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Benson Varon and Kenji Takeuchi

Developing Countries and Non-fuel Minerals

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DEVELOPING COUNTRIES
AND NON-FUEL MINERALS

By Bension Varon and Kenji Takeuchi

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DEVELOPING COUNTRIES AND NON-FUEL MINERALS

By *Bension Varon and Kenji Takeuchi*

OVER the past three years, a dramatic change has taken place in the world market for one key raw material, oil, whose production and reserves are heavily concentrated among the so-called developing countries of the world. Now, as part of the energy crisis, the developed countries of the world face the certain prospect of very much higher fuel costs in coming years, and the continuing threat that adequate supplies may be withheld either for political reasons or in a process of rather one-sided bargaining with the key producer countries in the now-famous OPEC grouping (the Organization of Petroleum Exporting Countries).

Inevitably, the question arises whether a similar transformation may be in store for one or more of the widely traded minerals not used for fuel. From the standpoint of the developing countries that produce substantial shares of these minerals, such a transformation represents a hope—after successive disappointments with aid flows, transfers of know-how, trade liberalization, and international commodity agreements—that they may now succeed in obtaining from advanced countries increased resources through the operation of the market in changed circumstances, and possibly through alliances emulating OPEC. Conversely, for the consuming countries, such a prospect could be alarming, raising the specter that to the already astronomical amounts they have to pay for oil will be added heavy increases for their other mineral needs, not to mention the chance of having on occasion to do without.

However viewed, the future terms of trade in non-fuel minerals can be deeply significant for individual countries, for the overall balance of economic power in the world, for the welfare of very large numbers of people. To what extent is a transformation in prospect?

It is not a question to be answered simply or with firm conviction. Each of the nine major minerals to be examined in this article—iron ore, bauxite, copper, manganese ore, lead, nickel, phosphate rock, zinc and tin—is affected by factors that cause it to differ greatly from the oil situation, and mostly also from

others in the group. Moreover, as *The Economist* has wryly reminded us, recent history is sprinkled with cases where a change in price factors operated to turn prophecies of scarcity into realities of glut; even in the medium term of five to ten years, predictions of resource supplies and markets are especially affected by too many unforeseeable elements to be subject to assured linear projections. This said, only by initially making such projections, however tentatively, can one see the lay of the land and identify and assess the elements that could change what happens.

II

These nine minerals account for 85 percent of the estimated value of world production of all non-fuel minerals; they are also the non-fuel minerals of export interest to the developing countries, accounting in 1970 for 12 percent of the aggregate exports of developing countries. By comparison, oil in 1970 accounted for 31 percent of these aggregate exports.

For the period from now to 1980, current forecasts by the staff of the World Bank look for world requirements of these minerals to increase, in the aggregate, at rates approximating those experienced in the last ten to 15 years. The needs of developing countries should grow at an accelerating pace, offsetting a slowing down in the dramatic recent growth rate of Japan's import demand for raw materials. And there is the crucial overall projection—now perhaps in more doubt than it would have seemed last October—that economic activity in the OECD countries, which are of course the major consumers by far, will grow by about five percent per year in real terms over this period.¹

Naturally, this projected growth in demand is uneven among the group. Demand for *bauxite*, *nickel*, and *phosphate rock* is anticipated to increase faster than economic activity generally (to have, as economists put it, an elasticity of demand greater than unity, or one). Bauxite demand is expected to expand by nine percent per year (faster than that of any mineral including petroleum), nickel by six percent, and phosphate rock (most of it used in the fertilizer industry) by 5.5 percent annually (seven

¹ The members of OECD (the Organization for Economic Coöperation and Development) are Australia, Canada, the United States, Japan, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and Yugoslavia.

percent in the first half of the decade, four percent thereafter). Demand for four major minerals, *iron ore*, *manganese ore*, *copper*, and *zinc*, will expand at rates of 4–4.5 percent a year, while the growth rates for the other two minerals considered, *lead* and *tin*, are estimated to be considerably lower, namely three percent and 1.2 percent—in line with trends which have already set in for those two commodities.

It should be noted that these forecasts refer to demand for virgin ore or for primary metal only; they do not include demand for scrap—or rather assume that recovery from so-called secondary sources will account for roughly its present percentage of total supply. For the majority of these minerals, scrap is indeed a major source of supply—40–45 percent of U.S. iron, copper, and lead metal requirements come from secondary sources. While the proportion of demand met from such sources is technically augmentable, a case-by-case examination of the prospects for this, particularly the economic incentives, does not yet indicate that scrap ratios are likely to change so markedly as to inhibit the growth of demand for virgin materials significantly in the foreseeable future. For example, while according to some studies the scrap ratio in aluminum production in the United States can be increased from the current 17 percent to nearly 45 percent under an active recycling policy, there is at present little incentive to do so, since bauxite is one of the most abundant minerals. Yet the assumption of “no major changes in recycling” may turn out to be wrong even in the seventies, since interest in recycling can be fueled not simply by economics but also by environmental considerations to which public opinion may become increasingly sensitive.

The above forecasts also assume no major change in rates of substitution—this on the basis of a case-by-case examination and giving special weight also to economic considerations. This assumption, too, while justifiable at present, may prove to be fallacious, since trends in substitution are determined, among other factors, by unpredictable technological innovations in product development and processing. The development of non-silver photographic processes or of alternatives to lead in increasing the octane of gasolines, for example, may alter the demand and price outlook for these two metals significantly.

Except to the extent that one metal is simply replaced by another, unforeseen developments in both recycling and substitu-

tion would tend, of course, to slow the growth of demand for new resources. In the longer run, moreover, a third and much more powerful force may be operating to reduce the growth rate in demand for minerals. This force is the dynamics of economic growth itself, and especially the trends within the present group of developed countries. Historical experience shows, and cross-section studies confirm, that as an economy grows and matures, its requirements for most raw materials per unit of GNP (their "intensity of use") tends to decline. Nowhere is the evidence clearer and more convincing than in the case of steel, the demand for which influences the trends of a number of minerals. A recent study by the International Iron and Steel Institute (IISI) found that significant growth in "steel intensity" did not occur until income reached \$300 (in 1963 prices) per head, the minimum level required before an economic takeoff can be expected. Thereafter, as rapid industrialization sets in, steel consumption is propelled upward faster than GNP; eventually, however, at an income level of around \$2,500, steel intensity begins to decline, as the industry sector is extended into sophisticated spheres and the service sector expands in relative importance. Taking into account the relative size of those national markets now at the \$2,500 level or above, and of those which will enter or remain at the \$300-\$2,500 level, one arrives at projected growth rates in demand for non-fuel minerals over the next 30 years that tend to be considerably *lower* than those just projected for the next ten years.

What then of availability and price? In terms of processing capacity, the meeting of the projected increases in demand does not appear to present serious problems, or indeed to require extraordinary investment; in the case of iron ore, nickel, and possibly one or two other minerals, existing capacity or capacity under construction is probably already sufficient for estimated 1980 requirements.

The reserve picture is more diverse. For phosphate rock, iron ore, bauxite, nickel, and manganese ore, world reserves are by any estimate ample. (Estimated proven iron ore reserves increased sevenfold in the last 25 years and are deemed sufficient to last for at least 250 years at current levels of consumption and for at least 100 years at exponentially growing demand; potential ore reserves are triple the size of proven reserves and well distributed geographically.) Copper, lead and zinc fall into an

intermediate category, with proven reserves now sufficient to last for only 30 years in the case of copper, and somewhat less for the other two. However, it should be noted that copper is currently being mined at progressively lower ore content and yet at costs rising only moderately in real terms, as a result of new extractive technology. (Because of increasingly strict pollution control standards, smelting costs, in contrast, have recently increased substantially.) Among significant minerals, the only ones whose reserves are tight or critical are silver and tin. Intensified explorations have failed to uncover significant new resources. There are, however, enormous hoards of silver in private hands which can be brought into the market by higher prices. In the case of tin, demand growth has already been forced down to about one percent per annum through substitution.

Finally, as one looks to the longer term, the mineral potential of the oceans becomes relevant. It is now clear that it is enormous, specifically for the nickel, copper, manganese and cobalt contained in the so-called manganese nodules scattered over vast areas of the ocean floor. And the technology of seabed mining appears to be rapidly approaching the point of feasibility at bearable cost. The politics of developing the mineral resources of the seabed are complicated and so far unresolved.² But there seems little doubt that a major contribution will come from this source well within the presently calculated life of the reserves of such minerals as copper. And for the relevant materials the seabed potential must of necessity hang over the market, for the future if not in the short term of the next five years.

This brings us to prices. For major minerals, these have been unusually high (especially in U.S. dollar terms) in 1973. The main factors responsible for this phenomenon have been (a) currency adjustments (early 1973) including the uncertainty that preceded the adjustments; (b) the coincidence of sharp upturns in industrial activities in all major developed countries; (c) serious supply problems in several major minerals arising from pollution control problems in the nonferrous metal smelting industry. Each of these was temporary, which would suggest that the price rises are by and large of a short-run nature. On the other hand, the dramatic recent increase in oil prices, and resultant energy costs, may raise substantially the cost and price

² See Seyom Brown and Larry L. Fabian, "Diplomats at Sea," *Foreign Affairs*, January 1974.

of some processed minerals—and in cases such as bauxite affect the return of countries which handle primary processing.

Nonetheless, if one looks at the prices of the raw minerals themselves, economic forces now suggest that these will be lower in real terms in the next few years than they have been in 1973. If one takes 1967–69 as a base period, then it can be estimated that only silver, zinc, and phosphate rock prices will rise faster than the rate of inflation assumed in this exercise—that the “index of the wholesale prices of internationally traded goods” will rise by 5.25 percent per year between 1967–69 and 1980. Since mineral prices are notoriously cyclical and unsynchronized (due mostly to supply factors, such as investment cycles, labor strikes, and calamities), such a forecast does not attempt to describe the shape of the price trend, only to suggest the general level of prices by the end of the period. Under this forecast, prices of bauxite, nickel and lead would hold their values in terms of 1967–69 constant dollars, while prices of copper and iron ore may decline slightly, and those of manganese ore and tin significantly.

Silver prices will register the sharpest gain in real terms, nearly 50 percent, between the late sixties and 1980, reflecting the chronic shortage of “new silver” and in order to bring out sufficient supplies from hoarded stocks to meet industrial demand. Zinc prices will follow with an increase of roughly 30 percent over the same period as a consequence of a shortage of smelting capacity (rather than ore) attributable to the problem of pollution control. In the case of the two commodities at the other end of the list, manganese and tin, real prices could decline from their 1967–69 base by about 30 percent and 20 percent respectively, reflecting sluggish demand (for tin), actual or potential overcapacity, and already-approved releases from the U.S. stockpile. The new stockpile objectives call for release of seven million tons of manganese ore, equivalent to total developing countries’ output in 1971. The U.S. tin stockpile totals about 250,000 tons, compared to annual world consumption of 185,000 tons in 1970–72; 43,000 tons of this, equivalent to 80 percent of average U.S. consumption per year, have already been approved for immediate release (though disposals to date have been limited), and congressional approval for the disposal of an additional 157,000 tons is being requested. Accelerated disposal of U.S. noncommercial zinc stocks, too, despite their more

modest volume (equivalent to two and one-half months’ world consumption) may have an impact on the market, but in this case perhaps a healthy impact, by holding prices in line with prices of substitute materials, especially aluminum and plastics.

III

On the basis of our projections of demand/supply balances and the price trends outlined above—and *without* taking into account possibly higher rates of inflation and the impact of higher energy costs—the conclusion is that developing countries’ exports of these nine major minerals are likely to increase from \$4.8 billion in 1967–69 to \$15.2 billion in 1980 in nominal (or current) terms, rising by ten percent annually—or to \$8.2 billion in constant dollar terms, rising at a rate of 4.6 percent per annum, as shown below.

Estimated Value of Developing Countries’ Exports
(millions of dollars)

	Average 1967–69	1980 Value in current dollars	1980 Value in 1967–69 dollars
Copper	2,281	8,000	4,315
Iron ore	811	2,460	1,325
Tin	565	930	500
Bauxite/alumina/ aluminum	450	1,475	800
Phosphate rock	220	800	430
Zinc	130	600	325
Silver	132	525	285
Lead	113	215	115
Manganese	98	195	105
Total	4,800	15,200	8,200

The picture that emerges from the trends spelled out above can be considered neither especially bullish for the developing countries nor threatening for the industrial countries. For the latter, the increased burden on the balance of payments of paying for non-fuel minerals will not be insignificant; moreover, since the United States in particular is dependent on external sources for steadily larger proportions of its mineral needs, the projected burden could rise more steeply after 1980.³

³ One study by the U.S. government has estimated that the United States would have to pay \$44 billion per year for its non-fuel, mineral imports by the year 2000. U.S. Department of the Interior, *Mining and Minerals Policy, 1973*, Second Annual Report of the Secretary of the Interior under the Mining and Minerals Policy Act of 1970. Washington, G.P.O., June 1973.

Nevertheless, it is important to keep the size of the trade in non-fuel minerals in perspective. For the developing countries as a group, for example, a growth in foreign exchange earnings of \$10.4 billion in current dollars between 1967-69 and 1980 would be less than one-tenth of the increase now projected to arise from petroleum exports in the much shorter period from 1973 to 1980—and this without assuming that the dramatic price increases of December 1973 are maintained. While the forecast suggests that mineral prices will do generally better in the 1970s than in the past, this will serve only—for most minerals—to arrest the downward trends experienced in the 1960s. Moreover, real prices for some will continue to decline; it should be noted that for the last five to six years, the inflation adjustments obtained by many mineral-producing countries under existing contracts or through bilateral negotiation has been on the order of 2.5 percent per year—far short of the 6.2 percent yearly increase actually registered over this period in the index of wholesale prices of internationally traded goods.

To repeat, the above analysis warns against the lumping of petroleum statistics and non-fuel mineral statistics—predictions that the import bill of consuming countries for “raw materials” might be X billion dollars by 1980, which are not explicit about the high ratio (currently at least 8:1) between projected oil import costs and the total costs of non-fuel minerals, are grossly misleading. In addition to distorting the import picture, the lumping of statistics overlooks the fact that while roughly half of the oil revenues will accrue to five resource-surplus countries (namely, Saudi Arabia, Qatar, Abu Dhabi, Kuwait, and Libya), the projected revenue from non-fuel minerals will go to as many as 40 developing countries, nearly all of which are in great need of capital and most of which face increased oil import costs themselves.

IV

The projections presented above have been based on market forces as they currently exist, without the operation of special new pressures by the producing countries in particular. It remains to consider whether, in the light of the remarkable success achieved by the OPEC grouping since 1971 in altering the terms of trade for oil (and recently in withholding supplies), any similar success could be achieved by producers' alliances among de-

veloping countries rich in other minerals.⁴

Obviously, the political urge to form such alliances is there. A sense of disappointment at their overall treatment by the industrial countries is almost universal among developing countries. For the producers of minerals, there is moreover (as for oil) the keen sense that their minerals are non-renewable, an asset that should produce the greatest possible return and if possible have its useful life stretched out. Hence, it is only natural that producers should seek to change a situation in which, by and large, the sellers of non-fuel minerals are competing, diffuse, and unorganized in the face of relatively few and well-organized buyers on behalf of the consuming countries.

The four principal producers of copper (Zaire, Zambia, Peru, and Chile) have long worked together in CIPEC (based on its French name, *Conseil Intergouvernemental des Pays Exportateurs de Cuivre*—the Intergovernmental Council of Copper Exporting Countries), and currently there are widespread reports of intense consultation among the producers of other key minerals. The very least that can come out of the current energy crisis is that the producers of all minerals (and of key agricultural commodities as well) will be far more alert to the market situation and far more aggressive in seeking to alter it to their advantage.

But when it comes to assessing their chances of major success, the present prediction must be very cautious. Even the strongest political urge, or the most adroit management, cannot alter certain basic factors that, in our judgment, severely limit the possible accomplishments of producers' alliances in non-fuel minerals.

The key economic fact is that, while demand for most non-fuel minerals is price-inelastic in the short run (i.e., not reduced in proportion to price increases), this is not necessarily true over the long run, certainly not to the extent that holds for oil. Calculations based on historic experience for tin, aluminum and copper, for example, suggest strongly that in the long run the drop in demand more than offsets any price increase, so that the total

⁴The question has received wide interest recently and several views on it have been expressed in the professional and daily press. See, on the one hand, C. Fred Bergsten, “The Threat from the Third World,” *Foreign Policy*, Summer 1973; a more negative view is contained in “State Doubts Imitation on Cartel in Oil,” *The Washington Post*, February 8, 1974; and Philip H. Trezise, “How Many OPEC's in Our Future?”, *The New York Times*, February 10, 1974.

return to the producers eventually becomes less than before the price change. Although the econometric measurement of price elasticities is a tricky process leading to differing estimates of individual cases, there is little disagreement on the broad point about short-term and long-term price elasticity.⁵

The reasons are threefold—stockpiles, recycling possibilities, and the use of substitutes—none of which, of course, apply to oil in anything like the same way as yet. All have already been referred to in this article, and the projections for the period to 1980 have assumed no major change in recycling or the use of substitutes.

First, the availability of stockpiles tends to mitigate the immediate impact of supply curtailment—although in times of anticipated protracted scarcity, these might not be released freely enough to improve effectively the short-term situation. Stockpiles, especially those of the United States, have long affected the price of tin, and to a lesser degree manganese and zinc. If these are maintained, the cushioning effect should continue. On the other hand, if the United States were now to dispose rapidly of its stockpiles, their hangover effect on the market would disappear, and after a period of depressed prices the result might be some tendency for prices to increase in the longer term.

The point, however, is that it is not necessary for all three factors to be at work at the same time. *Any one* of the three tends to place a ceiling on prices that would be much lower relative to current price levels than has been the case for the recent price rises of petroleum.

Thus, whereas oil is completely dissipated when consumed, recyclable metal scrap is generated continually in the major con-

⁵ The common arithmetical measure of elasticity is the ratio between the extent of a price change and the ensuing change in demand: thus, if a price rise of 10 percent produces a demand decrease of the same percent, the elasticity is said to be (minus) 1.0; if the same price rise produces a drop in demand of only 5.5 percent, the elasticity is (minus) 0.55 (and the producers as a group have a higher total return); at elasticities above unity, or one, the total return to the producers is less than before the price increase. Applying these measurements to selected minerals, one finds that while the short-run elasticity of world demand for tin has been in the neighborhood of 0.55, the long-run elasticity is estimated at about 1.25; and whereas the short-run price elasticity of U.S. demand for aluminum or copper has been about 0.20, the long-run elasticities are around 1.35 in the case of aluminum and above 2.50 in the case of copper (all figures are, of course, minus). See, for example, F. E. Banks, "An Econometric Model of the World Tin Economy: A Comment," *Econometrica*, Vol. 40, No. 4 (July 1972); Charles River Associates, Inc., *Economic Analysis of the Copper Industry* (U.S. Department of Commerce Publication, PB 189 927, March 1970); and Charles River Associates, Inc., *An Economic Analysis of the Aluminum Industry* (Cambridge, Mass., March 1971).

suming countries, adding to the already vast reserves of so-called secondary sources. While recovery from some of these sources would take time, accelerated recycling is possible for a wide range of materials, including aluminum, copper and lead. The real determinants of the pace of recycling are economic, basically whether prices are such that consuming industries find it advantageous to "dig into the scrap reserve." Environmental considerations may enter in, but recent events suggest that they too may be modified in response to changed economic circumstances. As for the potential impact of the "energy crisis" on recycling, it appears to vary sharply from case to case; for aluminum, where new production is highly energy-intensive, the incentive to use scrap may increase because of the energy input already embodied in it; for steel, on the other hand, the use of scrap requires more energy to process than does "hot metal" (molten pig iron). All in all, price remains the main factor affecting the amount of recycling.

Thirdly, the possibility of substitutes represents a real threat at any time to the effective maintenance of substantially higher prices. Such substitutes can replace the basic mineral as a source for the metal, the metal itself, or the metal-containing product altogether. (For example, bauxite can be replaced by other materials in making aluminum, aluminum can be replaced by tin in making cans, and cans can be replaced by plastic or glass containers.) Current or potential substitutes are available for the majority of minerals, among them nearly all of the nonferrous metals.

While these assessments can be countered by arguments that some of the very substitutes may be in short supply or high-priced (like plastics at this time due to the oil crunch), or that their supply too may be controllable by producers' alliances, it should be borne in mind that the field of metallurgy has historically been in the vanguard of experimentation and development of substitutes in the direction of the cheapest and most abundant raw materials. In short, the infrastructure for weathering a crisis at manageable cost within tolerable time is more sophisticated in this sector than in the energy sector. While, as recent events have shown, oil was grossly underpriced vis-à-vis substitutes, in the case of almost all non-fuel minerals the price increase at which either substitution or exploitation of lower-grade sources becomes feasible is a great deal less than it is for oil, and the process

involves substantially shorter time lags.

Another consideration as to the feasibility of powerful producers' alliances in non-fuel minerals is the size and distribution of global resources and the degree to which these can be controlled by certain configurations of countries. *A priori*, scarcity of a resource is not essential for the establishment of a successful cartel; what is required is *control* over present and potential supply. But the scarcity factor is important in the sense that it strengthens the hand of producing countries in imposing their terms and shaping the ultimate course of supplies, or costs. For it is crucial to the successful operation of a cartel that supply outside the membership be inelastic, i.e., that other suppliers are higher-cost producers with relatively small reserves. There are few minerals that are in fact, or are perceived to be, as potentially scarce as petroleum; and with the possible exception of copper, none is truly indispensable.

Furthermore, the distribution of world reserves cuts across categories of economic or political interest. Developing countries are estimated to have roughly 40-45 percent of the world's major non-fuel mineral reserves, with 35 percent in developed countries and 25-30 percent in centrally planned countries.⁶ Developed countries which produce and sell major non-fuel minerals in competition with developing countries include Canada, Australia, and South Africa. Consequently, in a number of minerals (copper, among others) a cartel confined to developing countries would be ineffective, since supply elasticity outside the cartel would be substantial at least in the medium term (three to four years).⁷ In such situations, then, the feasibility of a cartel would depend heavily on whether individual developed countries—facing complex factors including their own broad interdependence with developed consumer countries—would participate fully in the producers' alliance.

⁶ Among the minerals reviewed here, world reserves of phosphate, tin, and bauxite are concentrated in the developing countries, which also account for about half of the copper and nickel reserves, whereas the reserves of iron ore, manganese, zinc, lead and silver are concentrated in the developed and centrally planned countries. Higher mineral prices would not significantly alter the reserve situation in favor of the developing countries; for many minerals the opposite would be true. However, because of conceptual and measurement difficulties, reserve estimates and views such as the above must be regarded with caution.

⁷ For a discussion of these factors related specifically to copper, see Kenji Takeuchi, "CIPEC and the Copper Export Earnings of Member Countries," *The Developing Economies*, Institute of Developing Economies, Tokyo, v. X, No. 1 (March 1972).

Theoretically, the number of countries involved in a cartel effort need not be small, since the operative variable is "community of interest." But in practice, limited necessary membership is a facilitating factor also. The relationship between the amount of control by a cartel and the degree of its success cannot be stated in terms of a general formula. What is clear in the light of the wide geographic distribution of many of the minerals in question is that potential producers' alliances will have to include a wide range of heterogeneous interests among their membership. Lastly, since deposits vary in grade and in the economics of exploitation and processing, price increases would continuously recast the configuration of the membership necessary to bring control to bear. Iron ore provides perhaps the best illustration of this last point, with resources distributed over four continents and among varied economic groupings. It also brings home the difficulty of neatly categorizing the producers and consumers of non-fuel minerals as groups with identifiably contrasting interests.

In addition to the above general considerations, one must return to the specific projections of the future market for individual minerals. For most non-fuel minerals the demand outlook, as noted already, is not markedly different from past experience. If decelerated economic growth is now the general result of the high cost of energy, then the predictions earlier in this article would become even less buoyant.

Finally, there is what might be called the naked bargaining position of individual producing countries at a given time. In relation to their levels of development and dependence on exports of their mineral resources for achieving developmental goals—not to mention the actual financial reserves required to play a tough bargaining game—no group of potential cartel members for a non-fuel mineral seems likely to attain as strong a position as the OPEC countries have held since 1970. The latter were dealing from a unique position of strength—in that they had no major conflicting trade interests, either domestic or within the group, enjoyed a high degree of independence from developed countries, and came to hold large financial reserves. In contrast, a producers' group for any given non-fuel mineral would be likely to include one or more large countries with basic agricultural needs or heavily dependent on the continued expansion of its export markets for manufactured goods. Moreover, whereas the OPEC states had completed the development of their oil

resource base at the time of their concerted action, many developing countries that produce non-fuel minerals remain dependent on foreign capital and technology to develop, expand, transport and increase the processing of their resources.

Conceivably, some of the OPEC countries could come to the aid of a cartel in non-fuel minerals to the extent of supplying the financial resources for this kind of resource development, or to make up possible temporary shortfalls in revenues, even the "revenue foregone" by curtailment or non-development of a resource. But only the developed countries now command the technology, the wider development resources, and the markets on which many producers depend.

V

In sum, there are strong factors which seem to mitigate the feasibility of proliferating producers' alliances modeled on OPEC. Nonetheless, the possibilities for such alliances do exist in a few minerals. Foremost among these is bauxite, where the alliance-inducing factors seem to outweigh the obstacles, as illustrated by the preliminary consultations among Jamaica, Surinam, Guinea and other bauxite-producing countries. Moreover, in one case, Morocco, a major supplier of phosphate rock to the West European market, unilaterally raised its prices by a factor of three last fall; although the full extent of this recent price increase may not be maintained in the long run since there are large unexploited resources of the product, prices are certain to lie on a new plateau hereafter. There is an improved climate for group pressure or price leadership, and where the trend is toward higher mineral prices—often to pay the larger oil bills of the producing countries themselves—the new aggressive stance of producers would seem to make it irreversible.

Whether concerted pressure for higher commodity prices will be accompanied by true cartel forms of action and by attempts at supply constraints is still another question. As the above discussion makes clear, the obstacles to this kind of stronger action are especially great for the non-fuel minerals considered. Yet in a basic situation where developing countries urgently need resources for development, the chances of their resorting to such drastic measures could depend, in the last analysis, on the overall state of relations between rich and poor countries.