.	Jul.-Sep.	Oct.-Dec.	Jan.-Mar.	(spec. & size)
		Date issued / Unit	1978 Jan. 9	May 5	Jul. 27	Nov. 9	1979 Feb. 13	May 15	Aug. 15	Nov. 20	1980 Mar. 19 *1		1980 Oct. 21	Nov. 17	1981 Feb. 13	May 15	Aug. 14	Nov. 13 *2	
Total cost of blast furnace makers	Total cost	$/MT	323.23	346.30	365.12	399.59	383.94	379.97	378.86	379.63	379.63		442.85	446.63	466.22	467.81	467.74	463.60	
	Flexibility Band	%	—	—	—	⊖ 3.0	⊕ 1.2	⊕ 1.8	⊕ 1.1	⊕ 4.0	⊕ 4.0		—	—	—	—	—	—	—	
	Total cost as adjusted	$/MT	323.23	346.30	365.12	388.54	388.54	385.10	383.10	394.98	394.98		442.85	446.63	466.22	467.81	467.74	463.60	
	Exchange rate	Yen to $1	240	226	215	197	197	212	210	227	227		225	221	218	216	217	221	
	(Base period)		—	Mar. 1 ~ Apr. 30, '78	May 15 ~ Jul. 14, '78	Sep. 8 ~ Nov. 3, '78	Dec. 11, '78 ~ Feb. 9, '79	Mar. 5 ~ May 4, '79	Jun 8 ~ Aug. 7, '79	Sep. 3 ~ Nov. 2, '79	Sep. 3 ~ Nov. 2, '79		Sep. '77 ~ Aug. '80	'77.11 ~ '80.10	Feb. '78 ~ Jan. '81	May '78 ~ Apr. '81	Aug. '78 ~ Jul. '81	Nov. '78 ~ Oct. '81	
	Operating rate	%	85	85	85.2	85.2	78.2	78.2	78.2	75.2	75.2		74.9	74.5	—	72.4	73.0	72.3	
	Yield	%	80	80	82.7	82.7	83.7	83.7	83.7	83.7	83.7		83.7	83.7	86.0	86.0	86.6	86.6	
TPM prices	H steel	$/MT	259	275	286	306	306	302	302	311	311		349	352	386	386	386	386	A36 12"×12"
	Wire rod, ordinary	"	265	280	294	315	315	311	311	321	321		360	365	380	380	380	380	AISI1008 5.5㎜
	Wire rod, high carbon	"	309	326	342	366	366	361	361	372	372		417	421	429	429	429	429	AISI1029 5.5㎜
	C H Q	"	319	337	353	378	378	373	373	385	385		432	436	448	448	448	448	AISI1038 12.7㎜
	Plate	"	266	281	295	316	316	312	312	322	322		361	364	373	373	373	373	A36 ½"×80"×240"
	Hot coil(sheets)	"	231	244	262	280	280	276	276	285	285		319	322	331	331	331	331	A569 0.121"×48"×C
	Hot coil(bands)	"	—	238	250	268	268	264	264	272	272		305	308	316	316	316	316	
	C.R. coil	"	297	313	328	351	351	346	346	357	357	TPM suspended	400	404	416	416	416	416	A366 1.0㎜×48"×C
	G.I. sheet	"	345	364	390	417	417	411	411	424	424		475	479	484	484	484	484	A525G90C 8㎜×48"×C
	E.G. sheet	"	345	362	388	415	415	409	409	422	422		473	477	480	480	480	480	
	E.T. plate	"	477	503	515	551	551	543	543	560	560		628	634	656	656	656	656	SR25/25 75L×54"×C
	Tin free sheets	"	415	436	441	472	472	465	465	479	479		537	542	560	560	560	560	SR 75L×54"×C
	Electrical sheet (oriented)	"	1,000	1,055	1,106	1,185	1,185	1,166	1,129	1,164	1,164		1,305	1,317	1,320	1,320	1,320	1,320	M-4 0.011"×33"×C
	Electrical sheet (non-oriented)	"	558	568	596	638	638	629	629	648	648		726	735	718	718	718	718	M-45 0.018"×36"×C
	Black plate(coil)	"	373	394	380	407	407	401	401	413	413		465	467	482	482	482	482	A625 0.0085"×34"×C
	ERW pipe	"	511	528	544	568	568	565	565	419	419		470	474	495	495	495	495	A53B/API 5LB12"PLAIN
	SAW pipe	"	577	598	617	446	446	440	440	454	454		509	514	537	537	537	537	API 5LB 36"×0.5
	Seamless casing	"	415	456	467	489	489	482	482	497	497		557	562	649	649	649	649	API 5AK-55 9⅝"×0.352" STC
	Equal angles	"	199	227	238	261	259	265	264	265	265		229	269	303	300	295	285	ASTMA36 2"×2"
	Round bars	"	196	223	234	257	255	259	258	259	259		296	290	304	296	286	275	ASTMA615
	Flat bars	"	221	253	265	291	289	295	295	295	295		324	312	327	323	320	309	ASTMA36 ½"×8"

Notes: 1) TPM suspended temporarily Mar. 21, 1980
2) TPM suspended Jan. 11, 1982

Source: U.S. Department of Commerce

This system was simplified anti-dumping procedures similar to TPM of the United States.

2.1.1 The basic prices were set up for steels imported from the third countries. If the price of imported steel was below the basic price, countervailing duties were charged automatically.

2.1.2 The basic prices were CIF prices consisting prices based on lowest costs in a steelmaking country under normal competitive condition (South Africa for ferro-manganese, Brazil and Canada for foundry iron and Japan for other products) plus freight. Their levels were fixed a little lower than mandatory or non-mandatory bottom prices then in effect within EC. The prices covered about 140 items of 17 positions at the beginning.

2.1.3 The prices were a summary of prices studied by EC Commission in advance so that temporary duties could be charged on dumping. It was stressed that all other procedures were in accordance with of the GATT rules while the TPM system was not. It was also said that the basic price system was in line with Article 8 of International Anti-dumping Code of GATT.

2.1.4 Operation of basic price system

Commencement of dumping procedures by EC Commission was on the premises that complaint of dumping had been made by a member country.

When the custom-house of a member country found that an import was made at a delivered price declared in automatic import licence which was lower than the basic price, the custom-house immediately report the difference in the prices to the EC Commission. The EC Commission declares the import at a price below the basic price to be dumping automatically and conduct preliminary study on existence and extent of damages caused by dumping. If any damages are affirmed, a formal investigation is immediately commenced and, if considered necessary, provisional decision is made on imposition of provisional dumping duties at the same time. The provisional decision is published on official gazette. The provisional dumping duties are collected by the custom-house in the form of bank guarantee and the dumping margin is the difference between the basic price and the delivered import price.

Interested parties such as exporter, importer and the

government of the exporter are given an opportunity to inspect non-secret documents, based on which EC Commission decided to take anti-dumping procedures, and express their opinion, within 30 days from the date of public notice in the gazette.

The above provisional dumping duties can be held in effect up to 90 days, but if no fact of dumping is decided as a result of the formal investigation, it must be refunded.

The basic price system was not applied to the trade with nations who entered into bilateral agreements with EC. At present, almost all steel imports from major exporting countries are made under bilateral agreements.

2.2 Phase II up to the Present

As seen above, EC adopted restrictions of steel import from third countries by the introduction of the basic price system from January 1, 1978. But the system was in effect until March 31, and from April 1, EC made bilateral agreements for quantity and price of imported steel. The basic price system is not applied to the import from nations who entered into the bilateral agreements with EC and the import is subjected to such bilateral agreements.

The bilateral negotiation was, in the beginning, limited to major exporting countries and included also EFTA countries and centrally planned economies, but has been expanded to many other countries as well.

This system is also called negotiated system, under which the quantity is not to be lower (but the aim being not higher) than the level achieved in the past (at the start, the 1976 and 1977 level) and import price to be at a level lower to a certain limit than the lowest selling price in EC, mandatory or non-mandatory, effected by EC Commission. The price is always delivered price whether it is seaside or inland and fixed, considering production cost in Japan, Brazil and South Africa, etc., so as to give a range. In short, import prices set under bilateral agreements are delivered prices which are arrived at deducting penetration rates (differentials allowed for imported steels from EC steels) from the lowest prices in the price lists of steelmakers in EC as determined on the basis of Art. 60 of ECSC Treaty.

In addition, price alignment by EC mills was prohibited to arrest price deterioration in EC. Namely, EC mills cannot align their lowest selling prices to the import prices under bilateral agreements.