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Development Policy Comm. (Copper) 1976 (Jan - April)

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Mr. Kenji Takeuchi, Acting Chief, EPDCE DATE: April 16, 1976

FROM: Gerhard Thiebach, Economist, EPDCE

SUBJECT: UNCTAD Consultation on Copper - Back-to-Office Report
Geneva, March 23-26, 1976

1. The Consultation on Copper was convened by the Secretary-General of UNCTAD on an ad hoc basis, following a formal request made on behalf of the seven members of UNCTAD which constitute the Intergovernmental Council of Copper-Exporting Countries (CIPEC) 1/, seeking his assistance in opening a dialogue between copper-exporting and copper importing countries. The Consultation held meetings in Geneva from March 23 to 26 attended by delegates of 32 UNCTAD member states and by representatives from UNIDO, IMF, EEC, CIPEC, and IBRD, which I represented. The USSR was the only important copper country which did not participate.

2. At its closing meeting the Consultation adopted a draft report and agreed conclusions expressing the unanimous consensus of participants in favor of maintaining contacts between producing and consuming countries. Therefore, the Consultation requested the Secretary-General of UNCTAD to convene a meeting of a working sub-group of the consultation -- which would be open to all participants in the Consultation -- for the purpose of:

(a) Collecting and assessing the adequacy of statistics and studies already prepared by various organizations on questions relating to production, consumption and stocks of, and trade in, copper; and

(b) Studying practical arrangements for the establishment of a permanent intergovernmental consultative body in copper and preparing draft terms of reference for that body. These terms of reference should include, according to the "agreed conclusions":

(i) Revising, supplementing, up-dating and publishing statistics and studies;

(ii) Keeping under review the evolution of production, consumption, stocks, and trade and making forecasts at appropriate intervals;

(iii) Providing for regular exchanges of views and information between participants; and

(iv) Studying the broad range of problems affecting the copper market and possible means for their solution, including the practical means of reducing the wide fluctuations in the prices of copper and ensuring that prices are remunerative to producers and equitable to consumers; and defining and proposing alternative solutions for consideration by governments.

1/ Australia, Chile, Indonesia, Papua New Guinea, Peru, Zaire, Zambia.

The working sub-group is requested to submit its proposals, through the Secretary-General of UNCTAD, to the Consultation on Copper which is expected to be reconvened not later than October, 1976.

3. In the light of UNCTAD experience the Consultation on Copper was a major success although discussion of copper market problems was rather general. There was an obvious consensus in favor of the institutionalization of the producer-consumer dialogue on copper for which the lead-zinc study group was frequently mentioned as a model. But it was also evident that there is at present no basis for agreement on any kind of, nor in fact on the need for, action to stabilize the copper market. Some major consumers (US, Germany F.R.) are clearly not ready to make any financing available for such purposes, and even among producers there is probably no consensus on appropriate copper market strategy for the coming decade. At the same time establishment of permanent consultation machinery -- which can be expected to be set up independent from UNCTAD -- would be a major step forward in the view of almost all participants of the Consultation.

4. During the Consultation no requests or questions were directed at the Bank. But it is to be expected that we will be asked to make available studies on copper and to cooperate with the working sub-group. A "Tentative List of Topics Concerning the Copper Market Suggested for Examination" (i.e. by the working sub-group) was discussed at the Consultation and will be included in its report. (Copy of draft attached). I suggest that we reconsider the original outline of my proposed copper paper in the light of this list since discussion of the "tentative list" indicated that there is a widely felt need for a succinct description and analysis of past developments in the copper market as a basis for a study of possible future trends, including the practical means of copper market stabilization.

Attachments: - Provisional List of participants.
Tentative list of topics.

cc: Messrs. Tims, Holsen, Waelbroeck, Stern, Karaosmanoglu, Fuchs/Cash, Stern
Mr. Avramovic
Mr. Kuczynski - IFC
Mr. Burney

GThiebach:jmca

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File Title	Barcode No.
Development Policy - Commodities - Copper - January 1976 - April 1976	30124858

Document Date	Document Type
March 26, 1976	List

Correspondents / Participants

Subject / Title

United Nations Conference on Trade and Development, Tentative List of Topics Concerning the Copper Market Suggested For Examination

Exception No(s).

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☑ 7 ☐ 8 ☐ 9 ☐ 10 A-C ☐ 10 D ☐ Prerogative to Restrict

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UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

TRADE AND DEVELOPMENT BOARD
Committee on Commodities
Consultation on Copper
Geneva, 23 March 1976

24 March 1976

PROVISIONAL LIST OF PARTICIPANTS

This list is based on communications received to date. As further communications are received addenda to the list will be circulated. A final list of participants will be issued in due course and to facilitate this, delegations are requested to give corrections or additions in writing to the secretariat in the conference room or in Room E.8077.

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TD/B/C.1/COPPER/CONS./Misc.1
GE.76-63352

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: See Below Wouter Tims

DATE: January 23, 1976

FROM: Wouter Tims, Director, EPD

SUBJECT: Copper: Current Situation and Outlook for 1976

Attached for information is Commodity Paper No. 18, prepared by the Development Policy Staff, on the current world copper situation and outlook.

Distribution

President's Council
Directors and Department Heads, Bank and IFC
Chief Economists
Economic Advisers
IFC Economic Adviser
Senior Economists
CPS - Industrial Projects
EDI
DPS Headquarters
EPD Front Office
EPD Division Chiefs
EPD/CE Staff
Resident Missions
Countries economists (countries concerned)

G.Thiebach:cjl

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

COMMODITY PAPER NO. 18 (1/76)

COPPER: CURRENT SITUATION AND OUTLOOK FOR 1976

Prepared by: Gerhard Thiebach
Commodities & Export Projections Division
Economic Analysis & Projections Department
Development Policy Staff

TABLE OF CONTENTS

COPPER: CURRENT SITUATION AND OUTLOOK FOR 1976

I. Summary and Conclusions

1. The short-term outlook for copper prices is for a moderate increase, depending on how fast world industrial production, and hence consumer demand for copper, recovers from the recent recession. Stocks are abnormally high at the moment, while world 1/ copper production capacity is grossly under-utilized because of production cuts around the world. Though these two factors are likely to delay a rise in price for several months after consumption begins to recover, when speculative demand revives copper prices are likely to climb rapidly. Political developments in Angola, which are affecting Zambia's copper exports, could curtail its copper supply to the world market substantially if they should persist.

2. It is expected that 1976 copper prices at the London Metal Exchange (LME) will be higher than the 1975 average of $0.56 per pound; though their actual level will depend on the interplay of various factors. The most pessimistic forecast indicates an LME copper price of $0.60 in current dollar terms. An average price of about $0.67 seems most likely at present.

II. Recent Developments

A. Demand

3. After its increase of 11.2% in 1973, world consumption of refined copper declined by 6.3% in 1974, and by mid-1975 was 22% lower than a year earlier (see Table 1). Industry demand for refined copper continued to be quite weak through 1975, reflecting the unexpected depth and length of the recession.

4. Measured income elasticities of demand for copper range from 0.5 to 0.9, depending on a country's stage of economic development. However, there is typically a time lag of six to nine months between a change in economic activity and the reaction of industry demand. Copper consumption generally progresses in a rather erratic manner, which partly reflects the cyclical demand pattern for copper, but also results from the form of the statistics.

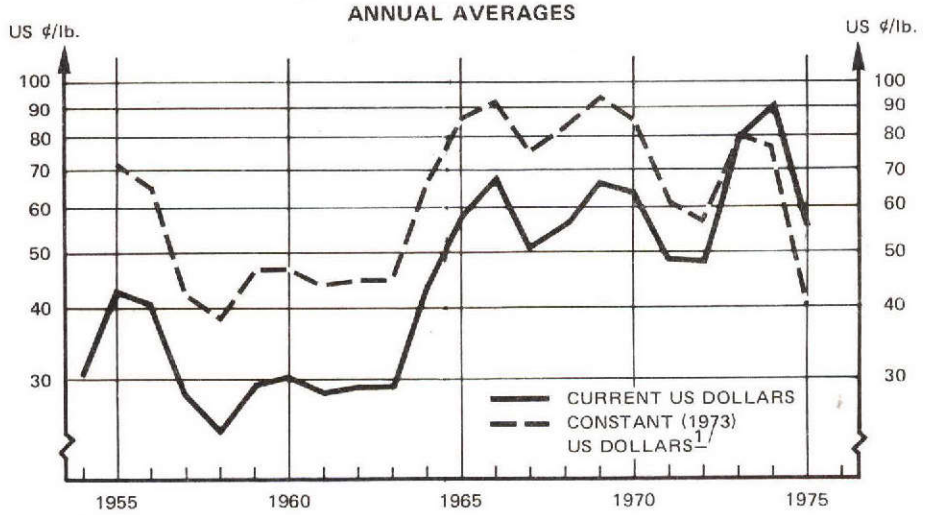
5. Consumption statistics are somewhat misleading as they reflect consumer inventory changes as well as actual consumption. Changing levels of consumer stocks tend to obscure actual consumption: in 1970-71, for example, when consumer inventories were growing, actual consumption was less than the figures imply. In 1974-75, on the other hand, the opposite appears to have been the case, and consumer stocks are now at a low level.

6. Major copper using industries and their estimated shares of copper consumption in 1973 are listed below:

1/ "World" here excludes the centrally planned countries (CPCs), unless noted otherwise.

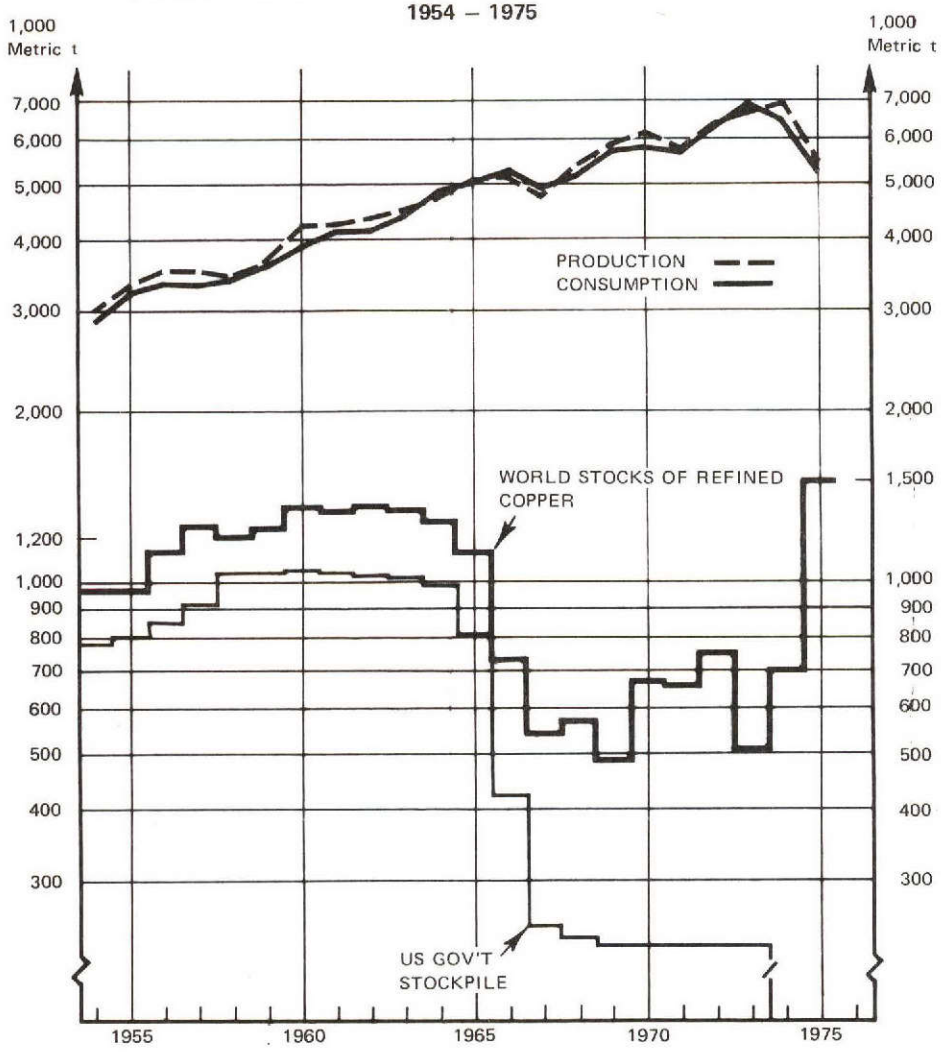
C H A R T 1.

COPPER PRICE, LME, 1954-1975
ANNUAL AVERAGES



1/ Deflator: IBRD Index of international inflation (c.i.f. index)

PRODUCTION, CONSUMPTION AND STOCKS OF REFINED COPPER
1954 – 1975



World Bank–15634

Industry	Share in total copper use (Percent)
Generation and distribution of electric power	35-40
Industrial machinery and equipment	20-25
Building construction	12-15
Communications	10-12
Transportation incl. automobiles	7-9
Military, coinage, appliances	6-8

Some of these industries were more affected by the recent recession than industry in general. The housing, transport and electrical industries suffered not only from the effects of the recession but also directly from its causes, such as the petroleum price increase and the high rates of inflation. Moreover, it may also be the case that the housing and automobile industries have entered a new cycle that reflects a reduction in the population growth of major industrialized countries.

B. Supply

7. In 1974 world copper production increased over 1973 in the face of declining consumption. Copper mine production outside CPCs in 1974 reached 6.2 million metric tons, about 3% more than in 1973 (Table 2). World refined copper production rose by 4% (Table 3). There was an interesting difference, however, with respect to trends in different countries. While U.S. production declined in 1974, with mine production falling by 7% and refined production by 8%, output in the rest of the world increased, with mine production increasing by 6% and refined production by 8%. The production change outside the U.S. was largely due to developments in Chile, which in 1974 achieved a 23% production increase over 1973 and regained its second place among world producers of newly mined copper. The U.S. production decline resulted from cutbacks in reaction to low prices, which made a number of operations unprofitable.

8. CIPEC members[1/] agreed to a reduction of copper shipments of 10%, from the average volume exported in the preceding six months, to take effect in December 1974. They decided to reduce shipments by another 5% and to cut production by 15% beginning in April 1975. In fact, CIPEC output during the first half of 1975 was only 5% less than for the comparable period in 1974 (when output was very high for reasons discussed in paragraph 7).

9. There have been production cutbacks since the second half of 1974 but the decline in production has not matched the sharp fall in demand. World mine production in the first half of 1975 was only 6 percent lower than during the same period of 1974 and refined copper production declined by slightly over 7%. However, this reduction was rather small in view of the 22% fall in refined copper consumption.

1/ CIPEC (Conseil Intergouvernemental des Pays Exportateurs de Cuivre), the Intergovernmental Council of Copper Exporting Countries, was formed in 1967 by Chile, Peru, Zaire and Zambia. In November 1975 Australia, Indonesia and Papua New Guinea became members of CIPEC. In 1974, the original four members accounted for 38% of world copper mine production and 60% of world copper exports.

C. Stocks

10. The widening gap between demand and supply resulted in accumulation of stocks which are presently (January 1976) estimated at some 1.4 million metric tons, equivalent to about 2.6 months' consumption. However, this "overhang" should be discounted somewhat for the following reasons. First, statistical information on stocks is notoriously unreliable, partly because of cyclical changes in coverage: at times of sluggish demand, stocks tend to be held by producers and are being accounted for, while during the upturn of the business cycle they move to consumers. There they become less visible and are often not reported. Second, the U.S. strategic stockpile, an important source of refined copper in the past, has been depleted. If the present level of stocks is compared to historical stock figures including the U.S. stockpile the "overhang" appears to be much less formidable (Table 4).

11. The U.S. stockpile which stood at 1 million metric tons during the 1958-1964 period was used to ensure an adequate supply of copper for the U.S. industry and to defend government wage-price guidelines. The three years 1965-67 saw the release of about 760,000 metric tons, which helped to relieve the supply/demand imbalance that caused record LME prices, surpassed only in 1973-74. In early 1974 the U.S. stockpile was virtually eliminated, with the sale of 230,000 metric tons, in stock since 1968, at prevailing high prices.

12. Recently some new government-sponsored stockpile schemes have been implemented in France and in Japan. So far, the French stockpile amounts to an estimated 60,000 tons. In Japan, there are government plans to help finance stocks accumulated by industry, which stood at about 200,000 tons as of June 1975.

D. Prices

13. Copper prices[1/] were very strong in 1973 and early 1974 with LME price reaching an all-time high of $1.52 per pound on April 1, 1974. Thereafter, prices declined rapidly and by December 1974 the monthly average LME price was down to $0.58 per pound. During 1975 the market remained depressed as stocks

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1/ Copper is priced in three markets, the London Metal Exchange (LME), the Commodity Exchange in New York (COMEX), and the producer-controlled markets. The London Metal Exchange is the most important "pricing" market for copper since the bulk of international copper trade (although contracted directly by producers and consumers) is undertaken at LME prices. The Commodity Exchange in New York is smaller and far less significant than the LME. Due to arbitrage, COMEX quotations usually differ by only a few US cents per pound from LME quotations. In some countries (Canada, US, COMECON) copper is also traded on the basis of producer prices - selling prices which are usually fixed by major producers and kept unchanged for several months.

continued to increase. The average LME price for 1975, at $0.56 per pound, represents the lowest annual average since 1957 if adjusted for changes in the international price index (c.i.f. index). 1/

14. U.S. producer prices of primary copper were frozen over the first four months of 1974 at 68¢ per pound. When U.S. price controls were terminated, the producer price jumped to 80-82¢ per pound. In early June producer quotes has moved further up to 87¢ per pound. Subsequent changes in the producer prices were all downward, and since February 1975 it has remained at 64¢ per pound (in current terms). The LME and U.S. producer prices have differed by over 10 cents in some months. Since the additional cost of importing copper from the LME warehouses in Europe into the U.S. is 5¢/lb. at most, the U.S. producer price would normally be under pressure. However, industry spokesmen consider the present U.S. producer price a "floor" in view of operating costs.

III. Outlook

A. Economic Growth in OECD Countries

15. Forecasts of economic growth in the OECD area are being revised, but an interim IBRD projection dated September 1975 is for a GNP growth rate of 5.2% in 1976, following a shrinkage of GNP by 2.1% in 1975. Growth rates will differ between the major industrialized countries (see Table 5), and the U.S. economy is expected to lead the recovery with GNP growth projected at 5.6%. Annual growth rates for European OECD countries and Japan are expected to be between 2.4% (U.K.) and 7.8% (Japan). Weighted by their shares in copper imports, OECD countries' industrial output would rise by 4.9% on average; details are given in Table 6.

B. Prospects for Copper Using Industries

16. The developed countries' major copper using industries -- the electrical and the equipment industries -- suffer at present from uncertainty and lack of financing. Plant and equipment expenditures are not expected to increase much in 1976, while electric utility outlays in the industrialized countries are likely to be limited by uncertainties about long-term electricity demand and fuel availability. To what extent the impact of slow growth in these industries on copper consumption can be offset by orders from developing countries, including oil producing countries, is not yet clear. A number of countries have implemented measures to support the construction industry and a moderate increase has been observed in construction activity in the U.S. and in Japan. However, a return to the levels of the past decade appears unlikely in the next few years. The outlook for transportation is similarly mixed, although the automobile industry recently reported unexpected favorable output growth in Japan, in the U.S. and in Germany.

1/ Depending on particular objectives, inflation can be measured in terms of several different indices. Those commonly used include the implicit GNP deflators, and indices of wholesale and retail prices. The c.i.f. index of prices of developed countries' manufactured exports, to all destinations, is used as the deflator when commodity prices are expressed in "constant dollars" to present the purchasing power of primary products. (See IBRD Report No.814, Price Forecasts for Major Primary Commodities, July 1975, p.12).

C. Supply and Demand

17. The excess of copper supply is likely to be much reduced in 1976: refined copper consumption, including rebuilding of consumer stocks, will increase substantially, perhaps by as much as 20%, while only a small increase is foreseen for refined copper production.

18. Short-term price forecasts for copper are primarily but not exclusively based on the relationship between the current year's consumption and the previous year's production. Therefore, the main determinant of price developments in 1976 will be the expected rise in consumption, while prices in later periods will depend to a greater extent on changes in refined copper production in 1976 (see Annex). Two alternative assumptions regarding refined copper production in 1975 have been used since complete data were available only for the first half of 1975: (a) that based on the actual percentage reported for the first half of 1975 refined production will be 7.3% lower than in 1974; (b) that, assuming a further production decline in the second half of 1975, in line with available data for some countries, refined production for the year will be 10.8% below the 1974 level.

D. Expectations and Speculation

19. Recent developments in the copper market confirm that in the short run copper prices tend to be strongly influenced by expectations and speculation. Early in 1974 copper prices continued to rise while the market failed to respond to the sharply increased level of production. In addition, an anticipation of a prolonged copper strike in the U.S. supported high prices in the face of a government decision to sell 230,000 tons of copper from the strategic stockpile.

20. In 1976, copper prices could again be influenced by expectations and speculation, perhaps fueled by developments not directly related to the copper industry. The price of gold, for example, will continue to influence the prices of other non-ferrous metals, as will judgments on developments in Angola and Zambia. 1/ Copper consumers' expectations regarding the possible reduction of the stock overhang and the shape of recovery from the recession will influence their decision to replenish their inventories or to continue operating with comparatively low levels of owned stocks. Speculators' assessment of how consumers will react to increasing demand will influence copper prices even before an actual rise in consumer buying occurs. It should also be noted that the copper market, like other commodity markets, is characterized by speculative selling in a declining market and speculative buying or retaining stocks in a rising market. Thus the apparent stock overhang will not necessarily prevent prices from rising. It would probably take a major price advance to dislodge large quantities of copper stocks held by non-industry sources as a hedge against inflation.

1/ The traditional export route through Angola which used to carry almost half of Zambia's copper exports has been closed for some months; Zambia attempts to reroute copper shipments and imported supplies for the mines through Tanzania and Mozambique; unfortunately these routes are already overcrowded.

E. Cooperation Among Producers

21. As indicated above, the four original members of CIPEC made attempts in late 1974 and early 1975 to influence the market through joint supply cutbacks. While their efforts probably had a certain impact on the market, it appears that circumstances have since become less favorable for further organized measures by producers. In addition to Zambia's transport problems it has been reported that Chile was unsatisfied with recent actions and has great reservations against further CIPEC measures.

22. Regarding the possibility of CIPEC action in times of increasing copper demand - as expected for 1976 - certain other factors need to be mentioned. First, production costs seem to have increased in Africa while they reportedly showed some decline in Chile. This may create a conflict of interest between African producers and Chile regarding future market strategy. Secondly, while the recent admission of new members increased CIPEC's share in the market from an estimated 60% to about 70% of world copper exports (net of refined exports of countries without mine production) it will not necessarily facilitate production or export restrictions. Thirdly, CIPEC's strategy has been changed in favor of an international copper agreement involving consuming countries.

F. Cooperation Among Producers and Consumers

23. In a major change of policy CIPEC members decided in November 1975[1/] to seek a dialogue between copper producing and copper consuming countries with a view to negotiating a copper price stabilization agreement. Forthcoming international conferences will provide the opportunity to pursue that aim. Some consumer countries, notably France and Japan, have already taken steps or called for measures to stabilize copper prices. Copper is among the commodities to be included in the stabilization scheme proposed by UNCTAD. While copper appears to be a prime candidate for price stabilization on technical grounds it is presently impossible to predict whether political decisions to be made by various countries will favor a stabilization agreement. If a stabilization scheme became operative, the reaction of copper prices would largely depend on the stabilization technique and its implementation.

24. The LME copper price is expected to remain at the 1975 level of 56¢ per pound until there are clearer signs of an upswing in industrial production in OECD countries. Given the high level of stocks and a lagged reaction of copper demand to increases in OECD industrial output -- which in turn is not expected to markedly accelerate before mid-1976 -- the LME copper price is expected to average 67¢ per pound in 1976. There is a possibility, however, that the average only increases to 60¢ per pound if further delays occur in the process of economic recovery in industrialized countries.

1/ The 8th Conference of Ministers of CIPEC held in Lima from November 17 to 19, 1975 "decided to initiate the opening of a dialogue with consumer countries to promote the negotiation of a stabilization agreement for copper prices". (Quoted from the press statement issued at the end of the Conference).

25. On the other hand, the average LME copper price in 1976 could exceed 67¢ per pound if, for example, Zambia's transport problems continue. But the pace of the expected economic recovery in developed countries will be the major factor affecting copper prices in 1976. Economic recovery will influence copper prices in two ways. It will increase copper consumers' demand for specific types of copper and it will fuel speculative expectations for a continued rise in copper prices. Such expectations could lead to a temporary holdback of supplies from the market. As a result a "bulge" could develop in the second half of 1976 which would lead to a sharp increase in prices; in the past, similar patterns have occurred in the copper market.

Table 1: COPPER - WORLD REFINED CONSUMPTION[1/]

(thousand metric tons)

	U.S.	Japan	Europe	Other	World Total
1970	1,854	821	2,466	654	5,795
1971	1,831	806	2,366	721	5,724
1972	2,029	951	2,496	768	6,244
1973	2,219	1,202	2,648	814	6,943
1974	1,994	871	2,677	962	6,504
First Semester					
1974	1,126	499	1,396	439	3,460
1975	634	391	1,248	427	2,700
	(Percent Change from previous period)				
1970	- 4.6	1.9	5.2	3.5	1.2
1971	- 1.2	- 1.8	- 4.1	10.2	- 1.2
1972	10.8	5.0	5.1	6.5	9.1
1973	9.4	26.4	6.1	13.8	11.2
1974	-10.1	-27.5	1.1	10.1	- 6.3
1975 (1st Semester 75/1st Semester 74)	-43.7	-21.6	-10.6	- 2.7	-22.0

1/ World excludes CPCs.

Source: World Bureau of Metal Statistics: World Metal Statistics, Oct. 1975

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Table 2: COPPER - WORLD MINE PRODUCTION

	U.S.	Other Developed Countries	Developed	LDC Total	CIPEC 2/	Chile	World Total
	(1)	(2)	(3) =(1)+(2)	(4)	(5)	(6)	(7) =(3)+(4)
			(Thousand Metric Tons)				
1970	1,560	1,245	2,805	2,358	2,133	692	5,163
1971	1,381	1,347	2,728	2,410	2,156	708	5,138
1972	1,510	1,457	2,967	2,691	2,404	717	5.658
1973	1,559	1,737	3,196	2,882	2,593	735	6,078
1974	1,449	1,665	3,114	3,127	2,862	902	6,241
I. Semester							
1974	766	812	1,587	1,507	1,373	431	3,085
1975	660	774	1,434	1,467	1,310	414	2,901
			(Percent Change from Previous Year)				
1971	-11.5	+ 8.2	-2.7	+ 2.2	+ 1.1	+ 2.3	- 0.5
1972	+ 9.3	+ 8.2	+8.8	+11.7	+11.5	+ 1.3	+10.1
1973	+ 3.2	+19.2	+7.7	+ 7.1	+ 7.9	+ 2.5	+ 7.4
1974	- 7.1	- 4.2	-2.6	+ 8.5	+10.4	+22.7	+ 2.7
1975 (I/75-I/74)	-13.8	- 4.7	-9.1	- 2.7	- 4.6	- 3.9	- 6.0

1/ World excludes CPCs.
2/ Australia, Chile, Indonesia, Papua New Guinea, Peru, Zaire and Zambia

Source: World Bureau of Metal Statistics
World Metal Statistics, October 1975 and October 1974 (for I/1974)

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Table 3: COPPER - WORLD REFINED PRODUCTION 1/, 1970-1975

(thousand metric tons)

	U.S.	Other Developed Countries	Total Developed 2/	LDC Total	CIPEC 3/	Chile	World Total
	(1)	(2)	(3) =(1) + (2)	(4)	(5)	(6)	(7) =(3)+(4)
1970	2,035	2,724	4,759	1,351	1,386	405	6,110
1971	1,780	2,668	4,448	1,326	1,335	399	5,774
1972	2,049	2,382	4,881	1,502	1,506	461	6,383
1973	2,098	3,091	5,189	1,495	1,501	415	6,684
1974	1,938	3,287	5,225	1.724	1,704	538	6,949
I. Semester							
1974	1,041	1,632	2,673	777	763	233	3,450
1975	855	1,531	2,386	813	806	256	3,199
			(Percent Change over Previous Period)				
1971	-12.5	-2.1	-6.5	- 1.8	- 3.7	- 1.5	- 5.5
1972	+15.1	+6.2	+9.7	+13.3	+12.8	+15.5	+10.6
1973	+ 2.4	+9.2	+6.3	- 0.5	- 0.3	-10.0	+ 4.7
1974	- 7.6	+6.3	+0.7	+15.3	+13.5	+29.6	+ 4.0
1975 (I. Semester over 1. Semester '74)	-17.9	-6.2	-10.7	+ 4.6	+ 5.6	+ 9.9	- 7.3

1/ World excludes CPCs.
2/ Australia, Canada, Western Europe (incl. Yugoslavia), Japan, Republic of South Africa and U.S.A.
3/ Australia, Chile, Indonesia, Papua New Guinea, Peru, Zaire, and Zambia

Source: World Bureau of Metal Statistics: World Metal Statistics, Oct. 1975 (Oct. 74 for 1. Semester 1974).

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Table 4: COPPER STOCKS, 1960-1975

(Thousand metric tons)

Year	Producers' Stocks 1/ Level at end of period (1)	Producers' Stocks 1/ Change during period (2)	LME Stocks (3)	US Govt. Stockpile (4)	Total (5) =(1) + (4)	Producers' Stocks as percent of Refined Production (6)	Total Stocks as % of Ref. Prod. (7)
1960	311	109	15	1,040	1,351	7.4	32.2
1961	284	- 27	17	1,036	1,320	6.6	30.9
1962	335	51	13	1,029	1,364	7.7	31.2
1963	321	- 14	14	1,018	1,339	7.2	30.1
1964	293	- 28	5	993	1,286	6.2	27.1
1965	309	16	8	814	1,123	6.1	22.3
1966	326	17	14	410	736	6.3	14.2
1967	297	- 29	12	250	547	6.2	11.5
1968	338	41	19	237	575	6.3	10.7
69	255	- 83	19	230	485	4.3	8.3
1970	435	180	72	230	665	7.1	10.9
1971	431	- 4	140	229	660	7.5	11.4
1972	515	84	183	229	744	8.1	11.7
1973	277	-238	35	229	506	4.1	7.6
1974	600	323	126	-	600	8.6	8.6
1975 (Est.)	1,300	700	500	-	1,300	20.5	20.5
'74 Mar.	277	0	11	56	333		
June	296	19	24	18	324	8.6	9.1
Sept.	430	134	87	-	430		
Dec.	600	170	126	-	600	8.6	8.6
1975 Mar.	721	121	176	-	721		
June	874	153	295	-	874	27.3	27.3
Sept.	1,006	132	431	-	1,006		
Dec. (Est.)	1,300	204	500	-	1,300	20.5	20.5

1/ Includes LME Stocks (Column 3) but excludes U.S. Government Stockpile (Column 4).

SOURCE: (1) and (2): American Bureau of Metal Statistics.
(3): World Bureau of Metal Statistics
(4): U.S. Bureau of Mines
(5): On the basis of production figures from Metallgesellschaft and World Bureau of Metal Statistics.

Note: American Bureau of Metal Statistics coverage represents about 80 percent of the free world. Reports are not received covering production of Finland, Japan, Norway, Poland, Spain, Sweden, Yugoslavia, and some other small producing countries. However, if any of this production is sold to an ABMS reporting company, that tonnage will appear in ABMS data.

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Table 5: REAL GNP GROWTH IN OECD COUNTRIES: 1960-1980

(Percentage changes at annual rates)

	Weights in Total	Average 1959/60 to 1972-73	Change from previous year							
			1973	1974	1975	1976	1977	1978	1979	1980
Canada	4.0	5.1	6.8	2.8	-0.7	6.5	8.2	8.2	8.0	7.8
U.S.	39.6	4.2	5.9	-2.1	-3.6	5.6	5.2	5.4	5.2	5.3
Japan	12.6	10.9	10.2	-1.8	1.4	7.8	7.2	7.2	6.6	6.5
France	7.6	5.9	6.0	3.9	-2.0	4.5	5.9	5.6	6.8	4.7
Germany	10.7	4.9	5.3	0.4	-3.4	3.9	5.4	4.8	4.5	4.4
Italy	4.2	5.6	5.9	3.2	-2.8	3.2	5.6	5.2	4.6	4.4
U.K.	5.2	3.3	5.3	0.1	0.0	2.4	3.6	3.9	4.2	4.6
Other Countries	16.1	5.5	4.3	2.7	-0.6	4.0	5.6	5.1	4.3	4.8
OECD Total	100.0	5.5	6.3	-0.1	-2.1	5.2	5.6	5.5	5.3	5.2

1/ 1974 GNP/GDP weights and exchange rates.

Source: OECD Secretariat, for 1973 and 1974.
IBRD midpoint projections for 1975-1980, dated September, 1975

Table 6: CHANGE IN INDUSTRIAL PRODUCTION (ANNUAL RATES) MAJOR COPPER IMPORTING COUNTRIES 1974-1976

(in percent)

	Weights	Change from previous year 1974	1975	1976
United States	5.8	-0.6	-9.0	8.5
Japan	26.2	-3.1	-10.5	10.75
Germany	19.4	-1.4	-7.25	4.5
France	13.5	3.2	-9.5	4.0
United Kingdom	12.4	-2.6	-5.0	-0.5
Italy	10.2	4.3	-10.0	1.5
Austria	0.9	5.0	-8.0	-1.0
Belgium	3.3	3.4	-9.0	0.0
Netherlands	1.7	2.5	-6.0	3.0
Spain	2.1	5.2	-4.0	0.0
Sweden	2.1	5.7	-2.5	0.0
Switzerland	1.7	0.9	-14.0	2.0
Yugoslavia	0.7	11.0	6.0	3.0
Index 1/	100.0	-0.1	-8.4	4.9

1/ Weighted by relative shares in total copper imports.

Source: OECD, Economic Outlook No. 18, December 1975.

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Annex

Forecast Models

This Annex presents a simple model which has been used as an aid to forecasting copper prices and as a supplement to expert opinion and extrapolation of price trends. The model 1/ consists of two equations, a price equation and a consumption function. Price (P) is assumed to depend on excess demand, measured by the ratio between production, lagged one year, (Q_{t-1}); lagged price (P_{t-1}) and output lost through strikes (OL). Dummy variables were introduced for periods of extraordinary influences in 1965/66 (Vietnam war) and in 1973/74 (extraordinary speculation).

Consumption depends on lagged price and industrial demand for copper, measured by an index of industrial production (X).

Fitted to annual data for 1955 to 1975 the regression equations are:

$$(1)\quad \ln P_t = -0.428 - 2.250 \ln \frac{Q_{t-1}}{C_t} + 0.078 \ln OL + 1.013 \ln P_{t-1} - 0.269\ \text{Dum A} + 0.276\ \text{Dum B}$$

(0.58) (5.72) (1.73) (10.38) (2.01) (2.60) 1955-75

$\bar{R}^2 = 0.90$ DW = 1.83 SE = 126.5

$$(2)\quad \ln C = 4.692 + 0.720 \ln X + 0.162 \ln C_{t-1} - 0.147 \ln P_{t-1}$$

(3.47) (0.56) (2.94) 1955-75

$\bar{R}^2 = 0.954$ DW = 1.16 SE = 4.9

where

P = Copper price (LME spot price of wire bars), annual average in US$ per metric ton
Q = World production of refined copper ('000 metric tons)
C = World consumption of refined copper ('000 metric tons)
OL = Output lost through strikes ('000 metric tons)
X = Index of industrial production (UN, Manufacturing production, market economies, 1963=100)
Dum A = Dummy variable = 1 in 1965 and 1966
= 0 for all other years
Dum B = Dummy variable = 1 for 1973 and 1974
0 for all other years

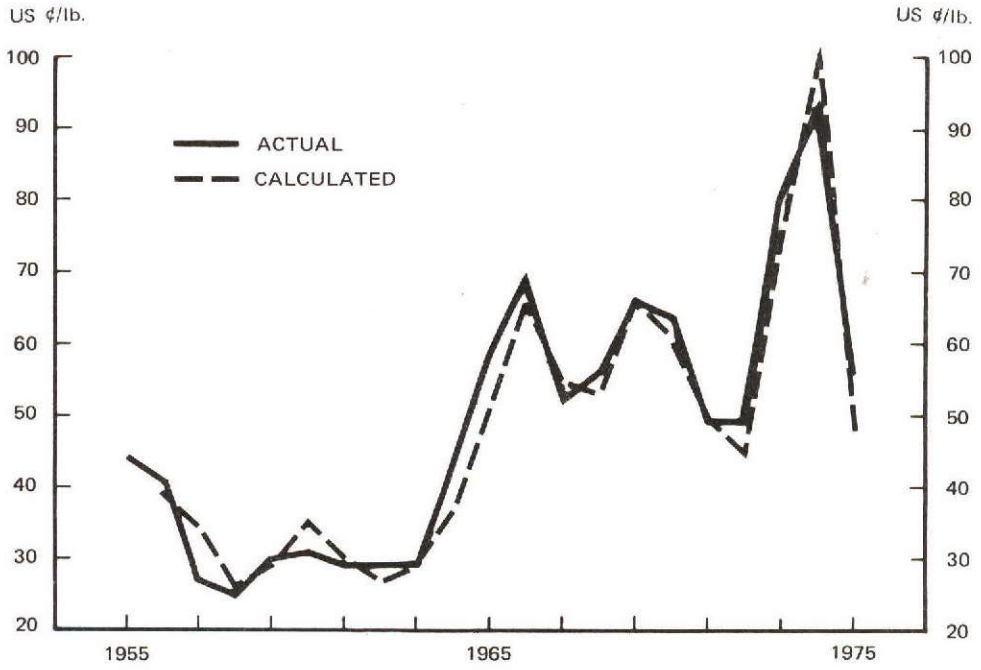
Chart 1 shows the actual values for C and P and those estimated from equations. Forecasts of price for 1976 are shown in Table A.1 below.

1/ See I. Khanna, "Forecasting the Price of Copper", in The Business Economist, Vol. 4, No. 1, Spring 1972; and H.-M. Stahl, A Forecast of Copper Prices, 1975, mimeo, unpublished, 1975. The version presented here is a modified Khanna model in which consumption depends on industrial production of the current year rather than the preceding year.

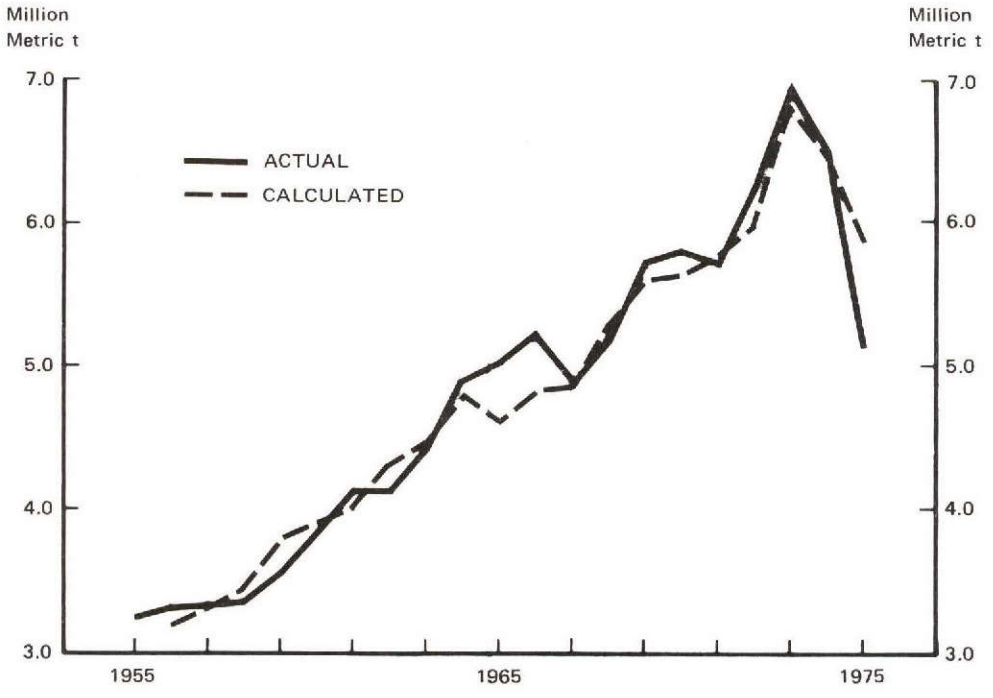
CHART A.1

COPPER PRICE AND CONSUMPTION – ACTUAL AND PREDICTED 1955 – 1975

COPPER PRICE, LME, 1955-1975
ACTUAL AND PREDICTED
ANNUAL AVERAGES



REFINED COPPER CONSUMPTION, 1955 – 1975
ACTUAL AND PREDICTED



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Annex

Table A.1: COPPER PRICE FORECAST FOR 1976

	1973	1974	1975	1976 (a)	1976 (b)	1976 (c)	1976 (d)
1. Production of refined copper							
'000 t	6,684	6,949	6,442				
Percent change	4.7	4.0	-7.3				
2. Index of industrial production							
(1963=100)	181	184	168	176			
Percent change	10.4	1.7	-8.7	+5.0			
3. Consumption of refined copper							
'000 t	6,943	6,504	5,150	6,330	6,442 1/		
Percent change		-6.3	-20.8	23.1	25.0		
4. Copper price, LME							
in current US$/lb.	0.81	0.93	0.56	0.54	0.57	0.62 2/	0.71 3/
in constant 1973 US$/lb.	0.81	0.76	0.42	0.37	0.39	0.42	0.48
5. International price index							
(1973=100)	100.0	121.8	134.9		147.0		
Percent change	+18.2	+21.8	+10.8		+8.8		

1/ Industry estimate
2/ Assuming Dum B = 0.5 to account for possible speculative and/or other factors discussed in Chapter III of this paper, and 5 percent growth of industrial production (i.e. copper consumption as in (a)).
3/ Assuming Dum B = 1 and using consumption forecast (a).

Note: If copper production in 1975 declined by 10.8% rather than by 7.3% price forecasts (in current dollar terms) under the above assumptions would range from 58¢/lb. to 80¢/lb.

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#29

WORLD BANK GROUP FINANCING OF INVESTMENTS IN COPPER PRODUCTION

I. Introduction

1.01 This paper attempts to fulfill the objectives outlined in Mr. Kalmanoff's memo of June 4, 1975 to Mr. J. Burke Knapp on the subject of "World Bank Group Financing of Investment in Copper Production". As noted there, the purpose of this paper is to "determine the order of magnitude over the next 5-15 years of desirable levels of output of copper in LDC's, and of investments required to achieve these levels, the problems associated with meeting these requirements, and an appropriate role for the Bank Group in this connection".

1.02 This paper represents the initial step in a broader exercise along the same lines on industrial raw materials generally, principally the non-fuel minerals (e.g. bauxite/alumina, iron ore, nickel, lead, tin, zinc, manganese, phosphate) and renewable natural resources such as forest products. While focussed specifically on copper, the paper nevertheless highlights issues of general relevance to the non-fuel mineral sector and offers some very tentative figures for the whole sector.

1.03 Severe data limitations, particularly on financing sources -- due either to the non-existence of useful published data or the haste with which this exercise has been attempted -- have obliged the authors 1/ of this paper to rely heavily on secondary information sources (research reports, industry journals, and a special report from the consulting firm, Commodities Research Unit (CRU) of London). Representative primary data (company prospectuses, non-published bilateral agency information, etc.) are still being sought to confirm, at a later stage, the findings of this exercise.

1.04 The paper has three additional chapters. Chapter II summarizes the supply/demand outlook for copper and expected capital requirements in the sector over the next 15 years; III discusses probable investment strategies; and IV suggests alternative Bank Group roles and their financial implications and attempts to link this paper to the non-fuel mineral sector as a whole.

II. Future Demand/Supply Balances and Capital Requirements in the Copper Industry

A. Demand

2.01 The future demand for refined copper in the world (excluding CPE's) is expected, after a rapid recovery in the next two to three years from the currently depressed market, to grow over the period 1978 to 1990 at an annual average rate of 4% (See Table 1 below, and Annexes 1 and 2).

1/ Rex Bosson of the Industrial Projects Department Department, IBRD, and Martin Hartigan of the Economics Office, IFC.

This is a forecast of the trend growth rate in the future and is not inconsistent with wide growth rate fluctuatons from year to year as have occured in the past (between -10% and +10% per annum over the period 1960-1975). This trend growth rate compares against a long term historic growth rate of 4.2% per annum, the slightly lower forecast reflecting, inter alia, the expected lower overall future economic growth in both the OECD and less developed countries. This trend growth rate could be as low as 3-1/2% per annum or as high as 4-1/2% per annum depending on the average rate of industrial growth in the developed world. These projections are based upon copper prices thought sufficient to bring forth the necessary long term supplies of copper and to give adequate returns on investment (i.e. 85-90c/lb in 1975 values). Outside experts in the copper field (CRU) have corroborated these demand trend projections utilizing sophisticated long term projection techniques linked to market determination of prices.

B. Capacity and Supply/Demand Balance

2.02 Including projects recently commissioned (up to early 1975) and small and higher cost operations now shut down due to depressed copper prices but which are expected to reopen with an improvement in prices, existing primary refined production capacity is estimated to be 6.8 million tons. 1/ In addition, a further 0.9 million tons is now under construction and will come on stream between 1976 and 1980 for a total capacity of about 7.7 million tons at the end of this decade, as summarized in the table below. It has also been assumed that secondary copper (i.e. copper refined from scrap) will continue as it has in the past to make up about 15% of refined copper consumption.

Table 1: Future Refined Capacity Requirements in The Copper Sector

	1975	1980	1985	1990
		(million of tons)		
Demand	5.9	8.5	10.3	12.5
Primary Capacity Required /1	5.9	8.0	9.7	11.7
Primary capacity, existing and under construction	6.8	7.7	7.7	7.7
New Primary Capacity				
- Now under Construction	0.9	-	-	-
- Additional Requirements	-	0.3	2.0	4.0

/1 Derived as explained in Annex 2.
SOURCE: Annexes 1 and 2

1/ All "tons" in this paper refer to metric tons unless otherwise stated.

2.03 Even with a rapid recovery from the currently depressed market conditions, a surplus supply condition will remain until 1979, with capacity utilization improving from 80% in 1975 to 90% in that year. In 1980, if capacity utilization rose to 95%, there would be no need for additional investment over and above the projects now under construction. However, historically the industry has consistently maintained a 5-10% capacity "cushion" to cope with sudden cyclical upturns in demand and unavoidable supply constraints (e.g. strikes, political difficulties). To maintain the average historical level of capacity utilization of about 90%, new capacity of 0.3, 2.0 and 4.0 million tons will be required by 1980, 1985 and 1990 respectively. Annex 2 shows how these additional capacity requirements figures would change in response to the different possible growth rates in copper demand. For example, by 1990 additional capacity requirements would vary between 5.0 and 3.2 million tons for the high (4-1/2%) and low (3-1/2%) demand growth rates respectively.

C. Capital Requirements

2.04 On the basis of projects recently completed or now under construction, Bank staff and the CRU have estimated the capital costs for new production capacity (in 1975 prices) to be roughly US$5,100 per annual ton of refined copper produced (US$3,400 for mining and concentrating, US$1,200 for smelting and US$500 for refining). This is a world-wide composite estimate taking into account new grass roots projects costing in the order of US$6,000/ annual ton and expansion projects costing as little as US$2,500/ annual ton. Regional differences in grade of ore deposits, availability of infrastructure, existing capacity, and ratio of new grass roots projects to expansion projects, have the net result of giving the LDC's a competitive advantage over the DC's with respective average capital costs of US$5,000 and US$5,400/annual ton (Annex 3).

2.05 Capital requirements for the copper industry can be divided into three major groupings, namely those for (a) new capacity required to meet increasing demand; (b) new capacity to replace operations whose ore bodies are being fully depleted; and (c) equipment replacement to maintain existing capacity. As calculated in Annex 2 and summarized in Table 2 below, capital requirements for the sector between 1978 and 1990 are US$48 billion (US$25 billion for new capacity; US$10 billion to replace facilities whose deposits will run out; and US$13 billion for regular equipment replacement) all at 1975 price levels. Of this, US$4.6 billion has already been committed, and because of the long lead time (5-6 years) in project construction, a further US$38-40 billion of the total investment requirements would need to be committed by 1985.

Table 2: Capital Requirements in the Copper Sector
(US$ Billions at 1975 constant prices)

	Through 1980	Through 1985	Through 1990
Cumulative Investment Required for:			
New Capacity	6.1	14.8	25.0
Existing Capacity			
- Replacement of Depleted Orebodies	2.6	6.0	10.1
- Equipment Replacement	3.5	8.0	13.5
Total Cumulative Investment Required	12.2	28.8	48.6

SOURCE: Annex 2

2.06 Hence over the 10-year period, 1975-1985, an average of US$3.8-4.0 billion per year will need to be committed to the copper industry; compared to estimated commitments of US$1.0-1.5 billion per annum over the last 10 years. These estimates do not include fabricating, or exploration expenditures. With respect to exploration in the future, copper is in a more fortunate position than some of the other minerals (e.g. nickel, lead, zinc) since ore reserves for more than 30 years have been proven and significant additional reserves identified. Therefore, over the next 10 years exploration does not create an issue, but may do so by about 1990.

III. Investment Strategies

A. Factors Affecting Investment Patterns

3.01 As for any sector, the geographical directions and pace of future expansion of the copper industry will be determined by several inter-related factors, principally: (a) the comparative advantage of production and distribution which different countries have in the copper sector; (b) the policies and programs of producer and consumer countries; (c) the future levels and degree of stability of world market prices of copper; (d) the willingness and ability of major producing companies to commit their own financial and technological resources to projects; and (e) the creditworthiness of the projects to be financed.

3.02 In these respects, the world copper sector is characterized by the following: (a) the concentration of reported proven high grade ore reserves in developing regions (Annex 3); (b) the importance of production in developing countries which contributed around 50% of world (excluding CPE's) copper mine production in 1974 (Chile 14%, Zambia 11%, Zaire 8%,

Peru 3.5%, Philippines 3.5%, Papua-New Guinea 3%) and around 60% of total world trade in copper (intermediates and refined) (Annexes 3 and 7); (c) despite, in many cases, a remoteness from developed areas and major markets, the competitive advantage of developing country sources of copper in terms of least production and distribution costs, estimated to average 10-13c/lb of refined copper (equivalent to 12-13%) as compared with developed country sources (Annex 3); (d) the critical economic importance of copper, in particular its balance-of-payments significance, to its key developing country producers (copper contributed in 1974, 85%, 95%, 65% and 40% of total exports in Chile, Zambia, Zaire and Peru respectively. (Annex 4); and (e) the severe volatility of world copper prices (Annex 5) together with the correspondingly strong cyclical pattern of investment in the industry in the past.

3.03 Clearly, comparative advantage in a purely economic sense would favor concentration of future investment, at least for the coming decade or two, in the developing countries of Latin America, Africa and, to some extent, Asia and Australasia. In practice, however, the interaction of commercial and political factors affecting investment climates is likely to inhibit the most economically efficient investment pattern.

B. Investment Climate in the Developing Countries

3.04 The critical economic importance of the copper sector to the principal developing country producers, the high political visibility of such natural resource sectors and the "feast or famine" volatility of the copper market, exacerbate the commercial risks that foreign investors making large-scale investment in the developing world would usually encounter.

3.05 At times of decline in the world copper market, the usual "down-side" commercial risks of debt-servicing vulnerability can be compounded by the associated balance-of-payments difficulties of the host countries, giving rise to additional exchange rate and currency inconvertibility risks. Naturally enough, such occurrences have also prompted host governments to believe they could benefit by a greater degree of control over the marketing and production of their copper.

3.06 Moreover, at peaks in the world copper market, "upside" risks have arisen for the foreign investor. Unusually large profits have prompted political action to raise the host country's share of the benefits, through such measures as retroactive tax increases in the recent Bougainville case in Papua-New Guinea, or elsewhere by agreements to increase host country ownership in the sector.

3.07 Until recently, the traditional structure of the industry outside of the centrally planned economies was one of complete domination by a dozen or so very large private companies based in the major consuming countries of the developed world (Annex 6). These companies were traditionally

relatively free to respond to market forces with a mininum of state intervention other than in those developed countries where, chiefly for security reasons, stockpiling was common and incentives such as the U.S. depletion allowances were used to maintain domestic industry competitiveness with foreign sources of supply.

3.08 This situation began to change by the mid-1960's as Chile and Zambia in particular began to progressively nationalize their industries and formed in 1967, along with Peru and Zaire, an association of exporting countries (CIPEC), which now accounts for about 35% of world mine production (excluding the CPE's) and 45% of total world trade in copper. The purpose of CIPEC has been mainly to arrive at an agreed policy of copper production and pricing in order to stabilize world copper market prices; but as yet it appears not to have been effective as a market force.

3.09 Nationalization had by 1973 progressed to the point where state enterprises owned all of the industry in Zaire, over 95% in Chile and over 70% in Zambia, though only around 15% in Peru. Subsequently, some minor reduction of state ownership occured in Zaire and Peru and some similar reduction is now expected in Chile. Nevertheless, "indigenousization" of the industry continues to proceed through local private sector participations, "fade-out" arrangements involving for example, gradual sale of shares to employees (as in the Cuajone project in Peru) and through the control of exploration activities and marketing of products by public agencies.

3.10 In the future, producer developing countries can be expected to continue to seek increasing domestic value added and a larger share of the benefits from their copper sectors by: (a) continuing to more fully integrate their industries through raising smelting and refining capacities toward balance with their mining output, thereby largely eliminating present exports of copper intermediates (concentrates and blister); (b) continuing to seek greater control over copper marketing with a view to defensive floor-price oriented copper price stabilization, via perhaps a strengthened CIPEC arrangement; and (c) tending to further expand their industries by whatever means with a greater concern for social returns and lesser concern for private profit than motivated their private sector predecessors.

3.11 The pattern now emerging is a mix of continued investment by state enterprises, sometimes perhaps more attuned in its timing to national plans than to cyclical developments in the market, and innovative types of financial and management arrangements with the private sector. In the recent Cuajone project in Peru, for example, 95% initial foreign ownership and 100% foreign long-term credit financing of the venture was possible. Peru was simultaneously assured more than half of the project's total economic value added, through tax arrangements and an equity fade-out arrangement under which

50% of the equity will gradually transfer to the local mine workers over an estimated 15-year period. At the other extreme is the example provided by Anaconda's undertaking to manage a large state-owned copper project now under construction in Iran.

C. Investment Climate in Developed Countries

3.12 Developed country attitudes toward the copper sector appear to be in a state of flux. While the developed countries still account for half the copper mining and the bulk of the smelting and refining in the world (Annex 7), a growing resource and environment consciousness and the progressive depletion of resources have created political obstacles to the uninterrupted further expansion of their domestic copper industries. This has resulted in delays to some expansions and higher costs of production for most producers.

3.13 In the future, a mix of investment strategies can be anticipated in the developed countries (outside of CPE's), probably reflecting in all instances a large direct or indirect political influence in the decision making of the industry (e.g. through provision of finance, insurance, other incentives for local and foreign investment and trade; and constraints such as environmental legislation).

3.14 A declining share of world output is anticipated in the medium term from developed countries which are now the large miners of copper (US, Canada, Australia and South Africa) and which account for about 50% of world output (excluding CPE's). The US will probably continue to expand output in line with its local market growth, thus maintaining a low import dependence. Recently uncertain investment climates in Canada and Australia have temporarily delayed investments and mineral exploration activity there, and in the longer-term, expansions by these countries are not foreseen to raise their share of world supply through 1990. South Africa is similarly not expected to undertake major expansions and its market share may decline.

3.15 The now likely prospect of declining world trade in copper intermediates (concentrates and blister) and hence of a decline in the custom-smelting and refining industry, particularly in Western Europe and Japan, could mean the gradual disappearance of the copper sector in many advanced countries in the 1980's. Such countries can therefore be expected to aggressively pursue assured long-term sources of refined copper, although they will turn to some degree to substitution possibilities in copper's end uses. Developing regions should continue to benefit from these trends through a variety of arrangements providing a bilateral exchange of technology and finance for a raw material essential to industry in developed countries, whether as concentrate, blister or refined copper.

D. Possible Directions of Investment

3.16 The net effect of current developments in the industry is that roughly 70% of the additional copper mining capacity now financially committed and under construction in the world (outside of the centrally planned economies) is located in developing countries (Annex 3), along with a similar proportion of the further projects in the "active planning stages".

3.17 It may not be unreasonable, therefore, to anticipate almost as high a proportion (i.e. 70%) of total copper industry investment for new and replacement investment to be incurred in the developing countries in the coming decade or so. Such a proportion should also correspond very roughly to a scenario in which: the US maintains its current low import-dependence; Canada, Australia and South Africa maintain their share of total world output; Western Europe and Japan gradually phase out their smelting and refining industries; and the centrally planned economies remain in approximate supply/demand balance. The following table very roughly summarizes the implied distribution of capital investment in the copper sector over the next fifteen years.

Table 3: Fixed Capital Costs/1 of Copper Sector Investments
(in US$ Billions at 1975 constant prices)

	1975-80	1981-85	1986-90	TOTAL
Developing Countries	7.8	10.8	12.7	31.3
Developed Countries (excluding CPE's)	4.4	5.8	7.1	17.3
World (excluding CPE's)	12.2	16.6	19.8	48.6

/1 Excluding permanent working capital requirements estimated to add a further 10-20% of fixed capital costs; excluding also interest during construction which could add a like percentage.

3.18 Of course, for this investment to take place, all of the critical components of viable investment packages must first be assembled. Raw materials sources and producer and consumer country attitudes have already been discussed in general terms. Technology, management and finance are the other key components; and their availability hinges at present largely on the ability and willingness of the world's major producing companies to commit their resources to projects.

E. Past Sources of Finance

3.19 After political factors, the element in this investment package now commonly thought of as most uncertain is the supply of finance on acceptable terms. This is understandable today in view of the increasingly large scale of economic-sized copper mines; the political risks for

equity capital, particularly in developing countries; the severe "down-side" commercial risks of copper price volatility for long-term lenders; and the influence of inflation in raising the cost and shortening the maturities of long-term credit and in threatening extensive project capital cost overruns, which not only reduce project competitiveness but strain the financial abilities of project sponsors.

3.20 Historically, the principal source of risk capital for large-scale new mining ventures has been the internally generated funds of the major mining companies. 1/ These companies have shown a traditional reluctance to float new equity issues or to borrow, perhaps because of their low and declining reported earnings levels 2/ in relation to investors' and creditors' perceptions of the high risks involved. The result apparently was that new projects were financed largely by parent companies until well after World War II.

3.21 However, as the highest grade, most accessible ore bodies became depleted, the size of projects increased dramatically. New and larger-scale technologies were introduced to deal with lower grade copper deposits; and the opening up of more remote ore bodies in undeveloped areas required large infrastructural investment. These trends have so strained the financing capabilities of these companies that they have been obliged to increasingly seek long-term credit financing from commercial, and other sources.

3.22 Direct loans to financially strong, highly diversified or vertically integrated parent companies, or guarantees by such parent companies of loans to their subsidiaries--backed by the "balance sheet" strength of the parent enterprises, rather than by the merits of the particular projects financed--were the initial methods used for raising large amounts of long-term credit finance for mining projects.

1/ A 1968 study for the US Bureau of Mines ("A Quantitative Analysis of Mining Industry Finance", by A.M. Lago) showed that from 1946 through 1966 a large representative sample of US mining enterprises continued to rely on internally generated funds for the bulk of their cash flow needs (averaging around 80-90% in different years). Equity sources usually contributed less than 5% but as high as around 10% in one year; long-term debt between 0% and 20% according to the year.

2/ Financial indicators from Moody's Industrial Manuals were reported by Macgregor and Vickers (Engineering and Mining Journal (E/MJ), September 1974, p. 112) to show for 12 leading North American non-ferrous and industrial minerals producers, low and declining profitability in the industry. Net profit/sales ratios declined from 13.5% in 1966 to 8.5% in 1972; net profit/equity ratios from 14.5% to 9% over the same period.

3.23 During the 1960's and early 1970's, the gradually declining long-term liquidity of these companies 1/, the increasing size and risks of projects and tightening world capital markets, have caused a major swing to "off-balance-sheet" project financing (i.e. linked to the merits of the project rather than the "balance sheet" strength of the sponsors), and to consortia financing (usually involving enterprises from many countries) to spread the risks.

3.24 Large mining projects are now initially very highly leveraged, with anywhere from two-thirds to four-fifths 2/ of total fixed capital costs financed by long-term credit, principally from commercial banking consortia. Creditors have accordingly become progressively more sophisticated in handling these projects, being satisfied at first by long-term sales contracts (such as "take or pay" agreements by project sponsors), clauses requiring mandatory pre-payment of loans out of excess profits and assignment of the foreign proceeds of sales to repayment of foreign debts. Sales contracts, for example, are now being hedged for some minerals in terms of "floor prices", "hell or high water" clauses (i.e., exclusion of "force majeure" loopholes) or backed by additional sponsor guarantees.

3.25 The initial "risk" or equity capital for copper industry ventures still originates principally from the large companies bringing knowhow or assured markets into projects, although state enterprises are beginning to take a larger role as mentioned earlier. This self-financing role of the majors has reputedly exacerbated the cyclical nature of investment in the copper industry since risk capital for new ventures often became available only when copper prices were high, causing delays in new projects during depressed market conditions. By contrast, some degree of counter-cyclical behaviour can perhaps be expected from state enterprises in the future.

3.26 Other non-commercial sources of finance for the non-fuel mineral industry, and for the copper industry in particular, appear to have been

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1/ Published financial statements of a sample of 13 of the largest US mining companies are reported by J. Hammes of FNCB to show an average debt/equity ratio of less than 10:90 in 1964 increasing to 25:75 by 1971 and declining slightly since then to 20:80 in 1974. Of course the contingent long-term liabilities implied in guarantees on behalf of subsidiaries, etc., are excluded from these figures.

2/ Macgregor and Vickers (E/MJ, Sept. '74, p. 114) reported that of the $1.68 billion required for ten of the largest, most recent international copper and nickel mining projects, 83% or $1.39 billion was provided by lending institutions. Initial debt/equity ratios of around 65:35 have been standard in recent IFC copper projects.

inconsequential in amount, accounting for certainly no more than 4-5% of total copper sector investment in the last decade. Of this, bilateral sources would have contributed no more than half and multilateral sources the other half. 1/ It is impossible to say, however, how important a catalytic effect this small investment may have had.

3.27 Similarly, bilateral agency insurance and guarantees have been insignificant in amount and possibly declining over recent years in the copper sector, 1/ because of the rising risk profile of the industry's new projects.

IV. World Bank Group Role in the Copper Sector

4.01 The major issue facing the Bank Group is whether there is a strong enough case for it to assume a special role in promoting the orderly development of world copper output, especially as concerns that of its LDC member countries. The issue involves the following aspects, among others:

(a) The most effective contribution which could be made at the multilateral level is the stabilization (or at least the prevention of large fluctuations) of world trade copper prices above an acceptable minimum price related to production costs (including adequate return on investment) of the highest-cost reasonably efficient producers. The evidence above suggests that the extreme volatility of copper prices has been, aside from purely political factors, the single most important obstacle to raising finance for major mining projects. If this is correct, the question then is whether the Bank Group should itself play a role in establishing a multilateral stabilization scheme, and how this role could most effectively be played. This subject is dealt with in a separate paper being prepared by the Development Policy Staff.

(b) The next question is whether direct Bank Group financing of copper development projects ought to be stepped up and whether this financing should be linked to an effective price stabilization scheme. If there is no such scheme, commercial financing might tend to be scarce and hence the demand for Bank Group financing much larger and the viability of projects more uncertain.

(c) Whatever role the Bank Group decides to play in the case of copper, it is likely to create a precedent for some other minerals for which market conditions and future financial requirements are not dissimilar.

1/ Based on preliminary figures being collected by the staff.

A. Bank Group Role in a Situation of Stabilized Copper Prices

4.02 In the event that some reliable mechanism for copper price stabilization were created, it is probable that all or most of the commercial financing required in the industry's expansion would be forthcoming. Significant reduction of the "downside" risk for project sponsors and creditors may be expected to promote a more than adequate flow of equity and credit finance to the industry, improve the creditworthiness of host developing countries, and perhaps lessen the political risks for foreign private investors. To the extent that unacceptable political risks persisted for essential private participants, a Bank Group financial presence in projects might be justified. Normally, however, the improved financial standing of the producer developing countries could be expected to make them sufficiently capable of financing their own projects in conjunction with external commercial sources of finance and knowhow, as to necessitate only a minimum of direct Bank Group financing. In such a scenario, the principal desirable Bank Group role might therefore be indirect, for example through ICSID or the financing of development expenditures in other sectors of the host countries. However, any such price stabilization scheme cannot be expected to become effective in the short or medium term and severe market price volatility is therefore expected to persist until at least the early 1980's.

B. Arguments for a Greatly Enlarged Bank Group Direct Financing Role

4.03 In view of the likely absence of effective market stabilization for some time, a far more active and difficult role by the Bank Group may be sought, as was done recently in the statements of Dr. Kissinger. The hesitancy and inability of commercial financial sources to make commitments in the copper sector can be expected to increase in the years ahead. Producer and consumer country government intervention in the industry will therefore have to increase substantially or major copper shortages will develop, leading to progressively more expensive copper and greater substitution of metals and plastics for copper in non-essential end-uses.

4.04 Such increased government/public intervention could take several forms:

(i) enlarged bilateral and/or multilateral promotion--through direct financing or guarantee/insurance functions--of low-production cost projects in the developing countries. In view of present international tensions and the decisive trend toward financing of mining projects by consortia comprising institutions from many countries, a preference might prevail for multilateral rather than bilateral support to such ventures. Since, however, technology and knowhow will also be needed from bilateral sources

a mix of bilateral and multilateral support would probably be most appropriate. Innovative financing and management arrangements would be called for, along with a sizeable multilateral financial presence.

(ii) greater self-financing by developing country governments of their potential new copper projects, and stronger efforts by them to stabilize the world copper market. Presumably, they could be in a position to do this once a world copper shortage, real or artificial, had progressed far enough that prices settled at permanently higher levels. Of course this would mean a sometimes irreversible loss of copper markets in favor of less efficient but cheaper substitutes. In addition, more developed consumer countries could meanwhile be encouraged to expand further than otherwise their supply of copper from more assured and controllable high-cost sources in developed countries, and from deep-sea mining. Alternatively, developing country governments might respond to the scarcity of commercial finance by seeking a much larger financial input from bilateral or multilateral agencies.

(iii) greater support, through incentives or more direct financial or other assistance, by developed consumer countries of their domestic producer industries, of deep-sea mining, and of projects in other developed countries which could supply their needs. Governments of some large consumer countries without domestic mines may, in any event, choose to promote copper-substitutes to avoid the prospect of shortages later and, in the event of shortages, make greater efforts to mobilize available copper scrap supplies.

4.05 Orderly and economically efficient development of the world copper market would therefore appear to pose the need for a larger multilateral role than in the past. 1/ However, there are various arguments against a greatly enlarged direct financing role by the Bank Group.

C. Arguments Against a Greatly Enlarged Bank Group Direct Financing Role

4.06 There are three principle arguments against an enlarged Bank Group role in direct financing of the copper sector.

4.07 First, there is the prospect that the total financial demands of the non-fuel mineral sector on Bank Group resources would become excessive.

1/ Annex 8 summarizes past and current Bank Group operations in the copper and minerals sectors.

A very rough estimate of the implicit requirements for Bank Group finance can be made by reference to the table in para. 3.17 of this paper. If Bank Group involvement became essential in all future large copper projects in the developing countries and, if the proportion of total project cost contributed by the Bank Group were to be at least 10-15%, the mininum necessary for a meaningful Bank Group influence in the formulation and execution of any project, 1/ then this would suggest a financial contribution of between US$3.5 and 5 billion over the next 15 years. Almost US$3-4 billion of the implied commitments would have to be made in the next 10 years--i.e. US$300-400 million per year compared to an average of less than US$25 million per annum in the last five years. With the same total Bank Group financial commitment, only 1/3 to 1/2 of all LDC copper projects could be assisted if the average Bank Group contribution were instead to be 30% of total project costs.

4.08 Separate studies would be required to look, in a similar way, at the other non-fuel minerals. However, at this stage we can make some initial approximations. Industry spokesmen have recently mentioned figures in the range of US$100-120 billion (in 1975 prices) as the possible financial requirement of total non-fuel mining industry investment over the next 10 years (1975-85). While our view is that the upper estimate is the more realistic figure, the range indicated would mean that annual capital investment in the industry, now estimated at US$8-10 billion per year, would increase to around US$14-15 billion per year (in 1975 prices) by the mid 1980's. Of this, we have suggested for copper a 70:30 division of investment between LDC's and DC's (para. 3.17). The division of investment will also favor LDC's for aluminum and nickel, particularly in view of the expected trend toward ore processing in low-cost energy locations. For iron ore the division could be even between LDC's and DC's. For lead, zinc and some of the minor metals and other industrial minerals, the greater part of the investment will be in the DC's. Overall, therefore, total investment for the non-fuel mineral sector could be divided evenly between the LDC's and the DC's, implying US$6-7 billion per year in the LDC's over the next 10 years. Clearly, a major overall Bank Group financial role in non-fuel mineral investment would not appear feasible for reasons of the probable size of the total investment required (US$0.6-1.1 billion per annum, using the 10-15% contribution factor), aside from the risks this investment would involve for the Bank Group.

1/ IFC past projects indicate a 5% average contribution in private sector projects. On the other hand, in state-sponsored ventures the Bank has been contributing between 20 and 40%.

4.09 The second argument against an expanded Bank Group financial involvement in the copper sector is that it would place the Bank Group at the center of the raw materials debate between producing (increasingly the LDC's) and consuming countries (industrialized DC's). Presumably the position of the DC's is that the larger the investment in projects, the greater (and hence the more assured) the supply, and the lower prices will be. Conversely, the position of LDC's would be that of containing supply and keeping prices high. In the case of copper, the strength of the argument appears lessened by the common view that aggressive cartel action on copper prices could not be effective. Major developed country producers in the US, Canada, Australia and South Africa, are, as indicated in Annex 3, not significantly higher cost producers than the developing countries and additional copper scrap sources could be mobilized in the consumer developed countries in the event of major shortages.

4.10 Finally, it can be argued that the availability of minerals is so essential to industrial economies that major mineral consuming industries, and/or their governments, will simply have to ensure that enough finance, technology and other resources are committed to the exploration and exploitation of these raw materials so as to protect the vital interests of their basic industries. If such goals of secure supply could no longer be guaranteed through the more traditional large mining companies, this would necessitate other arrangements such as those demonstrated by Japan (a combination of long-term contracts from widely diversified sources, small equity participations, premium pricing, etc.) or other innovative, more flexible approaches. In such a situation, however, there would be strong pressure on the Bank to provide a share of the required financing.

D. Recommended Bank Group Role

4.11 On balance, it is recommended that the Bank Group continue to be selective in the mining projects it supports, concentrating on those projects in which it can either play an essential catalytic role or can help in their formulation and bring about arrangements that will be fair to both host countries and outside technical partners, whether such relationships exist through equity participations or through management assistance contracts. It is believed that with such selectivity we can best serve the interests of developing countries and at the same time avoid substituting for alternative financial resources that may otherwise become available. Following this approach the Bank Group pipeline now contains 18-20 projects which could involve commitments during FY1976-80 of around US$700 million (US$140 million per year). This compares with commitments during FY1971-75 of US$310 million in 11 projects (US$62 million per year).

4.12 Regardless of the size of the Bank Group direct financing role in mining projects there may be some argument for revising slightly its financing requirements in such projects, becoming more prepared, for example, to take the later maturities of debt, thereby allowing other medium

term (including commercial) financing sources to be attracted. Additional flexibility may be possible in other ways too, where financial soundness is not sacrificed. For example, in the case of copper long-term sales contracts (usual in private sector projects) may not be needed where contract prices would in any case be expressed only in terms of world market prices (less perhaps some discount) since copper sales are always assured for any producer at the world market price (London Metal Exchange price).

4.13 The Bank may, in certain instances, be approached to establish "equity funds" in developing countries for the purpose of financing initial equity contributions to mineral projects by the governments of those countries. Such approaches will have to be assessed on their merits but approved on an exceptional basis only, as it would be financially unwise for countries to borrow extensively for such purposes, or for the Bank to commit large amounts of borrowed capital for risk capital purposes.

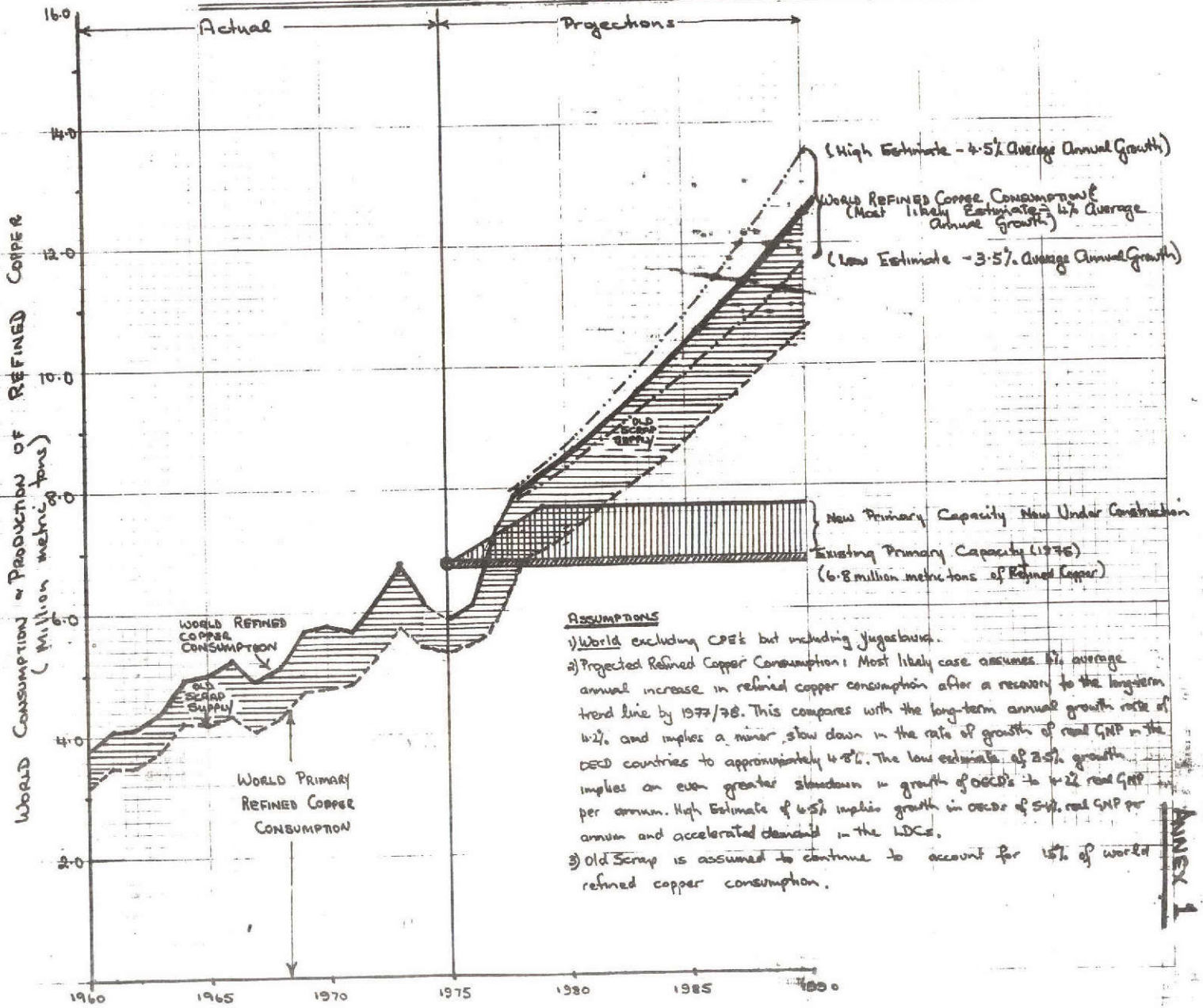
4.14 The Bank Group may increasingly be called upon to reconsider the possibility of providing guarantees or insurance for copper projects and similar raw material projects in the developing world. This would, however, appear to offer only an alternative, rather than a supplemental function to that of directly contributing funds; and might diminish rather than increase the Bank Group's total impact, unless its equity capital base were increased accordingly.

4.15 The importance of ICSID may grow in the future should there be an enlarged private capital flow to the non-fuel mineral sector in developing countries, especially if a lesser direct financial role is assumed by the Bank Group.

Industrial Projects Department
Office of Economic Advisor, IFC
July 21, 1975

WORLD BANK GROUP FINANCING OF INVESTMENTS IN COPPER PRODUCTION

WORLD CONSUMPTION AND PRODUCTION OF REFINED COPPER (1960 - 1990)



ASSUMPTIONS

1) World excluding CPE's but including Yugoslavia.

2) Projected Refined Copper Consumption: Most likely case assumes 4% average annual increase in refined copper consumption after a recovery to the long-term trend line by 1977/78. This compares with the long-term annual growth rate of 4.2% and implies a minor slow down in the rate of growth of real GNP in the OECD countries to approximately 4.8%. The low estimate of 3.5% growth implies an even greater slowdown in growth of OECD's to 1.2% real GNP per annum. High Estimate of 4.5% implies growth in excess of 5% real GNP per annum and accelerated demand in the LDCs.

3) Old Scrap is assumed to continue to account for 15% of world refined copper consumption.

ANNEX 1

WORLD BANK GROUP FINANCING OF INVESTMENTS IN COPPER PRODUCTION

FUTURE CAPITAL REQUIREMENTS IN THE COPPER SECTOR

	1975	1980			1985			1990		
		High	Low	Most Likely	High	Low	Most Likely	High	Low	Most Likely
A. Future Refined Copper Capacity Requirements	(Millions of Metric Tons)									
1. Demand[1]	5.9	8.7	8.3	8.5	10.8	9.8	10.3	13.5	11.7	12.5
2. Secondary Copper Supply[2]	0.5	1.3	1.2	1.2	1.6	1.5	1.5	2.0	1.8	1.9
3. Primary Capacity Required[3] (including reserve capacity)	5.9	8.1	7.8	8.0	10.1	9.1	9.7	12.7	10.9	11.7
4. Existing Primary Capacity[4]	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
5. Cumulative New Capacity Requirements	-	1.3	1.0	1.2	3.2	2.3	2.9	5.9	4.1	4.9
Of Which - Already Financed[5]	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)	(0.9)
- Yet to be Financed	-	(0.4)	(0.1)	(0.3)	(2.3)	(1.4)	(2.0)	(5.0)	(3.2)	(4.0)
B. Future Capital Requirements	(US$ Billions)									
6. Cumulative Investment Required for New Capacity[6]	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
- Already Financed	-	2.0	0.5	1.5	11.7	7.1	10.2	25.5	16.3	20.4
- Yet to be Financed										
7. Cumulative Additional Investment to Maintain Existing Capacity[7]		2.7	2.6	2.6	6.2	5.8	6.0	10.6	9.6	10.1
- For Orebody Depletion	-	3.6	3.5	3.5	8.3	7.7	8.0	14.1	12.8	13.5
- For Equipment Replacement	-									
8. TOTAL CUMULATIVE FINANCING REQUIRED	4.6	12.9	11.2	12.2	30.8	25.2	28.8	54.8	43.3	48.6
9. TOTAL CUMULATIVE FINANCING TO BE ARRANGED[8]	-	8.3	6.6	7.6	26.2	20.6	24.2	50.2	38.7	44.0
10. TOTAL CUMULATIVE FINANCING TO BE COMMITTED[9]	3.1	21.5	16.4	19.7	44.4	33.6	38.5			

1/ Demand for refined copper is derived from the curves presented in Annex 1.

2/ Secondary Supply of Copper: It is assumed that old scrap will, as in the past, continue to provide 15% of refined copper (Annex 1).

3/ Primary Capacity Required: Historically the primary copper producers have operated at about 93% of rated capacity. The estimate for future capacity requirements assume that this trend will continue, with 10% reserve allowed for the fluctuating demand in the copper market.

4/ Existing Primary Capacity: On the basis of data in the Commodities Research Unit (CRU) Report and Engineering and Mining Journal Publications, it is estimated that the existing capacity for primary refined copper production is 6.8 million tons. This takes into account all projects recently commissioned in late 1974 and early 1975 and also includes some of the small higher cost producers now shut down with the depressed copper prices but which are expected to reopen with improvement in the copper prices.

5/ New Capacity Already Financed: An estimate of this capacity was derived from the CRU Report, the Engineering and Mining Journal Project List, the Phelps Dodge Project List and staff estimates. This is estimated to be approximately 900,000 tons divided 70:30 between the LDCs and DCs respectively (see Annex 3).

6/ Capital Investment Required is calculated in 1975 price levels on the assumption that over the next 15 years the total new capacity will be divided between LDCs and DCs 70:30 with an average capital cost of US$5100 per annual ton of refined copper produced (see Annex 3 for more details).

7/ In addition to new capacity required to meet increasing demand, capital investment is also required to maintain the existing capacity at any point in time. This requires investment for (a) replacing orebodies which are worked out (depleted). A rate of depletion of 1½% per annum is assumed (i.e. the average orebody has a life of 67 years); and (b) equipment replacement at an annual rate of 2% of the replacement value of the existing capacity. Both these figures are estimates by Bank staff and are considered realistic. Future refinement of the estimates would require a substantive study of each of the production units of today with an assessment of orebody life for each, and the investment required to replace each depleted deposit.

8/ Total financing to be arranged excludes those projects now under construction for which it is assumed financing has already been obtained.

9/ Because of the significant lead time (5-6 years) for major copper mining and processing projects, project financing requires firm commitments some 5 to 6 years prior to the project reaching full capacity. This applies to projects providing new capacity and also those replacing depleted ore deposits - equipment replacement is generally financed out of cash flow and does not require such extensive lead times.

Industrial Projects Department
July 1975

WORLD BANK GROUP FINANCING OF INVESTMENTS IN COPPER PRODUCTION

COMPARATIVE DATA ON COPPER PRODUCING AREAS

	Developing Countries (LDCs)			Developed Countries						
	Asia & Oceania (excl. Aust. & Japan)	Latin America	Africa	U.S. & Canada	Europe	Australia & Japan	TOTAL DCs	TOTAL LDCs	WORLD (excl. CPEs)	Source of Data
Published Ore Reserves										
1. At US 70¢ 1975 price levels (000 metric tons of Cu content)	30	110	60	120	20	10	150	200	350	US Bureau of Mines & Staff Estimates
(% of total)	(9%)	(31%)	(17%)	(34%)	(6%)	(3%)	(43%)	(57%)	(100%)	
2. At US 100¢ 1975 price levels (000 metric tons of Cu content)	30	140	70	150	20	10	180	240	420	US Bureau of Mines & Staff Estimates
(% of total)	(7%)	(33%)	(17%)	(36%)	(5%)	(2%)	(43%)	(57%)	(100%)	
3. Typical Ore Grades (% Copper)	1-1.5%	0.7-1.8%	3.5-4.5%	0.4-0.9%	0.8-1.5%	0.7-1.2%	0.4-1.5%	0.7-4.5%		
Mine Production 1975										
(000 metric tons of contained copper)	526	1059	1476	2374	260	310	3009	2996	6005	C.R.U. Report
(% of total)	(9%)	(18%)	(24%)	(40%)	(4%)	(5%)	(50%)	(50%)	(100%)	C.R.U. Report
- by State-Owned Enterprise	64	735	1197	0	178	0	68	2106	2174	C.R.U. Report
- by Private-Owned Enterprise	462	324	279	2374	82	310	2941	890	3881	C.R.U. Report
New Mine Capacity (000 metric tons)										
Now under Construction	200	250	230	200	40	5	275	650	925	C.R.U. Report; Engineering/Mining
(% of total)	(22%)	(27%)	(25%)	(22%)	(47%)	-	(30%)	(70%)	(100%)	Journal Project List; Phelps Dodge
In the Active Planning Stage	200	1000	250	600	50	10	670	1440	2110	Project List; Staff Estimates
(% of total)	(10%)	(47%)	(12%)	(29%)	(2%)	-	(32%)	(68%)	(100%)	
Production Costs[1] (US¢/lb. of refined copper)										
Average Net Operating Costs (Cost of putting refined copper on market)	30¢/lb	28½¢/lb	24¢/lb	34¢/lb	30¢/lb	30¢/lb	33¢/lb	26¢/lb	29¢/lb	C.R.U. Report with some staff adjustments. Based upon a survey of actual 1974 costs.
Capital Charges for New Capacity[2]										
(a) @ 10% DCF Return (before tax on total investment)	40¢/lb	37¢/lb	34¢/lb	40¢/lb	40¢/lb	40¢/lb	40¢/lb	32¢/lb	39¢/lb	Staff Estimates
(b) @ 15% DCF Return (before tax on total investment)	59¢/lb	54¢/lb	49¢/lb	59¢/lb	59¢/lb	59¢/lb	58¢/lb	54¢/lb	56¢/lb	
(c) @ 20% DCF Return (before tax on total investment)	73¢/lb	66¢/lb	60¢/lb	73¢/lb	73¢/lb	73¢/lb	72¢/lb	66¢/lb	69¢/lb	
Total Production Costs (1975 Prices)										
(a) @ 10% DCF Return (before taxes)	70¢/lb	65½¢/lb	58¢/lb	74¢/lb	70¢/lb	70¢/lb	73¢/lb	63¢/lb	68¢/lb	
(b) @ 15% DCF Return (before taxes)	89¢/lb	82¢/lb	73¢/lb	93¢/lb	89¢/lb	89¢/lb	91¢/lb	80¢/lb	85¢/lb	
(c) @ 20% DCF Return (before taxes)	103¢/lb	94½¢/lb	84¢/lb	107¢/lb	103¢/lb	103¢/lb	105¢/lb	92¢/lb	98¢/lb	

1/ These are based on data provided by C.R.U., inflated to 1975 price levels. The data was compiled from a survey of the copper producing companies accounting for 96% of total non-communist world production. The costs are exclusive of all capital related charges (depreciation, amortization and return on investment) but are inclusive of all other operating, overhead and transport costs to point of sale; royalties are included but export taxes are excluded. Sales values of by-products (e.g., molybdenum, cobalt, gold, silver, lead, zinc), measured at 1974 price levels, are credited against costs.

2/ These are based upon rough estimates made by Bank staff and are considered to conservatively reflect the comparative advantages of the developing countries. The capital cost estimates take into account the following: (a) a fully-integrated new copper project in the U.S. which is estimated to cost US$6,000/annual ton of refined copper produced; (b) expansions vary between US$2,000/ton and US$4,000/ton; (c) the estimated ratio of grass roots projects to expansion projects; (d) the infrastructure requirements; and (e) the characteristics of the ore reserves in each of the regions. The results are summarized below:

Capital Cost per Annual Ton of Refined Output	
Asia & Oceania	5500
Latin America	5000
Africa	4500
U.S. & Canada	5500
Europe	5500
Total DCs	5400
Total LDCs	5000

The capital charges were therefore calculated assuming a three-year construction period, one-year startup, and fourteen-year operating lives with a capacity utilization of 93% for both the DCs and the LDCs (the historic ratio).

This data needs extensive review, possibly through contracting outside consultants for a special study.

Industrial Projects Department
July 1975

ANNEX 3

ANNEX 4

WORLD BANK GROUP FINANCING OF INVESTMENTS IN COPPER PRODUCTION

Selected Economic Indicators of the Copper Sector's Importance to the Major Developing Country Producers

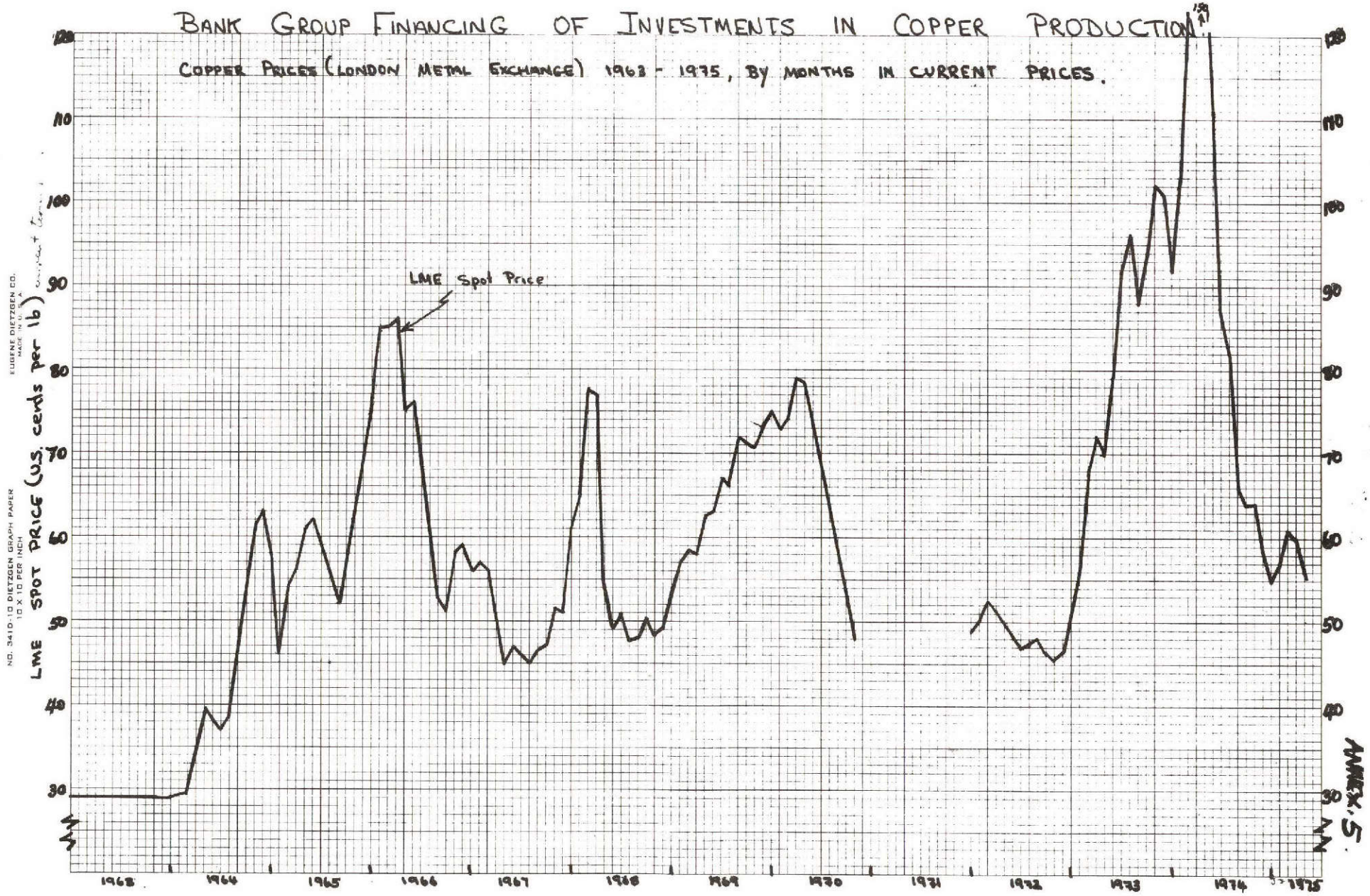
	Latin America				Africa				Asia/Australasia						Total of Selected Countries		Total of World (excl. CPE's)		Selected Countries as % of World (excl. CPE's)	
	Chile		Peru		Zambia		Zaire		Philippines		Papua New Guinea		Indonesia							
	1973	1974	1973	1974	1973	1974	1973	1974	1973	1974	1973	1974	1973	1974	1973	1974	1973	1974	1973	1974
																			%	%
Copper Production ('000 metric tons of copper content)																				
Mine	735	898	220	213	707	698	490	500	221	226	183	193	38	63	2594	2791	6006	6168	43.2	45.2
Smelter	590	720	173	179	689	709	485	480	--	--	--	--	--	--	1937	2088	6379	6550	30.4	31.9
Refinery	415	525	39	39	639	677	230	210	--	--	--	--	--	--	1323	1451	6697	6867	19.8	21.1
Value of Copper Exports as % of Total Merchandise Exports	82%	85%	30%	39%	94%	95%	64%	64% (1980 proj'n: 75%	15%	15%	55%	68%	2%	3%						
Percent of GDP from Copper Sector*	around 10% *		around 5% *		40% *	40% *	1968-71 around 20%*		n.a.	n.a.	n.a.	24% *	insignificant							
Labor Force Directly Employed in Copper Sector	around 40,000		around 50,000		around 65,000		around 30,000		1972 20,000		n.a.	n.a.	insignificant							
Percent of Gov't Revenues from Copper Sector (royalties, taxes, dividends)	n.a.	28-34%*	n.a.	around 5%*	27%*	50%*	1969-73 40% of total tax revenue*		1971-72 6%		n.a.	around 25%*	insignificant							
Investment in Copper Sector as % of Gross Fixed Capital Investment	15% of public investment		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1971-72 2-3%		1969-72 half of total capital formation		insignificant							

* Includes the contribution of other minerals extracted in copper mining.

IFC - Office of the Economic Adviser
July 15, 1975

BANK GROUP FINANCING OF INVESTMENTS IN COPPER PRODUCTION

COPPER PRICES (LONDON METAL EXCHANGE) 1963 - 1975, BY MONTHS IN CURRENT PRICES.



COPPER PRODUCTION BY LEADING COMPANIES, 1968-72

(In Thousand Short Tons)

Name of Company	Major Holding Company and its Country of Origin	1968	%	1969	%	1970	%	1971	%	1972	%
American Smelting	American Smelting & Refining/U.S.A.	89.0	1.8	101.1	1.9	100.0	1.8	92.0	1.6	108.0	1.7
Anaconda	Anaconda/U.S.A.	550.0	11.4	590.0	11.1	672.0	11.8	227.4	4.0	243.0	3.9
Baghdad Mine	Baghdad Mining Co./U.S.A.	19.0	0.4	18.0	0.3	17.3	0.3	20.0	0.4	19.0	0.3
Copper Range	American Metal Climax/U.S.A.	74.0	1.5	78.4	1.5	68.0	1.2	58.4	1.0	70.4	1.1
Duval Corporation	Duval Corporation/U.S.A	63.1	1.3	64.0	1.2	97.0	1.7	124.5	2.2	113.0	1.8
Inspiration	Mines Investment Corporation/U.S.A.	43.0	0.9	66.0	1.2	66.0	1.2	56.1	1.0	70.1	1.1
Kennecott	Kennecott/U.S.A.	552.4	11.4	699.0	13.2	713.4	12.5	456.1	8.1	461.0	7.5
Magma	Newmont Mining Co./U.S.A.	87.0	1.8	113.3	2.1	112.3	2.0	101.1	1.8	149.5	2.4
Phelps Dodge[1/]	Phelps Dodge/U.S.A	213.2	4.4	284.2	5.4	313.6	5.5	281.2	5.0	305.4	4.9
Pima Mining	Cyprus Mines Corporation/U.S.A.	64.5	1.3	65.6	1.2	66.3	1.2	68.1	1.2	82.8	1.3
Tenn. Corporation	Miami Copper Co./U.S.A.	24.0	0.5	29.6	0.6	33.9	0.6	31.0	0.5	30.0	0.5
Anglo American Group[2/]	Anglo American Corporation/U.K.	403.0	8.3	426.3	8.0	438.3	7.7	446.0	7.9	483.2	7.8
Atlas Consolidated	No Information Available	46.5	1.0	51.0	1.0	48.0	0.8	81.1	1.4	88.1	1.4
Campbell Chibougamau (Canada)	No Information Available	12.0	0.3	17.0	0.3	15.0	0.3	18.1	0.3	13.3	0.2
Cerro de Pasco (Peru)	Cerro Corporation/U.S.A.	53.0	1.1	53.0	1.0	50.0	0.9	49.0	0.9	57.1	1.0
Craigmont Mines (Canada)	Canadian Exploration Limited/Canada	17.0	0.4	17.3	0.3	17.0	0.3	20.0	0.4	24.0	0.3
Falconbridge	Falconbridge/Canada	22.1	0.5	23.0	0.4	31.4	0.6	63.0	1.1	69.1	1.1
Gaspa Copper	Noranda Mines Limited/Canada	33.0	0.7	29.0	0.6	34.5	0.6	35.0	0.6	33.3	0.5
Geco Mines	Noranda Mines Limited/Canada	31.0	0.6	31.0	0.6	23.8	0.4	37.7	0.7	36.0	0.6
Granby	Pacific Mining Corporation/Canada	4.1	0.1	5.0	0.1	6.0	0.1	6.0	0.1	5.5	0.1
Hudson Bay	Hudson Bay Mining & Smelting Co./Canada	51.1	1.1	51.5	1.0	51.0	0.1	32.0	0.6	60.0	1.0
International Nickel	International Nickel Co. of Canada/Canada	162.5	3.4	110.0	2.1	178.0	3.1	173.0	3.1	166.0	2.7
Katanga	Government Owned/Zaire	358.0	7.4	399.3	7.5	425.0	7.5	447.4	7.9	472.0	7.6
Mount Isa	American Smelting & Refining/U.S.A.	69.2	1.4	89.0	1.7	97.2	1.7	128.5	2.3	130.0	2.1
Noranda	Noranda Mines Limited/Canada	22.0	0.5	22.0	0.4	19.4	0.3	19.0	0.3	18.1	0.3
O'Okiep	American Metal Climax Inc./U.S.A.	41.1	0.9	37.1	0.7	39.2	0.7	38.0	0.7	40.4	0.7
Opemiska	Falconbridge Nickel Mines Ltd./Canada	20.4	0.4	20.0	0.4	20.0	0.4	-	-	-	-
Outokumpu Oy	Outokumpu Oy/Finland	40.0	0.9	37.3	0.7	37.5	0.7	35.6	0.6	42.4	0.7
Roan Selection Trust Group[3/]	American Metal Climax Inc./U.S.A.	337.0	7.0	368.2	6.9	338.0	5.9	276.0	4.9	268.0	4.3
Southern Peru	American Smelting & Refining/U.S.A.	151.3	3.1	133.2	2.5	148.0	2.6	140.2	2.5	137.2	2.2
Tsumeb (West Africa)	Newmont Mining Corporation/U.S.A.	33.0	0.7	30.2	0.6	30.5	0.5	27.0	0.5	19.4	0.3
TOTAL - Leading Companies		3686.5	76.5	4059.6	76.5	4307.6	75.0	3588.5	63.6	3815.3	61.4
TOTAL - WORLD (excluding CPE's)		4843.0	100.0	5300.0	100.0	5702.0	100.0	5643.0	100.0	6186.0	100.0

1/ Includes copper produced from purchased ores

2/ Nchanga consolidated

3/ Mulfulira, Luanshya, Chibuluma Kalengwa, and Chambishi

SOURCE: American Bureau of Metal Statistics and Company Reports

Industrial Projects Department
July 1975

Annex 7

WORLD BANK GROUP FINANCING OF INVESTMENTS IN COPPER PRODUCTION

WORLD DISTRIBUTION OF COPPER PRODUCTION AND CONSUMPTION, 1974

	Developed Countries			Developing Countries			Total LDCs	Total DCs	Total World (ex CPEs)
	US and Canada	Europe	So.Africa Japan and Australia	Africa	Asia and Oceania	Latin America			
	(000 metric tons of copper content)								
Mine Production	2272	283	507	1302	580	1224	3106	3062	6168
Smelter Production	2035	851	1351	1279	51	983	2313	4237	6550
Refined Production	2497	1451	1274	919	51	675	1645	5222	6867
Consumption of Refined Copper	2272	2549	1030	21	111	271	403	5851	6254

Source: World Metal Statistics, February 1975.

Industrial Projects Department
July 1975

WORLD BANK GROUP FINANCING OF INVESTMENTS IN COPPER PRODUCTION

Sources of Funds in World Bank Group-Assisted Operations in the Copper and Non-Fuel Minerals Industries

(Figures in current US$ millions)

Fiscal Year IBRD/IFC Loan Agreement	Country, Project Name and Production Capacity Life of Proven Reserves	Names and Nationalities of Principal Project Sponsors	Sources of Project Long-Term Finance 1/													Total Project Cost (7)+(12)
			Long-Term Loans								Equity					
			Foreign Loans					Local Loans			Foreign		Local			
			Commercial	Bilateral Agency Direct and Indirect Finance 2/	Of (1)+(2) Suppliers' Credits	IBRD	IFC	Commercial	Gov't	Total Loans (Sum (1) to (6))	Commercial	IFC	Commercial	Gov't	Total (Sum (8) to (11)	
			(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
COPPER:																
1957, 1959	Chile, MINESA 17,250 m.t.p.y. refined copper, 15 yrs.	Minesa (Chile)	2.0 2.0 (1959)	-- --	-- 0.2 (1959)	-- --	2.2 0.9 (1959)	2.2 2.9 (1959)	-- --	6.4 5.8	-- --	-- --	6.4 --	-- --	6.4 --	12.8 5.8
1968	Mauritania, SOMIMA 29,000 m.t.p.y. copper contained in concentrate, 15 yrs	Charter Group(UK) French Group Mauritainan Government	9.3	11.0(EIB)	--	--	16.5	--	--	36.8	14.5	3.5	--	5.0	23.0	59.8
1970	Chile, Sagasca 24 000 m.t p.y. copper contained in concentrate, 11 yrs.	Continental Copper (US) Codelco (Chilean Gov't)	Customers 10.0 Sponsors 2.6	--	--	--	8.7	--	0.9	22.2	6.4	1.3	--	2.6	10.3	32.5
1974	Peru, Cuajone 145-190 000 m.t.p.y. copper contained in blister, 35 plus yrs.	SPCC (US) comprising Asarco, Cerro, Phelps Dodge, Newmart Billiton (Netherlands/UK)	Customers 51.0 Other 200.0	75 3/ EXIM-US 43-ECGD-UK	141.0	--	15.0	--	--	407.0	237.0 4/	--	--	--	237.0	644.0 5/
1975	Zaire, Gecamines 120,000 m.t.p.y. refined copper, 40 plus yrs.	Gov't of Zaire	--	100.0 (Libya) 20.0 (EIB)	--	100.0	--	--	--	220.0	--	--	--	240.0	240.0	460.0
Total Past Copper Projects:			276.9	249.0	141.2	100.0	43.3	5.1	0.9	698.2	257.9	4.8	6.4	247.6	516.7	1214.9

Possible IBRD Contribution

Pipeline:			Estimated Proj. Cost
	Chile	Codelco (Gov't)	$ 30.0 million Project to Maintain Existing Capacity Only — $ 55.0 mil.
	Peru	Centromin (Gov't)	$ 58.0 million 6,000 m.t.p.y. refined copper; 50,000 m.t.p.y. — $150.0 mil.
			$ 88.0 million contained copper in concentrates — $205.0 mil.

1/ Including interest during construction and permanent working capital except see 5/ below.
2/ Includes finance not directly contributed by bilateral agencies but guaranteed/insured by them; includes also minor non-Bank Group multilateral agency contributions.
3/ 20 million under US-EXIM Bank guarantee
4/ 5 percent of this was indirectly contributed by Peruvian mine workers through their 7 percent ownership of SPCC at that time.
5/ Excludes $112 million of permanent working capital to be arranged by SPCC.

IFC - Office of Economic Adviser
July 11, 1975

THE NON-FUEL MINERAL INDUSTRY
PAST BANK GROUP OPERATIONS IN THE MINERAL SECTOR

Region/Country	Name of Borrower	IBRD/IDA/IFC	Date of Loan Agreement	Amount of Contribution (US$ millions)	Project/Bank Group Financed Component
EAST AFRICA					
Botswana	Republic of Botswana	IBRD	June 30/71	32.0	Shashe Nickel Project/Infrastructure (townsite, road, rail, water) facilities only
Zaire	Generale des Carrieres et des Mines du Zaire (Gecamines)	IBRD	March 8/75	100.0	Copper Mining and Processing Facilities
WEST AFRICA					
Gabon	Compagnie Miniere de L'Ogoove (COMILOG)	IBRD	June 30/59	35.0	Manganese Ore Project/Mine, Cableway, Railroad and Port
Congo-Graz	Compagnie des Potasses du Congo (CPC)	IBRD	January 9/67	30.0	Potash Project/Mining, Benefication, Transport and Port facilities
Guinea	Republic of Guinea	IBRD	September 18/68	64.5	Boke Bauxite Project/Infrastructure (Railway) facilities only
"	Republic of Guinea	IBRD	June 25/71	9.0	Boke Bauxite Expansion Project
Mauritania	Societe Anonyme des Mines de Fer de Mauritanie (Miferma)	IBRD	March 17/60	66.0	Iron Ore Project/Mines, Railway and Port
"	Societe Miniere de Mauritanie (SOMINA)	IFC	May 68	20.0	Copper Project/Mining, Beneficiating, Townsite and Port
ASIA					
India	Government of India	IBRD	August 9/61	35.0	Private Sector Coal Production/Mining, Washing facilities
"	Indian Iron and Steel Company	IBRD	December/61	19.5	Chasnalla Coal Mining Projects/Mining, Washing Cable facilities
Philippines	Marinduque Mining and Industrial Corp.	IFC	July 6/71	15.0	Nickel Project/Mining Smelting facilities
EUROPE, MIDDLE EAST & NORTH AFRICA					
Israel	Dead Sea Works, Ltd.	IBRD	July 11/61	25.0	Potash Production/Evaporation and Material Handling facilities
Greece	Aluminum de Grece, Societe Anonyme Industrielle et Commerciale	IFC	May 70	8.6	Aluminum Project/Smelting facilities
Tunisia	Compagnie des Phosphates et du Chemin de Fer de Gafsa (GAFSA)	IBRD	October 75	23.0	Phosphate Mining and Washing facilities
LATIN AMERICA & CARIBBEAN					
Dominican Republic	Falconbridge Dominicana C por A (Falcondo)	IBRD	December 10/69	25.0	Ferro-Nickel Project/Infrasture (Power) facilities only
Bolivia	Banco Industrial S.A. (BISA)	IDA	February 74	6.2	Minning Credit to Medium Miners
Mexico	Minera del Norte	IFC	February 70	1.5	Iron Ore Project/Mining
Brazil	Companhia Mineira de Alumino (Alcominas)	IBRD	January 26/68	22.0	Aluminum Project/Mining, Refining and Smelting facilities
"	Mineracoes Brasilieras Reunidas S.A. (MBR)	IBRD	August 25/71	50.0	Iron Ore Project/Mining Beneficiating and Port facilities
"	Rede Ferroviaria Federal S.A.	IBRD	August 25/71	46.0	Iron Ore Project/Infrastructure (Rail) facilities only
"	Empresa de Desenvol vimento Recursos Minerales (CODEMIN)	IFC	April 24/73	30.0	Mining and Refining Nickel
Chile	Corp. de Fomento de la Produccion and Carbonifera	IBRD	July 24/757	12.2	Lota Coal Mine/Mine Equipment
"	Produccion and Carbonifera	IBRD	July 24/57	9.6	Schwager Coal Mine/Mine Equipment
"	Empresa Minera de Mantos Blancos, S.A.	IFC	February 57,59	3.1	Mantos Blancos Copper Mine/Mining and Smelting facilities
"	Minera Sagasca, S.A. (MINESA)	IFC	February 70	10.9	Sagasca Copper Mine/Mining and Leaching facilities
"	Southern Peru Corporation (CUAJONE)	IFC	September 75	15.0	Copper Project/Mining; Smelting; Transportation, Townsite and Other Infrastructure
Guatemala	Exploraciones Y Explotaciones Mineras Izabal (EXMIBAL)	IFC	/75	15.0	Lateritic Nickel Mining and Metallergical Processing to Sulphide Matte

Totals	No. of Operations	Commitments	Average Size of Commitment
IBRD/IDA	18	US$610 million	US$33.9 million
IFC	9	US$119 "	US$13.2 "
Total Bank Group	27	US$728 "	US$27.0 "

INTERNATIONAL DEVELOPMENT ASSOCIATION | INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT | INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Mr. Wouter Tims, Director, EPD DATE: January 20, 1976

FROM: A. Karaosmanoglu, A.K. Director, Dev. Policy

SUBJECT: Copper: Current Situation and Outlook for 1976

I think Messrs. Takeuchi and Tiebach have now produced a very good paper but, as we have already discussed, I have serious reservations on the idea of circulating short-term commodity papers to the Board with the possible exception of foodgrains.

My reservations stem from the following questions:

i. What would be the value of short-term commodity papers in the deliberations of the Board?

ii. How many such papers could we produce per year?

iii. What should be the criteria in choosing the commodities for which papers will be presented to the Board?

In cases where major changes in the short-term prospects for a commodity create a need for program lending, the necessary analysis could easily be incorporated in the project report.

If you have no objections, I suggest we circulate this paper to the President's Council and the staff, but not to the Board.

AKaraosmanoglu:mb

cc: Messrs. Chenery
King
Avramovic
Takeuchi
Tiebach

Attila

1. I have my doubts about the copper paper.

2. The key para. is no. 24, which is not too clear anyway. Anyhow the first question is when the upturn will come and how long after copper prices will follow it. Hence, with two uncertainties, any <u>average</u> price for 1976 must be the average of 56c for x months and some rising figure for the remaining (12-x). For one "x", it is 67c and for another it is 60c.

3. Secondly there is the problem of Angola and Zambia; the question of Chilean policy (para 22) and so on. The 60c or 67c average is presumably based on some most likely eventuality in these problems.

4. I am not sure that the information given in this document is useful enough to the Board to counterbalance the possible adverse effects of a very easily garbled leak. The qualifications in the paper are many and key ones inevitably disappear or be distorted.

5. Perhaps a version which deemphasizes 1976 (in the title and para 2) might be better.

6. A typo on p4 and suggestion for easier understanding of tables 2 & 4 indicated in the text.

FORM NO. 75
(7-73)

WORLD BANK GROUP

ROUTING SLIP	DATE January 16, 1976
NAME	ROOM NO.
Mr. Karaosmanoglu	E.723

	APPROPRIATE DISPOSITION		NOTE AND RETURN
	APPROVAL		NOTE AND SEND ON
	COMMENT		PER OUR CONVERSATION
	FOR ACTION		PER YOUR REQUEST
	INFORMATION		PREPARE REPLY
	INITIAL		RECOMMENDATION
	NOTE AND FILE		SIGNATURE

REMARKS

For your clearance.

Your suggestions on the draft have been incorporated and Mr. Tims has given approval.

FROM	ROOM NO.	EXTENSION
K. Takeuchi	D.434	4107

SecM76-

FROM: The Secretary

COPPER: CURRENT SITUATION AND OUTLOOK FOR 1976

Attached for information is a note, prepared by the Development Policy Staff, on the current world copper situation and outlook.

Distribution:

Executive Directors and Alternates
President
Senior Vice President, Operations
Executive Vice President and Vice President, IFC
President's Council
Directors and Department Heads, Bank and IFC

No.

COPPER: CURRENT SITUATION AND OUTLOOK FOR 1976

Commodities & Export Projections Division
Economic Analysis & Projections Department
Development Policy Staff
January 1976

TABLE OF CONTENTS

COPPER: CURRENT SITUATION AND OUTLOOK FOR 1976

I. Summary and Conclusions

1. The short-term outlook for copper prices is for a moderate increase, depending on how fast world industrial production, and hence consumer demand for copper, recovers from the recent recession. Stocks are abnormally high at the moment, while world 1/ copper production capacity is grossly under-utilized because of production cuts around the world. Though these two factors are likely to delay a rise in price for several months after consumption begins to recover, when speculative demand revives copper prices are likely to climb rapidly. Political developments in Angola, which are affecting Zambia's copper exports, could curtail its copper supply to the world market substantially if they should persist.

2. It is expected that 1976 copper prices at the London Metal Exchange (LME) will be higher than the 1975 average of $0.56 per pound; though their actual level will depend on the interplay of various factors. The most pessimistic forecast indicates an LME copper price of $0.60 in current dollar terms. An average price of about $0.67 seems most likely at present.

II. Recent Developments

A. Demand

3. After its increase of 11.2% in 1973, world consumption of refined copper declined by 6.3% in 1974, and by mid-1975 was 22% lower than a year earlier (see Table 1). Industry demand for refined copper continued to be quite weak through 1975, reflecting the unexpected depth and length of the recession.

4. Measured income elasticities of demand for copper range from 0.5 to 0.9, depending on a country's stage of economic development. However, there is typically a time lag of six to nine months between a change in economic activity and the reaction of industry demand. Copper consumption generally progresses in a rather erratic manner, which partly reflects the cyclical demand pattern for copper, but also results from the form of the statistics.

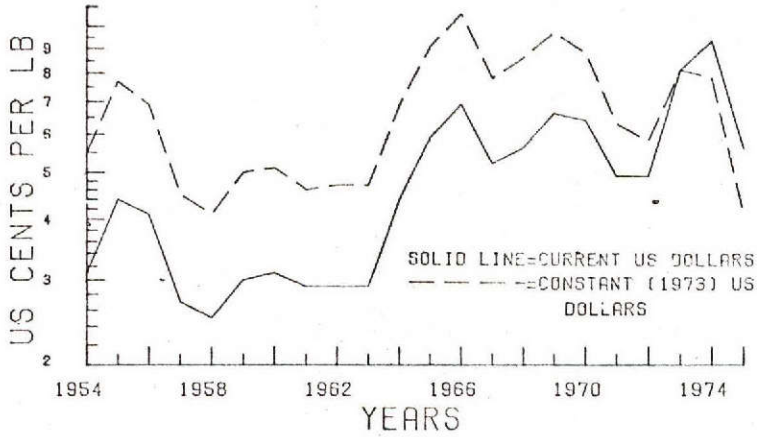
5. Consumption statistics are somewhat misleading as they reflect consumer inventory changes as well as actual consumption. Changing levels of consumer stocks tend to obscure actual consumption: in 1970-71, for example, when consumer inventories were growing, actual consumption was less than the figures imply. In 1974-75, on the other hand, the opposite appears to have been the case, and consumer stocks are now at a low level.

6. Major copper using industries and their estimated shares of copper consumption in 1973 are listed below:

1/ "World" here excludes the centrally planned countries (CPCs), unless noted otherwise.

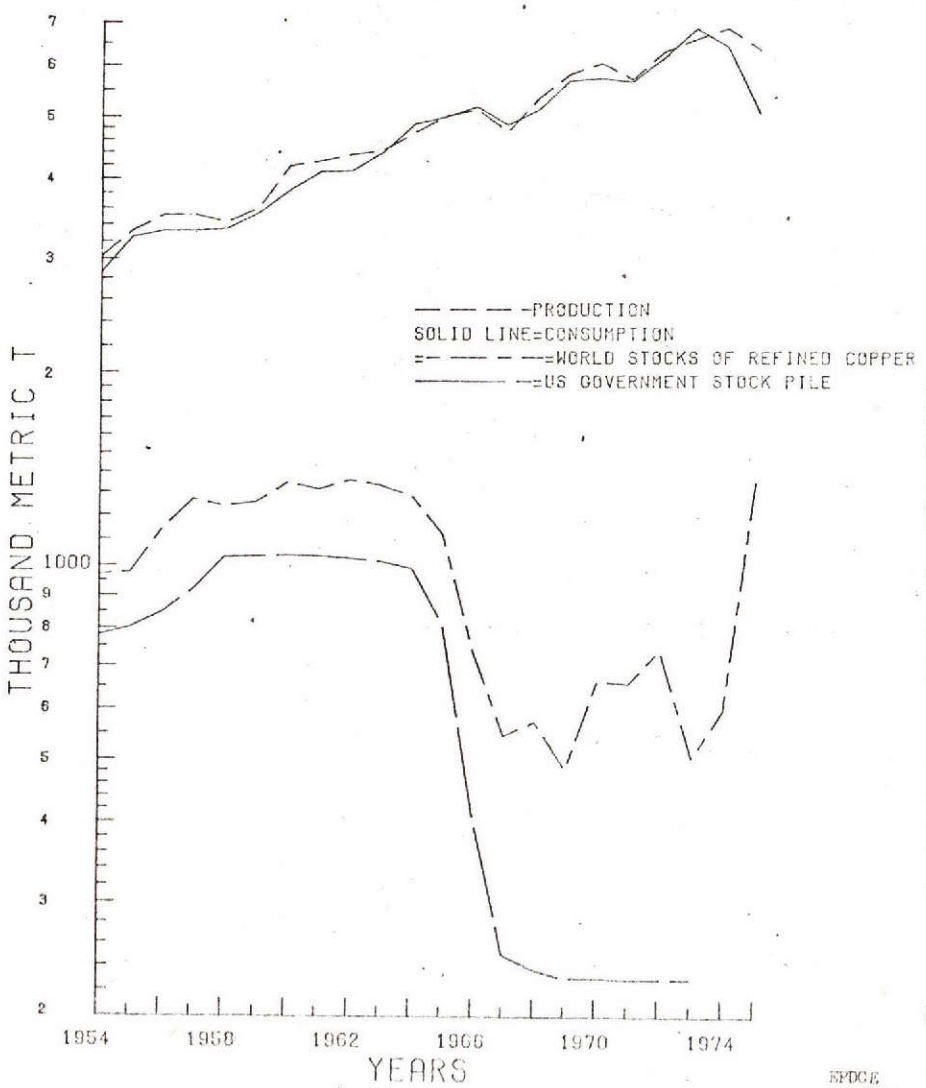
CHART 1.

COPPER PRICE, LME, 1954-1975



DEFLATOR: IBRD INDEX OF INTERNATIONAL INFLATION (C.I.F. INDEX) - 1973=100

PRODUCTION, CONSUMPTION AND STOCKS, REFINED COPPER 1954-1975



EPDCE
1/15/76

Industry	Share in total copper use (Percent)
Generation and distribution of electric power	35-40
Industrial machinery and equipment	20-25
Building construction	12-15
Communications	10-12
Transportation incl. automobiles	7-9
Military, coinage, appliances	6-8

Some of these industries were more affected by the recent recession than industry in general. The housing, transport and electrical industries suffered not only from the effects of the recession but also directly from its causes, such as the petroleum price increase and the high rates of inflation. Moreover, it may also be the case that the housing and automobile industries have entered a new cycle that reflects a reduction in the population growth of major industrialized countries.

B. Supply

7. In 1974 world copper production increased over 1973 in the face of declining consumption. Copper mine production outside CPCs in 1974 reached 6.2 million metric tons, about 3% more than in 1973 (Table 2). World refined copper production rose by 4% (Table 3). There was an interesting difference, however, with respect to trends in different countries. While U.S. production declined in 1974, with mine production falling by 7% and refined production by 8%, output in the rest of the world increased, with mine production increasing by 6% and refined production by 8%. The production change outside the U.S. was largely due to developments in Chile, which in 1974 achieved a 23% production increase over 1973 and regained its second place among world producers of newly mined copper. The U.S. production decline resulted from cutbacks in reaction to low prices, which made a number of operations unprofitable.

8. CIPEC members[1/] agreed to a reduction of copper shipments of 10%, from the average volume exported in the preceding six months, to take effect in December 1974. They decided to reduce shipments by another 5% and to cut production by 15% beginning in April 1975. In fact, CIPEC output during the first half of 1975 was only 5% less than for the comparable period in 1974 (when output was very high for reasons discussed in paragraph 7).

9. There have been production cutbacks since the second half of 1974 but the decline in production has not matched the sharp fall in demand. World mine production in the first half of 1975 was only 6 percent lower than during the same period of 1974 and refined copper production declined by slightly over 7%. However, this reduction was rather small in view of the 22% fall in refined copper consumption.

1/ CIPEC (Conseil Intergouvernemental des Pays Exportateurs de Cuivre), the Intergovernmental Council of Copper Exporting Countries, was formed in 1967 by Chile, Peru, Zaire and Zambia. In November 1975 Australia, Indonesia and Papua New Guinea became members of CIPEC. In 1974, the original four members accounted for 38% of world copper mine production and 60% of world copper exports.

C. Stocks

10. The widening gap between demand and supply resulted in accumulation of stocks which are presently (January 1976) estimated at some 1.4 million metric tons, equivalent to about 2.6 months' consumption. However, this "overhang" should be discounted somewhat for the following reasons. First, statistical information on stocks is notoriously unreliable, partly because of cyclical changes in coverage: at times of sluggish demand, stocks tend to be held by producers and are being accounted for, while during the upturn of the business cycle they move to consumers. There they become less visible and are often not reported. Second, the U.S. strategic stockpile, an important source of refined copper in the past, has been depleted. If the present level of stocks is compared to historical stock figures including the U.S. stockpile the "overhang" appears to be much less formidable (Table 4).

11. The U.S. stockpile which stood at 1 million metric tons during the 1958-1964 period was used to ensure an adequate supply of copper for the U.S. industry and to defend government wage-price guidelines. The three years 1965-67 saw the release of about 760,000 metric tons, which helped to relieve the supply/demand imbalance that caused record LME prices, surpassed only in 1973-74. In early 1974 the U.S. stockpile was virtually eliminated, with the sale of 230,000 metric tons, in stock since 1968, at prevailing high prices.

12. Recently some new government-sponsored stockpile schemes have been implemented in France and in Japan. So far, the French stockpile amounts to an estimated 60,000 tons. In Japan, there are government plans to help finance stocks accumulated by industry, which stood at about 200,000 tons as of June 1975.

D. Prices

13. Copper prices[1/] were very strong in 1973 and early 1974 with LME price reaching an all-time high of $1.52 per pound on April 1, 1974. Thereafter, prices declined rapidly and by December 1974 the monthly average LME price was down to $0.58 per pound. During 1975 the market remained depressed as stocks

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1/ Copper is priced in three markets, the London Metal Exchange (LME), the Commodity Exchange in New York (COMEX), and the producer-controlled markets. The London Metal Exchange is the most important "pricing" market for copper since the bulk of international copper trade (although contracted directly by producers and consumers) is undertaken at LME prices. The Commodity Exchange in New York is smaller and far less significant than the LME. Due to arbitration, COMEX quotations usually differ by only a few US cents per pound from LME quotations. In some countries (Canada, US, COMECON) copper is also traded on the basis of producer prices - selling prices which are usually fixed by major producers and kept unchanged for several months.

arbitrage!

continued to increase. The average LME price for 1975, at $0.56 per pound, represents the lowest annual average since 1957 if adjusted for changes in the international price index (c.i.f. index). 1/

14. U.S. producer prices of primary copper were frozen over the first four months of 1974 at 68¢ per pound. When U.S. price controls were terminated, the producer price jumped to 80-82¢ per pound. In early June producer quotes has moved further up to 87¢ per pound. Subsequent changes in the producer prices were all downward, and since February 1975 it has remained at 64¢ per pound (in current terms). The LME and U.S. producer prices have differed by over 10 cents in some months. Since the additional cost of importing copper from the LME warehouses in Europe into the U.S. is 5¢/lb. at most, the U.S. producer price would normally be under pressure. However, industry spokesmen consider the present U.S. producer price a "floor" in view of operating costs.

III. Outlook

A. Economic Growth in OECD Countries

15. Forecasts of economic growth in the OECD area are being revised, but an interim IBRD projection dated September 1975 is for a GNP growth rate of 5.2% in 1976, following a shrinkage of GNP by 2.1% in 1975. Growth rates will differ between the major industrialized countries (see Table 5), and the U.S. economy is expected to lead the recovery with GNP growth projected at 5.6%. Annual growth rates for European OECD countries and Japan are expected to be between 2.4% (U.K.) and 7.8% (Japan). Weighted by their shares in copper imports, OECD countries' industrial output would rise by 4.9% on average; details are given in Table 6.

B. Prospects for Copper Using Industries

16. The developed countries' major copper using industries -- the electrical and the equipment industries -- suffer at present from uncertainty and lack of financing. Plant and equipment expenditures are not expected to increase much in 1976, while electric utility outlays in the industrialized countries are likely to be limited by uncertainties about long-term electricity demand and fuel availability. To what extent the impact of slow growth in these industries on copper consumption can be offset by orders from developing countries, including oil producing countries, is not yet clear. A number of countries have implemented measures to support the construction industry and a moderate increase has been observed in construction activity in the U.S. and in Japan. However, a return to the levels of the past decade appears unlikely in the next few years. The outlook for transportation is similarly mixed, although the automobile industry recently reported unexpected favorable output growth in Japan, in the U.S. and in Germany.

1/ Depending on particular objectives, inflation can be measured in terms of several different indices. Those commonly used include the implicit GNP deflators, and indices of wholesale and retail prices. The c.i.f. index of prices of developed countries' manufactured exports, to all destinations, is used as the deflator when commodity prices are expressed in "constant dollars" to present the purchasing power of primary products. (See IBRD Report No.814, Price Forecasts for Major Primary Commodities, July 1975, p.12).

C. Supply and Demand

17. The excess of copper supply is likely to be much reduced in 1976: refined copper consumption, including rebuilding of consumer stocks, will increase substantially, perhaps by as much as 20%, while only a small increase is foreseen for refined copper production.

18. Short-term price forecasts for copper are primarily but not exclusively based on the relationship between the current year's consumption and the previous year's production. Therefore, the main determinant of price developments in 1976 will be the expected rise in consumption, while prices in later periods will depend to a greater extent on changes in refined copper production in 1976 (see Annex). Two alternative assumptions regarding refined copper production in 1975 have been used since complete data were available only for the first half of 1975: (a) that based on the actual percentage reported for the first half of 1975 refined production will be 7.3% lower than in 1974; (b) that, assuming a further production decline in the second half of 1975, in line with available data for some countries, refined production for the year will be 10.8% below the 1974 level.

D. Expectations and Speculation

19. Recent developments in the copper market confirm that in the short run copper prices tend to be strongly influenced by expectations and speculation. Early in 1974 copper prices continued to rise while the market failed to respond to the sharply increased level of production. In addition, an anticipation of a prolonged copper strike in the U.S. supported high prices in the face of a government decision to sell 230,000 tons of copper from the strategic stockpile.

20. In 1976, copper prices could again be influenced by expectations and speculation, perhaps fueled by developments not directly related to the copper industry. The price of gold, for example, will continue to influence the prices of other non-ferrous metals, as will judgments on developments in Angola and Zambia. 1/ Copper consumers' expectations regarding the possible reduction of the stock overhang and the shape of recovery from the recession will influence their decision to replenish their inventories or to continue operating with comparatively low levels of owned stocks. Speculators' assessment of how consumers will react to increasing demand will influence copper prices even before an actual rise in consumer buying occurs. It should also be noted that the copper market, like other commodity markets, is characterized by speculative selling in a declining market and speculative buying or retaining stocks in a rising market. Thus the apparent stock overhang will not necessarily prevent prices from rising. It would probably take a major price advance to dislodge large quantities of copper stocks held by non-industry sources as a hedge against inflation.

1/ The traditional export route through Angola which used to carry almost half of Zambia's copper exports has been closed for some months; Zambia attempts to reroute copper shipments and imported supplies for the mines through Tanzania and Mozambique; unfortunately these routes are already overcrowded.

E. Cooperation Among Producers

21. As indicated above, the four original members of CIPEC made attempts in late 1974 and early 1975 to influence the market through joint supply cutbacks. While their efforts probably had a certain impact on the market, it appears that circumstances have since become less favorable for further organized measures by producers. In addition to Zambia's transport problems it has been reported that Chile was unsatisfied with recent actions and has great reservations against further CIPEC measures.

22. Regarding the possibility of CIPEC action in times of increasing copper demand - as expected for 1976 - certain other factors need to be mentioned. First, production costs seem to have increased in Africa while they reportedly showed some decline in Chile. This may create a conflict of interest between African producers and Chile regarding future market strategy. Secondly, while the recent admission of new members increased CIPEC's share in the market from an estimated 60% to about 70% of world copper exports (net of refined exports of countries without mine production) it will not necessarily facilitate production or export restrictions. Thirdly, CIPEC's strategy has been changed in favor of an international copper agreement involving consuming countries.

F. Cooperation Among Producers and Consumers

23. In a major change of policy CIPEC members decided in November 1975[1/] to seek a dialogue between copper producing and copper consuming countries with a view to negotiating a copper price stabilization agreement. Forthcoming international conferences will provide the opportunity to pursue that aim. Some consumer countries, notably France and Japan, have already taken steps or called for measures to stabilize copper prices. Copper is among the commodities to be included in the stabilization scheme proposed by UNCTAD. While copper appears to be a prime candidate for price stabilization on technical grounds it is presently impossible to predict whether political decisions to be made by various countries will favor a stabilization agreement. If a stabilization scheme became operative, the reaction of copper prices would largely depend on the stabilization technique and its implementation.

24. The LME copper price is expected to remain at the 1975 level of 56¢ per pound until there are clearer signs of an upswing in industrial production in OECD countries. Given the high level of stocks and a lagged reaction of copper demand to increases in OECD industrial output -- which in turn is not expected to markedly accelerate before mid-1976 -- the LME copper price is expected to average 67¢ per pound in 1976. There is a possibility, however, that the average only increases to 60¢ per pound if further delays occur in the process of economic recovery in industrialized countries.

1/ The 8th Conference of Ministers of CIPEC held in Lima from November 17 to 19, 1975 "decided to initiate the opening of a dialogue with consumer countries to promote the negotiation of a stabilization agreement for copper prices". (Quoted from the press statement issued at the end of the Conference).

25. On the other hand, the average LME copper price in 1976 could exceed 67¢ per pound if, for example, Zambia's transport problems continue. But the pace of the expected economic recovery in developed countries will be the major factor affecting copper prices in 1976. Economic recovery will influence copper prices in two ways. It will increase copper consumers' demand for specific types of copper and it will fuel speculative expectations for a continued rise in copper prices. Such expectations could lead to a temporary holdback of supplies from the market. As a result a "bulge" could develop in the second half of 1976 which would lead to a sharp increase in prices; in the past, similar patterns have occurred in the copper market.

Table 1: COPPER - WORLD REFINED CONSUMPTION 1/

(thousand metric tons)

	U.S.	Japan	Europe	Other	World Total
1970	1,854	821	2,466	654	5,795
1971	1,831	806	2,366	721	5,724
1972	2,029	951	2,496	768	6,244
1973	2,219	1,202	2,648	814	6,943
1974	1,994	871	2,677	962	6,504
First Semester					
1974	1,126	499	1,396	439	3,460
1975	634	391	1,248	427	2,700
			(Percent Change from previous period)		
1970	- 4.6	1.9	5.2	3.5	1.2
1971	- 1.2	- 1.8	- 4.1	10.2	- 1.2
1972	10.8	5.0	5.1	6.5	9.1
1973	9.4	26.4	6.1	13.8	11.2
1974	-10.1	-27.5	1.1	10.1	- 6.3
1975 (1st Semester 75/1st Semester 74)	-43.7	-21.6	-10.6	- 2.7	-22.0

1/ World excludes CPCs.

Source: World Bureau of Metal Statistics: World Metal Statistics, Oct. 1975

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(3) = (1) + (2) ; (7) = (3) + (4)

Table 2: COPPER - WORLD MINE PRODUCTION

(1) (2) (3) (4) (5) (6) (7)

	U.S.	Other Developed Countries	Developed	LDC Total	CIPEC 2/	Chile	World Total
			(Thousand Metric Tons)				
1970	1,560	1,245	2,805	2,358	2,133	692	5,163
1971	1,381	1,347	2,728	2,410	2,156	708	5,138
1972	1,510	1,457	2,967	2,691	2,404	717	5,658
1973	1,559	1,737	3,196	2,882	2,593	735	6,078
1974	1,449	1,665	3,114	3,127	2,862	902	6,241
I. Semester							
1974	766	812	1,587	1,507	1,373	431	3,085
1975	660	774	1,434	1,467	1,310	414	2,901
			(Percent Change from Previous Year)				
1971	-11.5	+ 8.2	-2.7	+ 2.2	+ 1.1	+ 2.3	- 0.5
1972	+ 9.3	+ 8.2	+8.8	+11.7	+11.5	+ 1.3	+10.1
1973	+ 3.2	+19.2	+7.7	+ 7.1	+ 7.9	+ 2.5	+ 7.4
1974	- 7.1	- 4.2	-2.6	+ 8.5	+10.4	+22.7	+ 2.7
1975	-13.8	- 4.7	-9.1	- 2.7	- 4.6	- 3.9	- 6.0
(I/75-I/74)							

1/ World excludes CPCs.
2/ Australia, Chile, Indonesia, Papua New Guinea, Peru, Zaire and Zambia

Source: World Bureau of Metal Statistics
World Metal Statistics, October 1975 and October 1974 (for I/1974)

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Table 3: COPPER - WORLD REFINED PRODUCTION 1/, 1970-1975

(thousand metric tons)

	U.S.	Other Developed Countries	Total Developed 2/	LDC Total	CIPEC 3/	Chile	World Total
1970	2,035	2,724	4,759	1,351	1,386	405	6,110
1971	1,780	2,668	4,448	1,326	1,335	399	5,774
1972	2,049	2,382	4,881	1,502	1,506	461	6,383
1973	2,098	3,091	5,189	1,495	1,501	415	6,684
1974	1,938	3,287	5,225	1,724	1,704	538	6,949
I. Semester							
1974	1,041	1,632	2,673	777	763	233	3,450
1975	855	1,531	2,386	813	806	256	3,199
			(Percent Change over Previous Period)				
1971	-12.5	-2.1	-6.5	- 1.8	- 3.7	- 1.5	- 5.5
1972	+15.1	+6.2	+9.7	+13.3	+12.8	+15.5	+10.6
1973	+ 2.4	+9.2	+6.3	- 0.5	- 0.3	-10.0	+ 4.7
1974	- 7.6	+6.3	+0.7	+15.3	+13.5	+29.6	+ 4.0
1975	-17.9	-6.2	-10.7	+ 4.6	+ 5.6	+ 9.9	- 7.3
(I. Semester over I. Semester '74)							

1/ World excludes CPCs.
2/ Australia, Canada, Western Europe (incl. Yugoslavia), Japan, Republic of South Africa and U.S.A.
3/ Australia, Chile, Indonesia, Papua New Guinea, Peru, Zaire, and Zambia

Source: World Bureau of Metal Statistics: World Metal Statistics, Oct. 1975 (Oct. 74 for I. Semester 1974).

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Table 4: COPPER STOCKS, 1960-1975

(Thousand metric tons)

Year	Producers' Stocks 1/ Level at end of period (1)	Producers' Stocks 1/ Change during period (2)	LME Stocks (3)	US Govt. Stockpile (4)	Total (5)	Producers' Stocks as percent of Refined Production (6)	Total Stocks as % of Ref. Prod. (7)
1960	311	109	15	1,040	1,351	7.4	32.2
1961	284	- 27	17	1,036	1,320	6.6	30.9
1962	335	51	13	1,029	1,364	7.7	31.2
1963	321	- 14	14	1,018	1,339	7.2	30.1
1964	293	- 28	5	993	1,286	6.2	27.1
1965	309	16	8	814	1,123	6.1	22.3
1966	326	17	14	410	736	6.3	14.2
1967	297	- 29	12	250	547	6.2	11.5
1968	338	41	19	237	575	6.3	10.7
1969	255	- 83	19	230	485	4.3	8.3
1970	435	180	72	230	665	7.1	10.9
1971	431	- 4	140	229	660	7.5	11.4
1972	515	84	183	229	744	8.1	11.7
1973	277	-238	35	229	506	4.1	7.6
1974	600	323	126	-	600	8.6	8.6
1975 (Est.)	1,300	700	500	-	1,300	20.5	20.5
1974 Mar.	277	0	11	56	333		
June	296	19	24	18	324	8.6	9.1
Sept.	430	134	87	-	430		
Dec.	600	170	126	-	600	8.6	8.6
1975 Mar.	721	121	176	-	721		
June	874	153	295	-	874	27.3	27.3
Sept.	1,006	132	431	-	1,006		
Dec. (Est.)	1,300	294	500	-	1,300	20.5	20.5

1/ Includes LME Stocks (Column 3) but excludes U.S. Government Stockpile (Column 4).

SOURCE: (1) and (2): American Bureau of Metal Statistics.
(3): World Bureau of Metal Statistics
(4): U.S. Bureau of Mines
(5): On the basis of production figures fron Metallgesellschaft and World Bureau of Metal Statistics.

Note: American Bureau of Metal Statistics coverage represents about 80 percent of the free world. Reports are not received covering production of Finland, Japan, Norway, Poland, Spain, Sweden, Yugoslavia, and some other small producing countries. However, if any of this production is sold to an ABMS reporting company, that tonnage will appear in ABMS data.

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(5) = (1) + (4)

Table 5: REAL GNP GROWTH IN OECD COUNTRIES: 1960-1980

(Percentage changes at annual rates)

	Weights in Total	Average 1959/60 to 1972-73	Change from previous year							
			1973	1974	1975	1976	1977	1978	1979	1980
Canada	4.0	5.1	6.8	2.8	-0.7	6.5	8.2	8.2	8.0	7.8
U.S.	39.6	4.2	5.9	-2.1	-3.6	5.6	5.2	5.4	5.2	5.3
Japan	12.6	10.9	10.2	-1.8	1.4	7.8	7.2	7.2	6.6	6.5
France	7.6	5.9	6.0	3.9	-2.0	4.5	5.9	5.6	6.8	5.7
Germany	10.7	4.9	5.3	0.4	-3.4	3.9	5.4	4.8	4.5	4.4
Italy	4.2	5.6	5.9	3.2	-2.8	3.2	5.6	5.2	4.6	4.5
U.K.	5.2	3.3	5.3	0.1	0.0	2.4	3.6	3.9	4.2	4.2
Other Countries	16.1	5.5	4.3	2.7	-0.6	4.0	5.6	5.1	4.3	4.2
OECD Total	100.0	5.5	6.3	-0.1	-2.1	5.2	5.6	5.5	5.3	5.2

1/ 1974 GNP/GDP weights and exchange rates.

Source: OECD Secretariat, for 1973 and 1974.
IBRD midpoint projections for 1975-1980, dated September, 1975.

Table 6: CHANGE IN INDUSTRIAL PRODUCTION (ANNUAL RATES) MAJOR COPPER IMPORTING COUNTRIES 1974-1976

(in percent)

	Weights	Change from previous year 1974	1975	1976
United States	5.8	-0.6	-9.0	8.5
Japan	26.2	-3.1	-10.5	10.75
Germany	19.4	-1.4	-7.25	4.5
France	13.5	3.2	-9.5	4.0
United Kingdom	12.4	-2.6	-5.0	-0.5
Italy	10.2	4.3	-10.0	1.5
Austria	0.9	5.0	-8.0	-1.0
Belgium	3.3	3.4	-9.0	0.0
Netherlands	1.7	2.5	-6.0	3.0
Spain	2.1	5.2	-4.0	0.0
Sweden	2.1	5.7	-2.5	0.0
Switzerland	1.7	0.9	-14.0	2.0
Yugoslavia	0.7	11.0	6.0	3.0
Index 1/	100.0	-0.1	-8.4	4.9

1/ Weighted by relative shares in total copper imports.

Source: OECD, Economic Outlook No. 18, December 1975.

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Annex

Forecast Models

This Annex presents a simple model which has been used as an aid to forecasting copper prices and as a supplement to expert opinion and extrapolation of price trends. The model 1/ consists of two equations, a price equation and a consumption function. Price (P) is assumed to depend on excess demand, measured by the ratio between production, lagged one year, (Q_{t-1}); lagged price (P_{t-1}) and output lost through strikes (OL). Dummy variables were introduced for periods of extraordinary influences in 1965/66 (Vietnam war) and in 1973/74 (extraordinary speculation).

Consumption depends on lagged price and industrial demand for copper, measured by an index of industrial production (X).

Fitted to annual data for 1955 to 1975 the regression equations are:

$$(1)\quad \ln P_t = -0.428 - 2.250 \ln \frac{Q_{t-1}}{C_t} + 0.078 \ln OL + 1.013 \ln P_{t-1} - 0.269\ \text{Dum A} + 0.276\ \text{Dum B}$$

(0.58) (5.72) (1.73) (10.38) (2.01) (2.60) 1955-75

$\bar{R}^2 = 0.90$ DW = 1.83 SE = 126.5

$$(2)\quad \ln C = 4.692 + 0.720 \ln X + 0.162 \ln C_{t-1} - 0.147 \ln P_{t-1}$$

(3.47) (0.56) (2.94) 1955-75

$\bar{R}^2 = 0.954$ DW = 1.16 SE = 4.9

where

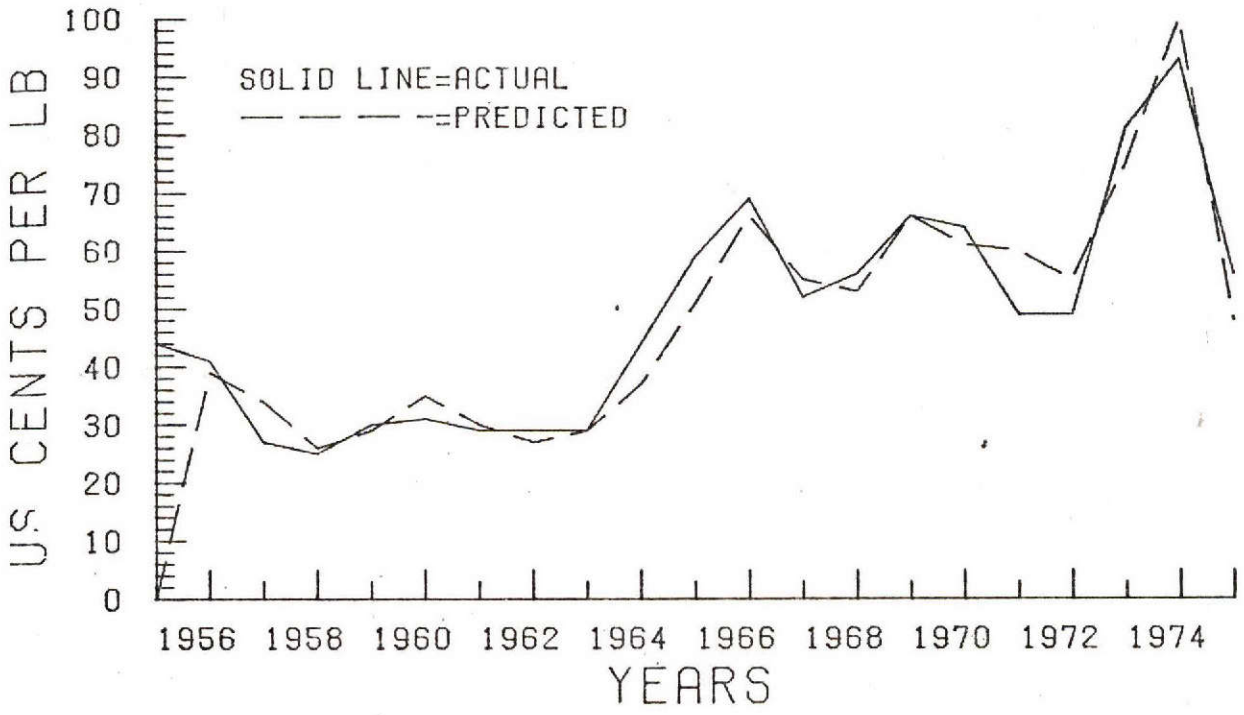
P = Copper price (LME spot price of wire bars), annual average in US$ per metric ton
Q = World production of refined copper ('000 metric tons)
C = World consumption of refined copper ('000 metric tons)
OL = Output lost through strikes ('000 metric tons)
X = Index of industrial production (UN, Manufacturing production, market economies, 1963=100)
Dum A = Dummy variable = 1 in 1965 and 1966
= 0 for all other years
Dum B = Dummy variable = 1 for 1973 and 1974
0 for all other years

Chart 1 shows the actual values for C and P and those estimated from equations. Forecasts of price for 1976 are shown in Table A.1 below.

1/ See I. Khanna, "Forecasting the Price of Copper", in The Business Economist, Vol. 4, No. 1, Spring 1972; and H.-M. Stahl, A Forecast of Copper Prices, 1975, mimeo, unpublished, 1975. The version presented here is a modified Khanna model in which consumption depends on industrial production of the current year rather than the preceding year.

CHART A.1

COPPER PRICE, LME, 1955-1975
ACTUAL AND PREDICTED



REFINED COPPER CONSUMPTION, 1955-1975
ACTUAL AND PREDICTED

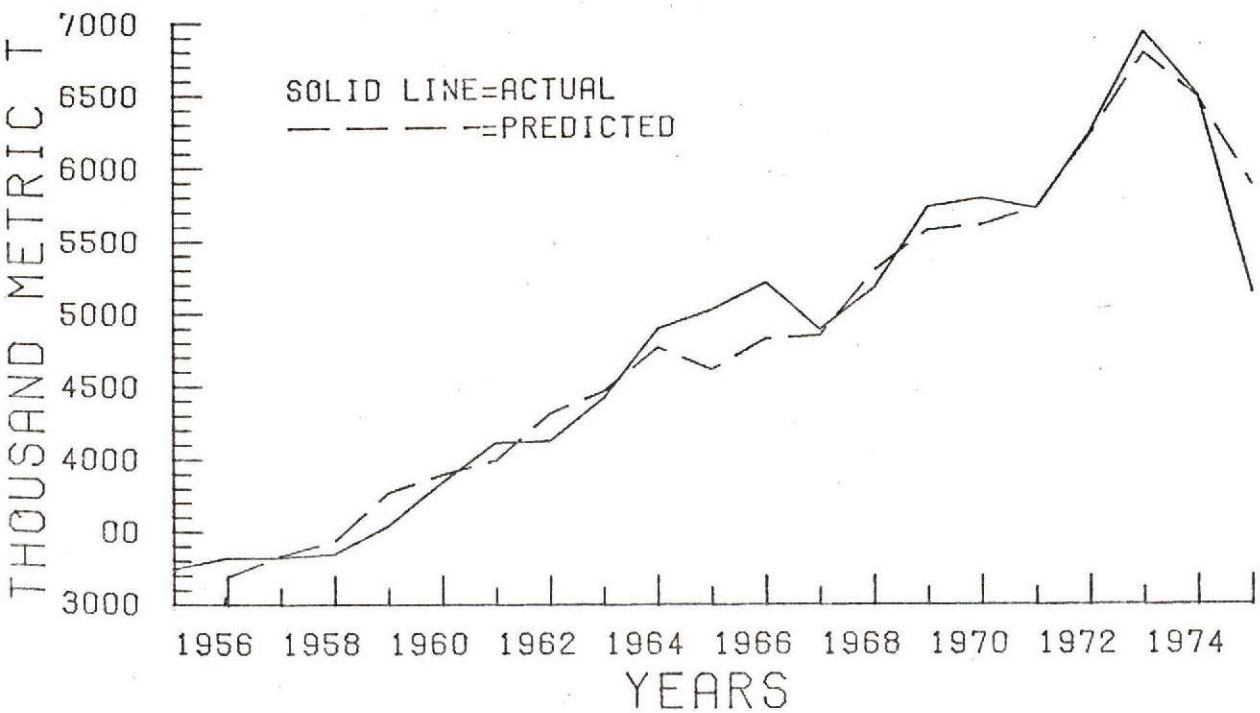


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Table A.1: COPPER PRICE FORECAST FOR 1976

	1973	1974	1975	1976 (a)	1976 (b)	1976 (c)	1976 (d)
1. Production of refined copper							
'000 t	6,684	6,949	6,442				
Percent change	4.7	4.0	-7.3				
2. Index of industrial production							
(1963=100)	181	184	168	176			
Percent change	10.4	1.7	-8.7	+5.0			
3. Consumption of refined copper							
'000 t	6,943	6,504	5,150	6,330	6,442 1/		
Percent change		-6.3	-20.8	23.1	25.0		
4. Copper price, LME							
in current US$/lb.	0.81	0.93	0.56	0.54	0.57	0.62 2/	0.71 3/
in constant 1973 US$/lb.	0.81	0.76	0.42	0.37	0.39	0.42	0.48
5. International price index							
(1973=100)	100.0	121.8	134.9		147.0		
Percent change	+18.2	+21.8	+10.8		+8.8		

1/ Industry estimate
2/ Assuming Dum B = 0.5 to account for possible speculative and/or other factors discussed in Chapter III of this paper, and 5 percent growth of industrial production (i.e. copper consumption as in (a)).
3/ Assuming Dum B = 1 and using consumption forecast (a).

Note: If copper production in 1975 declined by 10.8% rather than by 7.3% price forecasts (in current dollar terms) under the above assumptions would range from 58¢/lb. to 80¢/lb.

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