Materials: Some Recent Trends and Issues

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Man has always been preoccupied over tomorrow's supplies. While immediate needs are perhaps less in question now, the dynamics of growth have enormously broadened the scope of concern. One useful definition of "growth" is a multiplication of options—of opportunities, that is, to do conventional things in more than one way, and to add to them ways of doing new things. Once provisions of minimum food and shelter needs have been assured, growth has meant added ways of occupying one's time and most of these involve the use of *materials*. (For this discussion, materials comprise basically the nonenergy minerals, forest products, fibers, both natural and man-made, and those chemicals not already covered in the above categories. Excluded are food, energy sources, and drugs.) What we wear, move on and in, live, sit, and lie in, use to fashion tools, simple and complex, or need for modern entertainment, recreation, education, and much of the healing arts, all this incorporates materials as here defined.

The volume and variety of materials used in modern society have grown steadily. When the President's Materials Policy Commission—more commonly remembered as the Paley Commission—published its findings in 1952 (*1*), it reported that annual per capita consumption in the United States of all materials, food and energy included, amounted to 18 tons per citizen. Census data in constant dollars suggest that, in the two decades that have since elapsed, the 1952 figure may have risen by some 10 percent (*2*). Within that all-inclusive category, materials as defined here have lost in relative importance, with per capita consumption about level. Although data are fragmentary, they indicate that in the developing countries per capita use of materials has been growing, starting of course from a much lower base. A good illustration is a better than doubling in per capita steel consumption in India between 1950 and 1970.

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Depletion, Adequacy, and All That

The rise in aggregate consumption has given birth to two ideas. One is the opinion that materials exhaustion could bring civilization tumbling down (*3*). The other is a rather widespread opinion that the advanced societies are moving away "from goods to services" and will continue to do so. A gradual reduction in the rate of growth of materials consumption and eventually perhaps in consumption itself would follow. There is yet a third group of theorists who point to mankind's past success in overcoming the threat of scarcity as grounds for believing that we are neither threatened by exhaustion nor must we seek salvation in a transition to a service-oriented economy. Specifically, reliance is put on more efficient ways of gaining materials in conventional environments, of identifying new environments and new materials, and proceeding to more efficient use and reuse of materials.

The battle among these groups has swayed rather indecisively. The impact made by the *Limits to Growth* school (*3*) has been massive, especially in some European countries that have traditionally been materials-poor.

Stripped of the moral and emotional overtones that often accompany the main theme, there remains a core of insight to the warnings; this core deserves serious consideration when appropriately formulated. Brooks and Andrews (*4*) point to the declining usefulness of distinguishing between renewable and nonrenewable (finite) resources and suggest that, given the dimensions of the globe, even finite resources are in reality not a stock but a flow resource. They caution, however, that the rub comes in managing the extraction and processing stages because the effects of earth-moving and other disturbances of the environment present increasingly difficult and costly obstacles that can overwhelm the task of supplying rising quantities of desired materials and may constitute the real limits to growth.

Companion arguments focus on the relative magnitude of the earth's unexplored and explored portions, the ocean bed as a future technologically feasible supply base for at least half a dozen metals, and the known, very large occurrences of a few minerals—such as iron, aluminum-containing ores, silicates, carbon, titanium, and magnesium—on which could be based, if not an exact replica of today's society, a reasonable variant thereof. While as yet little explored, the building of credible scenarios incorporating severe constraints with regard to the availability and variety of materials could usefully illuminate this particular issue, sometimes dubbed "the worst case" approach. The point is not to stress the fact that mankind once existed with a small fraction of our materials supply, so why couldn't we; but rather it is to inquire, knowing what we know now, to what extent, in what direction, and at what cost a greatly restricted materials menu would force us to modify our way of life.

A recent entry, represented also in this issue (*5*), is the idea that, given sufficient low-cost energy, the materials problem tends to disappear as energy becomes a substitute. Consequently, the emphasis shifts to the limits set for energy consumption by way of heat release or other accompanying circumstances of energy production and consumption, that counsel at least prudence.

By and large, the adequacy debate seems at a standoff. The *Limits to Growth* approach no doubt has increased our sensitivity to the depletion issue. At the same time, the bigger-than-life dimensions of the model have limited its usefulness to policymakers and maximized the number of objections based on its mechanistic framework (*6*) and its neglect of important variables that could be assumed to be operating in the early portion of the time span of the *"Limits"* model. In contrast, no technological breakthroughs of the kind that would give the argument that depletion continues to be shifted forward in time a winning edge have occurred; nor has there been a breakthrough, for example, in seabed material recovery, or a switch to new abundant mineral resources in, say, the aluminum area, or in recovery methods, such as leaching as opposed to excavation.

No wonder that proposals to engage in a systematic, thorough drilling exercise have found some enthusiastic supporters, especially among geologists. The idea of "inventorying" as a means of arbitrating the controversy has perennial appeal, especially when accompanied by estimates that attempt to show this to be a relatively low-cost venture.

New Hostility

A relatively new issue in materials affairs is that increasing demand for materials has been paralleled by increasing obstacles to their discovery and production. Thus, even if we could, at a tolerable cost, be better informed of the location and characteristics of hidden treasures, it is no longer legitimate to assume that (i) exploration would be generally welcomed and (ii) exploitation would follow. Ironically, now that we have better tools than ever to locate deposits, or—to broaden the analysis to encompass nonminerals—to increase the harvest of reproducible materials supplied by trees and other living organisms, not only has a large and growing segment of society developed an intense hostility toward such activities, but the institutional setup has been modified to give their voices both platforms and operating room. The arena of action ranges from removal of land from exploration to stringent conditions affecting the process of extraction or harvesting, treatment, and transformation.

Federally owned land has come under a growing number of statutes that bar it from mining activities. Examples of these exclusions are wildlife refuges, national parks, reclamation lands, native lands, and other exclusions under the Alaska Native Claims Settlement Act of 1971. The list does not—nor can it—include citizen opposition to individual undertakings in specific locations.

Jack Carlson, Assistant Secretary for Energy and Minerals, U.S. Department of the Interior, in addressing the American Mining Congress on 28 September 1975, put some figures on these trends:

> In all of our history up until 1968, the Federal Government had effectively withdrawn from mining and exploration about 17% of all Federal lands. This comparatively small amount was something we could all live with.
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> But suddenly, in 1968, it seemed as though the dam had burst as withdrawal after withdrawal piled up. Without coordination, without knowledge of what was being done elsewhere in the Government, and certainly with no desire to cripple domestic mineral capability, the Congress and Federal agencies totally withdrew or significantly restricted vast acreages of land. Today, some 500 million acres, the size of every State east of the Mississippi except Maine—67 percent of all Federal lands—are off limits to miners.
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> And, there has been no let up. More withdrawals were identified last year than the previous year. The momentum is growing, and we can expect the percentage of withdrawals to increase. If the rate established in 1974 were to continue, we could close all public lands, one-third of the land area in the U.S., and some of our best mineralized areas—by 1980.

The emergence of this hostility and its reflection in recent laws are not, of course, fortuitous. At the rate of exploitation engendered by levels of population and income and their rates of growth over the past three decades, the scars inflicted on the environment, animate and inanimate, are correspondingly large and conspicuous. To this has been added a change in the way in which ore exploration and mining as well as foresting activities are regarded. Once looked upon as free-wheeling ways of life that offered escape from constraints imposed on citizens living in settled urban and rural areas, they have now taken on the image of near-illegitimate intrusions by man upon nature, violating pristine surroundings, promoting boom-and-bust communities, and burdening local authorities with an unwanted influx of new migrants—in other words as highly undesirable events. If that is the way to wrest materials from their habitat, let it occur elsewhere, seems to be the spreading attitude. Applied to a whole country or continent, "not here" quickly escalates from a local to a national issue. Thus there seems to be a change from wondering whether the stuff exists to wondering whether it can be produced, with only little consideration being given to what Freeman Dyson has called "The Hidden Cost of Saying No" (*7*).

Goods versus Services

Perhaps there is a way out if we are indeed slated to develop into a society in which production of goods is rapidly giving way to production of services. With demand diminishing, first in its rate of growth, then absolutely, the opportunities for clashes of competing objectives would equally diminish. It is, therefore, useful to review the nature of this phenomenon, sometimes referred to as the "post-industrial society." As I have suggested elsewhere (*8*), the concept is somewhat at variance with the facts. To begin with, the so-called service industries are in part quite material-intensive: transportation and utilities are good examples. Consumer expenditures for services in the National Accounts (*9*), as opposed to service industries—a murky category—equally involve heavy materials use, extending to such apparent nonmaterial categories as recreation, medical services, entertainment, and others as practiced in our society. Consider, for example, that listening to an opera in the Kennedy Center in Washington is associated with three floors of garage space filled with automobiles that, on the average, may travel 10 to 15 miles (1 mile = 1.6 kilometers) each way! To illustrate more formally, when a couple of years ago I sorted out the appropriate categories in the 1970 National Accounts, I found that, of an estimated $39 billion of consumer expenditures for recreation, fully 17 consisted of durables and 11 of nondurables, while only the remaining 11, or less than one-third of the total, were classified as "services" proper; even portions of this last category may in turn contain a quota of materials.

Nor, contrary to impressions sometimes gleaned in the media, have we gone very far in the "turn to services." Only when shifts in employment are considered do we find a pronounced and significant trend to services: from 56 to 68 percent of total employment in the two decades ending in 1970 (a large part of this change reflecting the decline in agricultural and the growth in government employment, especially education). In contrast, services grew only from 34 to 38 percent of total consumer expenditures during the same 20 years, and the share of the so-called service industries, their fuzzy definition apart, was from 60 to 63 percent of the gross national product (GNP), corrected for inflation.

If the record of the past two decades renders it questionable to count on a reduction in the rates of the use of materials because the service sector will grow at the expense of the goods sector, this is not to say that such rates need to continue at their historic trend. There are other ways in which materials use may be reduced. Some, like Malenbaum (*10*) and Brooks (*4*) have attempted—mostly for metals—to systematize this reduction by postulating materials-intensity factors that decline with rising per capita GNP. The idea is seductive, even though the statistics adduced lack a description of underlying process and motivations. Students of U.S. energy history are reminded of a parallel in which, over a period of some 100 years, the ratio of per capita energy use to per capita GNP first increased, then flattened out, and then declined. Various explanations have been offered to account for the underlying real events (*11*). In the case of materials, this phase of research remains to be tackled.

Moreover, in the absence of a common measure of materials use—other than a monetary unit—the thesis so far rests on historical trends and projections for single commodities. Substitution effects thus cannot be isolated. Over extended periods in which materials of petrochemical origin, for example, have risen with extreme rapidity, one would like to test the hypothesis for materials in the aggregate. Such an effort in combination with reasoned and specific explanations would assess, for example, whether a country passing through a heavy capital goods investment phase, including construction of major transportation networks, public facilities, and the like, is especially materials-intensive;

how far improved efficiency in use plays a role, as economies mature; whether, as suggested above, the trend is toward newer materials, imparting to the old standbys—such as iron, copper, lead, and zinc—a downward momentum, which may be misread as a general "law," and the like. In the meantime, it is probably prudent not to look to the possible existence of such long-term relationships—an intensity rise and decline law—as offering a way out of contemporary problems associated with materials production and use.

Materials Extenders

Recycling and substitution are the two magic terms that suggest more immediate escapes from scarcity and are on everybody's agenda of remedies. Despite the fact that neither is new, knowledge for judging the opportunities they offer is scant. Recycling has been given added momentum since the "materials cycle" concept has been popularized and suggests that it can be beneficial in the path from extraction or harvesting to eventual disposal. But at the same time, we have become aware of the obstacles to recycling or reuse, some of them institutional, some technological, and some economic, that is, cost-associated. Estimates of the potential contribution to the total materials supply by "mining" after-use streams or stacks of materials depend on assumptions regarding the estimated length of the useful life of the product, efficiency of gathering mechanisms, recovery efficiency, characteristics of the recovered material in relation to the specifics of demand, and no doubt public policies designed to affect the incentives for increasing efficiency all along the line.

As the result of an attempt a few years ago to judge what metals might raise the contribution made by scrap if there were an active recycling policy, it was estimated that little in the way of added material could be expected for iron and lead (that is, recycling mechanism and incentives appear to be working effectively already), somewhat more for copper, and a great deal more for zinc and aluminum (*12*). In the last instance, the relatively recent emergence of the material as a large tonnage item inevitably means that the volume should rise as stocks of obsolete products come increasingly into the market. Given the large energy component in primary aluminum and the relatively small one in the secondary product, the prospect of a rising recovery potential is cheering, but much depends on creating the slope that will enable the secondary material to slide into use rather than disposal.

All this is in the future, however. The available statistics reveal no upswing in recycling up to now, a circumstance that may be linked as much to the institutional impediments as to the fact that the country has been in a recession and the prices of most primary materials have plunged from their heights of early 1974.

As for substitution, the upheaval in energy prices has upset the once widespread speculation that the more abundant minerals, like aluminum and magnesium, and those derived from oil and gas, would increasingly encroach upon their competitors. High energy costs of both are now an obstacle to expansion, and while their light weight gives them an advantage in some uses (for example, aluminum and plastics in motor vehicles), this must now be balanced against the demerit of a high energy input in their manufacture. Indeed, there has been occasional agitation for deliberately reversing the historical trend and substituting steel for aluminum, solely on the grounds that the former is less energy-intensive. Like most single-purpose policies, this one too suffers from the tunnel vision of its perpetrators. Very sophisticated and specific models would be required to decide which material has some over-all superiority in a societal sense; and since social goals no less than private ones are bound to change with changing circumstances, and especially technology, one would by such calculations, could they be satisfactorily made and implemented, saddle both the materials-producing and materials-using industries with great and continuing uncertainties. It is only one of many instances in which the overriding concern with energy-saving tends to push the burden onto the materials industries, a temptation that needs to be curbed. On a more general plane, it requires that we refrain from subordinating or even sacrificing aggregate cost estimates to calculations cast in physical terms.

A more recent suggestion designed to widen the materials horizon has been to consider substituting renewable—that is, biomaterials—for nonrenewable ones. Forest products, fibers, natural rubber, and others are said to merit a new look. The driving forces here are (i) the high price of energy in situations where the fossil fuels constitute the feedstock, supply the needed process heat, or both, (ii) the desire to ease the draft upon depletable minerals, and (iii) the thought that such a turn would be beneficial to some of the developing countries that have in the past lost their markets to synthetic substitutes.

The suggestion, or set of issues, cannot be evaluated in any generally valid sense. At some level of cost it may indeed be cheaper to derive feedstocks for the chemical industry from trees or other plants rather than from natural gas, oil, or coal; or natural rubber may regain part of the market it has lost in the past three decades to the synthetic product. If and when such conditions arrive as a consequence of relative shifts in costs and prices, judgments will have to be made whether these changes are desirable also from other vantage points. Land devoted to growing industrial materials, for example, would not be available for raising food crops. In order to increase productivity, fertilization would have to be greatly increased. Environmental problems are bound to emerge at various processing stages. They would require input of resources to manage them. While one ought to be alert to the opportunities offered by moving along this particular substitution route, comprehensive analysis is in order before facile hypotheses turn into conventional wisdom. It is perhaps worth stressing that forest land is likely to be eyed as potential cropland, as "energy farmland" to produce combustible timber, and as a source of chemical feedstock, quite apart from the traditional growing of timber for forest products. Multiple claims will have to be sorted out and reconciled.

The International Dimension

One cannot discuss recent trends and issues without at least a brief reference to the international scene. The setting of the problem is reasonably clear. The well-known issues in materials production—renewed concern over depletion, awareness of a materials "cycle" as opposed to separate material worlds, opportunities for and restraints upon recycling and substitution, speculation on long-term relationships between materials use and economic growth, the impact of energy and environmental costs—have most recently been joined by a wholly new issue: the demand for, and U.N. agreement on, a "new international economic order."

Materials, and not only those of mineral origin, tend to be subject to frequent and often violent fluctuations in demand, supply, and price. The costs of such fluctuations for the economies of both producer and consumer countries are probably substantial, although good research on that subject is only now beginning to be undertaken. It is certain in any event that the situation can be severely disruptive for countries that have one-crop or one-material economies. (As a consequence of the slump in copper prices, Zambia, living almost wholly off its copper resources, has been undergoing a severe economic crisis in 1975.) Employment, foreign exchange income, and government revenues are badly

depressed, and the social fabric of such an area may begin to tear under the stress. Consumer countries find the ups and downs unattractive, to say the least. The alternation of feast and famine causes a good deal of costly adjustment, sometimes transient, at other times permanent. Many, perhaps most, losses go unmeasured because they are diffused through the economy. Suppliers and consumers alike would probably gain if at least the most violent fluctuations could be avoided. Under the combined impact of the Organization of Petroleum Exporting Countries (OPEC) episode and newly aroused concerns over early depletion, the reasonable core of the matter has been transformed into a highly politicized claim by producers in the developing countries for a "fair price," which this time around is viewed as a means of restitution for past colonial exploitation, of escaping from the slings and arrows of price and demand fluctuations, and as a club with which to beat the rich countries and strengthen the domestic political base of exporter countries. Those who do not sell materials and cannot afford to buy them add their demand for an ill-defined "equal access" to materials, which, if it is to mean anything, must be understood to be a demand for an international redistribution of income, beginning with increased outside financial aid, to permit sharing the global materials pie.

The problem is not new; it used to be carried on under the "terms of trade" heading and played a large role in the creation of the U.N. Conference on Trade and Development (UNCTAD) in 1964. What is new is not only the highly charged rhetoric and the level of aspirations in terms of desired price ranges and other arrangements, but also a willingness of the rich consumer countries to listen and perhaps negotiate.

So great has been the OPEC shock that, no matter how fuzzy, the "new order" has in record time become an accepted concept, if not a fait accompli. Materials play a leading role in it. Rapidly, schemes that have long been anathema to the philosophy of the U.S. government, for example, have become legitimate items at least for discussion: buffer stock schemes, economic stockpiles, export compensation funds, and other tools that might defuse potential conflict or assure continuity of supplies (or both). In addition, novel ways of (i) channeling funds into mining ventures and (ii) taking the sting out of having resource exploitation ventures foreign-owned or managed (or both) are being discussed.

The points (i) and (ii) above seem especially constructive and urgent, for it is largely the economic recession that has given the world respite from the problems created by demand chasing inadequate supplies and driving up prices in the process. Yet the traditional lumpiness of investment and capacity additions in materials and especially in the extractive industries has undoubtedly been aggravated by political considerations; a reviving materials demand could easily trigger shortages and price boosts comparable to or perhaps worse than those that erupted in 1972–73.

Materials Diplomacy

It is much too soon to speculate what will come of the parleys that began in December 1975. They would be useful even if the "polylogue" among the more than two dozen countries, deemed to be representative of developed and developing countries, merely begins to reveal the priorities among the numerous aims of the participants.

The priorities of the industrialized, materials-consuming countries seem straightforward:

1) To invent mechanisms that will (i) minimize the possibility of supply interruptions, (ii) provide for higher and more stable incomes to Third World material exporters but prevent price revolutions à la OPEC, and (iii) create a political and legal climate that will encourage investment in exploration and development.

2) To quickly abandon generalities and come to cases, preferably product-by-product.

3) To provide for relief to the Fourth World or most seriously affected countries.

It is less easy to identify the real aims and perhaps even the potential gains of the developing countries. The principal reason is that the glamor of "materials power" is in all likelihood a mirage, although it may for a while yield significant gains (and what political leader will not try to reap them and heavily discount the longer future?). Higher raw materials prices, especially if they result from market restrictions, are not the high road to economic emancipation and growth. That rather lies through transfers and digestion of technology and capital, higher labor skills, education, and a more diversified economy.

It is quite probable that the OPEC example has set a misleading precedent. To be sure, larger revenues from higher-priced materials exports, if sustained, can fuel meaningful development schemes. But unless arrangements can be made on a comprehensive materials scale, that is, embracing competing materials, long-term price maintenance is likely to be difficult. Consumer countries, however, while perhaps ready to talk copper, or bauxite, or lead, are likely to balk at broad across-the-board negotiations and arrangements. Thus, the talks could aggravate rather than calm conflict, and as a result it may get harder rather than easier to mobilize support for sustained income and technology transfers—the real levers in development strategies.

Moreover, the tougher and more comprehensive the proposed new materials regime, the greater the consumers' incentive to evade its consequences. Consider indexation. On the not unrealistic assumption that at least a moderate degree of inflation is the way of life in the industrialized countries, the price of raw materials would rise continuously and automatically. What greater incentive to R & D to economize, recycle, and develop substitutes?

More Government

These considerations reveal yet one more clear trend in materials affairs: the steeply rising role of governments and their control over the marketplace. Government control has long been a fact in the planned economies. It is now a fact in many of the developing countries. And the recently expressed willingness of the outstanding holdout, the U.S. government, to play a larger role, makes one wonder if it will perhaps increasingly be a fact in the OECD (Organization for Economic Cooperation and Development) countries as a whole. This discussion suggests that the performance of the marketplace has not been all that wonderful, else there would not be such agitation to stabilize conditions. Yet, an enlarged government role heralds arbitrariness, unilateral decision-making, the instant conversion of technical disputes into matters of national concern and prestige, and attrition of attention to the economic dimension. Turning concern over materials supplies and prices into affairs of state may worsen the state of affairs.

State of the Economy

Masking the more fundamental issues that are likely to affect materials over the long run is the state of the economy, in this instance that of the world. The low level of activity from which the industrial nations find it hard to rise has severely depressed demand for most materials and led to heavy inventory buildup. As a result, the more forceful objectives of the materials exporters in the developing countries have been somewhat muted, while the consuming countries have had a breathing spell in which to review outlook and strategies.

U.S. imports of bauxite illustrate the sit-

uation: in the first nine months of 1975 they showed a decline of nearly 20 percent from the same period a year earlier. Within that aggregate there were severe dislocations: imports from Jamaica, Surinam, and Guyana declined by 23, 35, and 80 percent, respectively; those from Guinea increased by 50 percent. Not surprisingly under the circumstances, Jamaica retreated somewhat from its insistence that purchasers of bauxite must take minimum quantities—a provision adopted in 1974 to prevent dissatisfied customers from switching to competing suppliers. Amidst such fluidity it is difficult if not impossible to fashion policy and, if it exists, to live by it. Recession periods are not conducive to putting the squeeze on customers. All this could change quickly if and when the pace of demand picks up, and especially if it should do so rapidly and once again bump into capacity ceilings.

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International Trade in Raw Materials: Myths and Realities

Edward R. Fried

Only two years ago the industrial world was gripped by something close to hysteria over developments in international commodity markets. The phenomenon had complex roots which included the gloomy resource forecasts of Meadows *et al.* (*1*), fears that OPEC's success in controlling the oil market would touch off a proliferation of commodity cartels, and a spreading inflationary psychology. Against this background, the explosion of commodity prices then under way tended to be interpreted not in cyclical terms but as heralding a disquieting secular trend.

What made prevailing attitudes even more unusual was their political dimension. Concepts such as "commodity power" and "resource diplomacy" as well as predictions that the industrial countries would become engaged in a struggle over raw materials supplies became newly fashionable and received serious attention. Altogether the atmosphere produced a foreboding, if not a conviction, that power in the world had suddenly shifted from buyers to sellers of primary commodities.

Much of this apprehension lifted as the commodity cycle ran its traditional course. But enough lingers to warrant asking why the reactions to the events of 1972–74 were so overblown, and what the experience suggests about the characteristics of international trade in raw materials and about potentially useful directions for policy.

Postmortem on the Commodities Boom

While the 1972–75 commodity cycle tends to be viewed as a single phenomenon, its separate parts are evident enough and not always causally related. They are worth keeping in mind.

It is of course true that the price rise was about as comprehensive as it was sharp. Each of the major commodity groups showed the effects. With regard to the steepness of the rise, from the beginning of 1972 to the middle of 1974 the U.N. index of export prices of all primary commodities increased by more than 150 percent, fully three times the advance that occurred during the Korean War commodity boom (*2*). With the use of the London *Economist* commodities index, which does not include fuels and is otherwise less comprehensive than the U.N. index, Cooper and Lawrence (*3*) found that "during the past 115 years there has been no year in which commodity prices rose as rapidly as they did in 1972–73 (63 percent) and no 3-year period in which they rose as rapidly as in 1971–74 (159 percent)." Similarly, for a few industrial materials, the sharpness of the decline in prices since mid-1974 has no parallel in the past century.

Nonetheless, the rate, timing, and duration of the advance varied considerably among the major commodity groups. A number of factors, some related to supply and others related to demand, were responsible for the difference in behavior.

In the case of oil, the price explosion did not occur until after the October 1973 embargo. Before that, OPEC (Organization of Petroleum Exporting Countries) demands for higher taxes and a larger share of the total take, which were persistent and successful from 1971 onward, did not cause oil prices to rise much more rapidly than prices of most other primary commodities. Import demand had been expanding rapidly for a number of years—at about 8 to 9 percent a year—principally because of a preference for oil over other energy fuels (due to its low price) and because of the sudden emergence of the United States as a large and growing importer of oil. While world export capacity easily kept up with demand, the oil situation created unusual alarm because of the evidently growing market power of OPEC and because of the contrast with the 1960's, when oil prices declined (*4*).

When OPEC boosted its demands through the almost accidental series of events that began in October 1973, the strong growth in oil consumption and the

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