EIR Special Report

America needs high-technology breakthroughs

by David Goldman

America will not survive as an industrial nation, and the human race will not reach the year 2000 intact, unless the new administration becomes the vehicle for a series of high-technology breakthroughs on the model of the 1960s moonshot program. This conclusion is inescapable on the strength of a comprehensive set of measurements of the American economy, generated by the LaRouche-Riemann econometric model and excerpted in this survey.

In contrast to the flawed national-income accounting methods of the Department of Commerce and the leading private think tanks, the model's measurements strip away the ideological nonsense from econometrics and present the economy's status as a physical system. The question we try to answer with these measurements is, how do our economic choices today affect our chances of making it through until a year, or 10 years, or 20 years from now?

No amount of nominal growth in the form of inflation-adjusted Gross National Product will contribute to the survival chances the U.S. still has if that growth is based on urban real-estate booms, legalized gambling, computerized electronic toys, and sophisticated office equipment. Yet that is precisely what the "Agenda for the '80s" task force of the Carter administration, under the direction of Time, Inc. executive Hedley Donovan, suggests for the U.S. economy.

GNP measurements, narrow-focus "cost-benefit analysis," and even conventional labor productivity studies miss the point. Measuring the imputed profitability or efficiency of past or projected investments must answer to one overriding criterion; that is, how they help or hinder the economy's future capacity to reproduce itself.

The economy in physical terms

Our measurements of the physical economy do not yet fully enable us to say with precision what quality of technologies we will need by what point in the future. This, the next generation of the LaRouche-Riemann model now under development, will accomplish. But they do show us some basic

Courtesy of Bethlehem Steel

truths about the economy in a strikingly clear way.

In summary, they demonstrate that the economy's rate of gross profit in *physical terms,* the amount of useful tangible product the economy yields per unit of capital and labor input, rose dramatically when the federal government backed up technological development, but collapsed during the past decade when this backup disappeared. In contrast to some econometric studies which purport to show that the technology "factor," by some ill-defined statistical weighting, is of minor importance in postwar economic growth*, we provide hard data that yield only one conclusion: the economy's rate of absorption of science through new technological applications is the fundamental determinant of our economic health and our growth rate.

In policy terms, this establishes the following requirements: the new administration and Congress must act swiftly on two legislative initiatives, the McCormack fusion bill passed in 1980 by both Houses of Congress, and the just-released initiative of Sen. Harrison Schmitt (R-N.M.) to revive the National Aeronautics and Space Administration for a three-quarter-century effort to build a manned colony on Earth's moon.

The worst cost-accounting tendencies exhibited by the new Director of Office of Management and Budget, David Stockman, must be resisted in favor of substantial funding of these frontier technology efforts. Without them the U.S. will never recapture the productivity growth rates of the mid-1960s, the absolute miminum condition for the survival of the United States as a great industrial power.

Let us examine the evidence. Taken together, the following measurements (displayed in adjacent computer-generated graphs) provide a competent set of accounts of the American economy:

1) the rate of surplus tangible wealth production, or "value added" in physical terms;

2) the rate of gross profit (or total productivity), i.e. surplus divided by capital plus labor inputs;

3) the productivity of labor, or surplus divided by labor inputs;

4) the net profit of the economy, i.e., surplus available for reinvestment into goods-producing industries (S′);

5) the economy's net rate of profit, or investible surplus (surplus net of overhead, S′ divided by capital and labor inputs);

6) the capital intensity of the economy.

The data for the aggregate economy display the problem clearly. The graph of surplus shows a rise (but at a declining rate of growth) from $328 billion 1976 dollars to $552 billion 1976 dollars between 1963 and 1981, with recessionary interruptions. However, the rate of gross profit (surplus per unit of input) went through a dramatic turnaround. From 1963 (when the effects of the moonshot program start to filter through the economy) this measures a straight-line rise from about .73 to .77 in barely four years.

After 1971—when budget managers George Shultz and Caspar ("Cap the Knife") Weinberger gutted the NASA budget—the measure begins a bumpy descent to the levels it started from. The U.S. economy is getting

no more output per unit of physical investment of capital and labor than it did in 1963! The rate of net profit twice dips into the negative during the 1970s, during the 1974-1975 recession, and again during the present bust, as does the absolute net profit.

Productivity decline

In financial terms, the effect of this decline in physical productivity has not shown. The reason is evident from other measures of the aggregate economy. Labor inputs have declined since 1973 in real terms, i.e., the American standard of living has fallen drastically. The economy is obtaining more surplus per unit of labor-time by paying its labor less (with the obvious penalties for future labor skills and family formation); hence labor productivity, or surplus/labor input, appears to rise steadily. This is a short-run phenomenon due to cost-cutting on the quality of America's future skilled labor force. It merely serves to temporarily mask the actual decline of the productivity of capital, which is a function of technology.

It will not be sufficient to merely extend the existing technology base. Without substantial funding of frontier technology efforts, the United States will never recapture the productivity growth rates of the mid-1960s, the absolute minimum condition for survival as a great industrial power.

As we emphasized in a general multisector forecast for the U.S. economy (*EIR*, Dec. 10, 1980)—which projected the consequences of the continuation of the Federal Reserve's high interest-rate policy—the consumer sector of the economy would be virtually destroyed, in a misguided effort to maintain this fraud through a 40 percent and up further reduction in U.S. living standards during the next five years.

Energy intensity

The collapse of the American economy's efficiency in converting physical nature into useful goods (its "reducing power") is most evident in the *energy-intensive* sectors of the economy. The starting point of any effort to examine the economy as a physical system is the efficiency with which it produces and uses energy. For domestic energy production and conversion, shown in the graphs for the petroleum and gas sector and the electric utilities sector, the problem is spectacular.

In the case of domestic petroleum and gas output the ultimate problem, resort to marginal resources which are more difficult to obtain, is evident. Of course, the emphasis on secondary recovery methods and offshore drilling in the United States is largely due to the rise in OPEC oil prices abroad. However, the marginalization problem is built into the fossil fuels economy. Moreover, the implications for an economy in which the sector attracting the greatest investment is also subject to the worst collapse of productivity in real terms are ominous.

We are measuring physical output of oil and gas, and the physical outlay of capital and consumer goods required to produce it. The graphs show a tremendous growth in activity from the oil-price rise of 1973 onward measured by net capital investment and labor input. Labor input virtually triples. But surplus, i.e., domestic oil and gas output, falls sharply during the same period, and rises at the end of the 1970s to barely the level of 20 years earlier. The rate of gross profit falls from 1.4 to 0.8, or by more than 42 percent. Labor productivity falls to a third of the 1972 peak.

That this decline is not a special case for oil and gas production, which employs more labor and capital in secondary recovery methods, is evident in the graphs showing the performance of electric utilities. Surplus grows, but at a visibly declining rate after 1973. Net capital investment drops off sharply during the same years. The net contribution of utilities to total reinvestible surplus (the industries' contribution to S′) drops by about one-third in absolute terms.

Most indicative is the drop in the gross profit rate of the electric utilities sector from about 0.6 to about 0.48, a drop of 20 percent. Not only has the efficiency of energy extraction collapsed, but the efficiency of conversion of energy into its most versatile and useful form as well. Here we see the results of the abortion of the U.S. nuclear industry, along with associated environmentalist restrictions. Within a picture of declining net capital investment, we have an accelerating rate of plant and equipment outlays (in physical terms).

In physical terms, such outlays more than tripled on an annual basis between 1963 and 1980, from $2.8 billion per annum to $8.7 billion per annum, and rose at an accelerating rate during the past five years. But the content of these outlays was dominated by environmental demands: conversion from coal to oil, in some cases conversion back from oil to coal, installation of smokestack scrubbers, purchase of coal from more distant fields, and other expenses that make no contribution to

The U.S. moon landing in 1969.

electricity output. (Since modifications of existing plant do not add to the value of capital stock, net capital investment fell when capital outlays rose the fastest!)

The situation of gas utilities is not much better.

Declining profit rates

As the remaining sector graphs indicate, the pattern of declining gross profit rates in real terms is uninterrupted through the most energy-intensive sectors, including agriculture, mining, iron and steel, and chemicals. That is the core of the problem of the economy as a whole. In some of the highly capitalized industrial sectors, the rate of gross profit continues to rise somewhat, but this is more than outweighed in the total-economy accounts by the sharp decline elsewhere.

This is the combined result of resort to emarginated resources, obsolescence, and diversion of capital into counterproductive investments dictated by the Environmental Protection Agency. There is cause for concern, but not for real pessimism. In most cases of sectoral productivity decline, the earlier growth periods are equally impressive. The electric utilities—the core of the national economy—may have registered a spectacular productivity decline during the 1970s, but they had earlier demonstrated the ability to assimilate an equally important rise in productivity with the right economic environment.

In its first actions, the Reagan administration will almost certainly grant major regulatory relief on the environmental front. That by itself will give the utilities, for example, a crucial margin of freedom to complete long-stalled projects, including speeding up the completion of more than 400 plant starts in various stages of completion around the country. Assuming that credit market conditions are tolerable, the immediate reaction of this and other industries will be to step up capital investment.

Expand nuclear energy

But it will not be sufficient to merely extend the existing technology base. Unleashing the full productive potential of the nation's existing technological base is merely a means toward transforming that base from the ground up. During the next decade our agenda must include not only mass production of nuclear reactors, the majority for export, but the building of fast-breeder reactors and crash R & D to bring on line yet more efficient breeder reactors. Otherwise, the uranium problem will cease to be a matter of apparent cartel manipulation and turn into a devastating bottleneck for nuclear energy production.

By the year 2000 the globe will contain 6 billion inhabitants. The power requirements to bring them into the industrial world can be expressed as a requirement

to build about 7,000 gigawatt nuclear reactors in 20 years, an increase by an order of magnitude in the rate of reactor construction. That, in turn, establishes a deadline for the perfection of an entire new generation of breeder technology.

Oil and uranium, however, merely indicate the general nature of the problem. Fusion power must come on line by the end of this century, in part because the mass expansion of power production with conventional nuclear technology will generate a further order-of-magnitude demand for power in the succeeding generation. But the technological implications of fusion power, including direct-reduction mining at temperatures equivalent to those on the sun's surface, are a matter of economic survival.

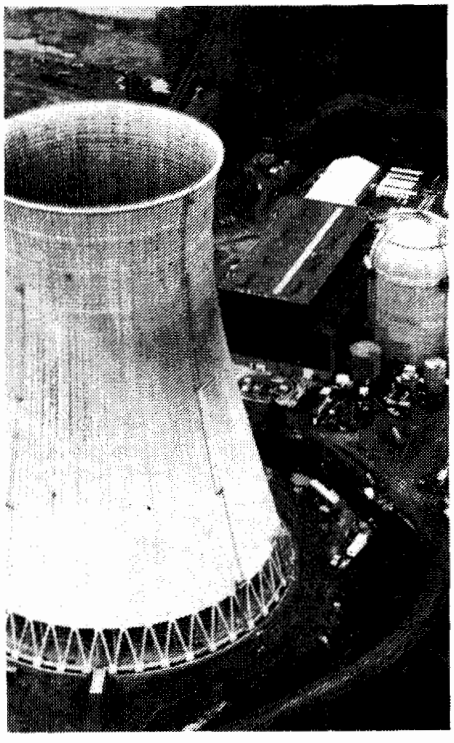
By the year 2000, the power requirements to bring six billion people into the industrial world can be expressed as a requirement to build about 7,000 gigawatt reactors in twenty years. That, in turn, establishes a deadline for the perfection of a new generation of breeder technology.

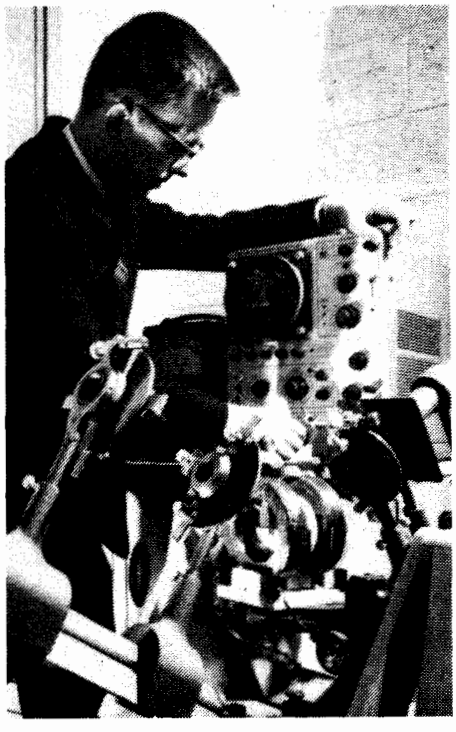
To cite one example: in an April 1980 Special Report, "The Industrial Development of India," *EIR* and Fusion Energy Foundation researchers demonstrated that India could achieve the status of the American or Soviet economies within 40 years. But the resource requirements to fuel such an economy would absorb virtually all known reserves of copper and other minerals before the program came to completion! Without a quantum leap in mining technology, development will grind to a halt.

The credit and tax policy requirements to avoid short-term economic disaster are, in the final analysis, a relatively elementary matter, provided that the required qualities of statecraft are available to the Reagan White House. More challenging are the tasks of setting our national course toward the goals we have no choice but to achieve in the next two decades, if this nation is to maintain its world standing as an industrial power.

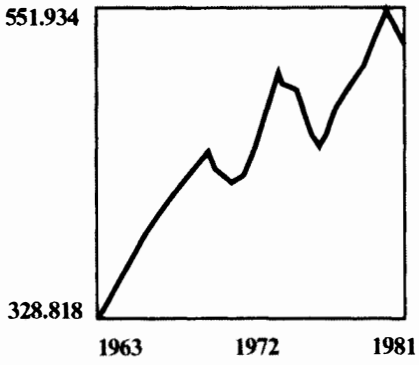
* American Council of Life Insurance, *Capital, Efficiency and Growth* (Cambridge, Mass., 1980), edited by International Monetary Fund economist George von Furstenberg.

Aggregate

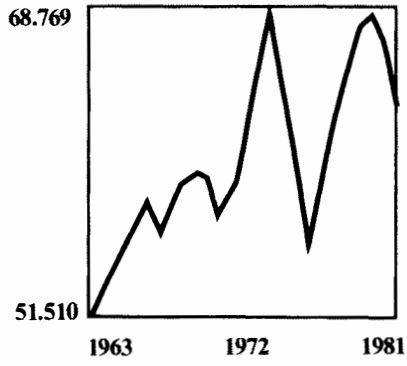




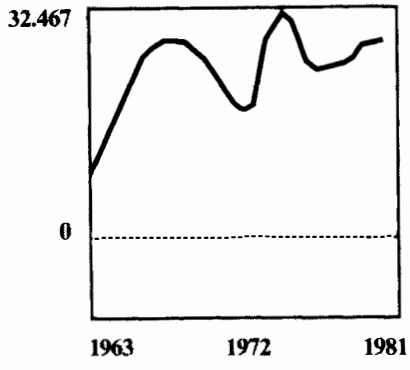
Surplus
(billions of 1976 dollars)



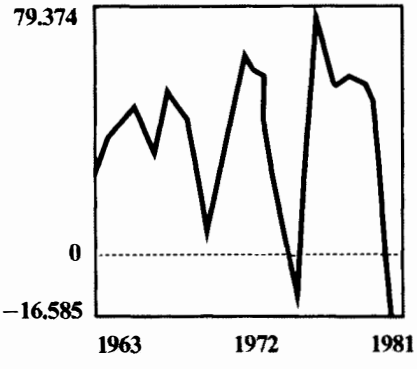
Consumption of productive workforce
(billions of 1976 dollars)



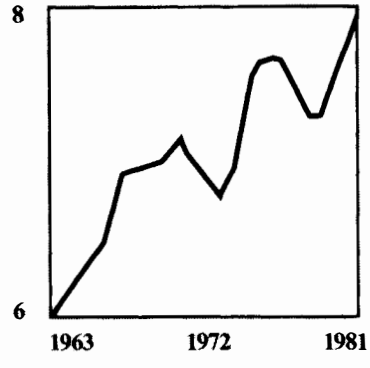
Net capital investment
(billions of 1976 dollars)



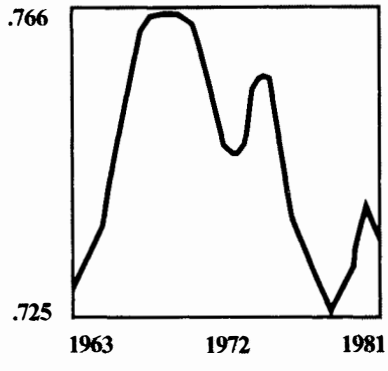
Reinvestible surplus
(billions of 1976 dollars)



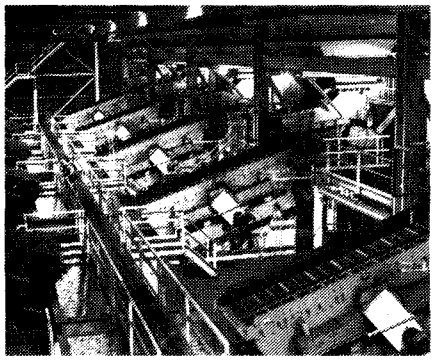
Ratio of surplus to consumption of productive workforce

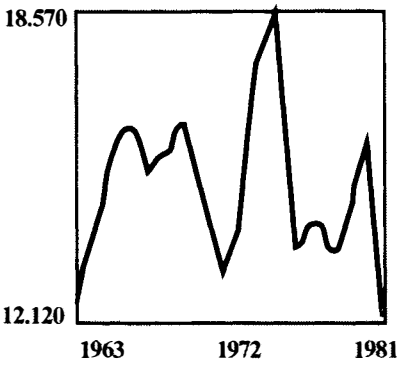


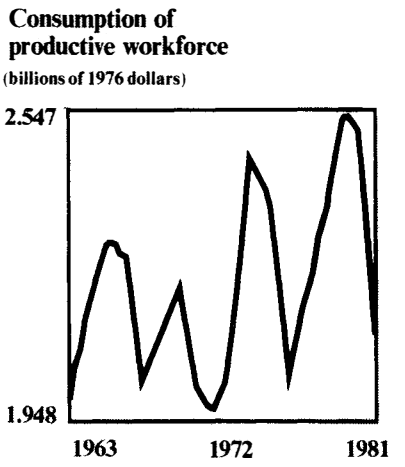
Ratio of surplus to total capital and labor inputs
(Gross profit)



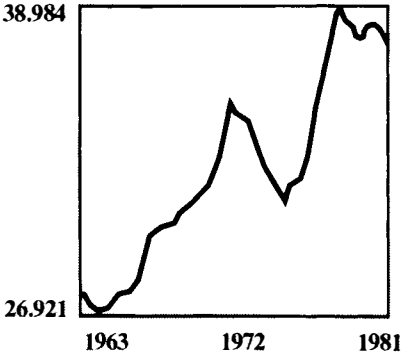
Iron & Steel

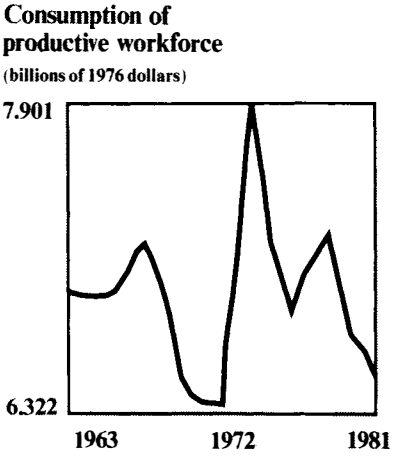




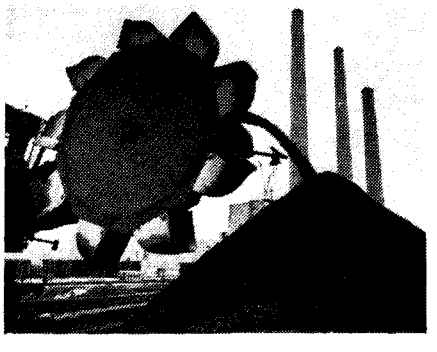


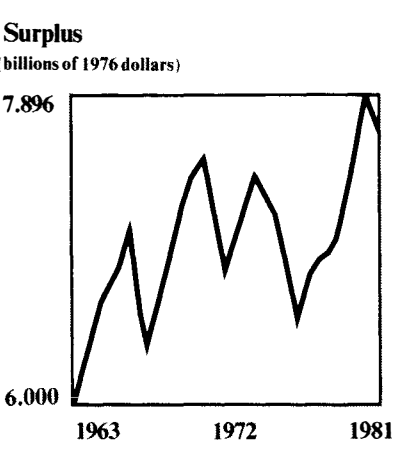
Agriculture

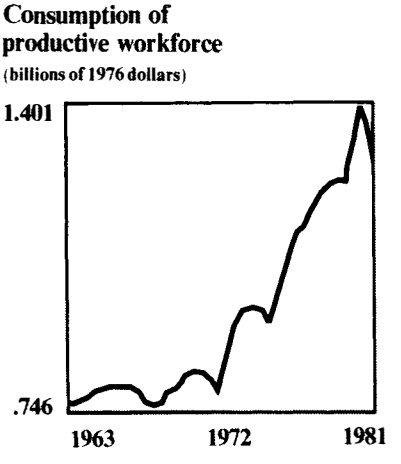




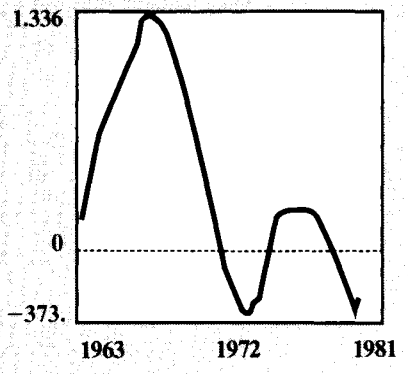
Mining



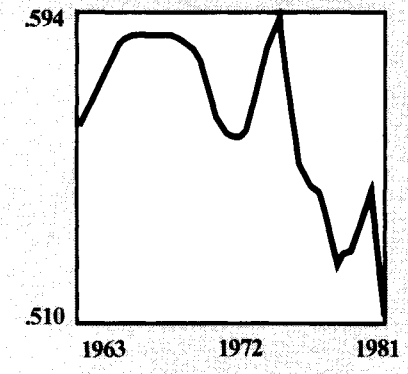




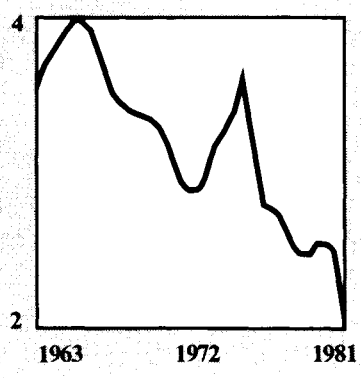
Net capital investment
(billions of 1976 dollars)



Ratio of surplus to total capital and labor inputs
(Gross profit)



Sectoral surplus as percentage of total surplus



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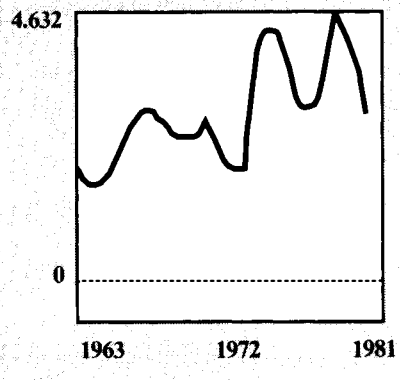

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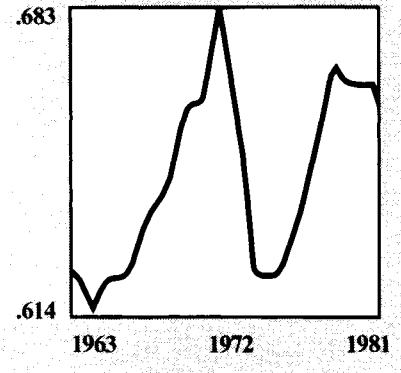

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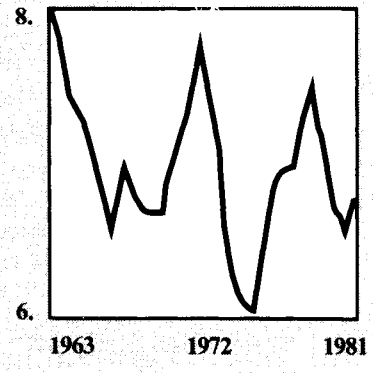

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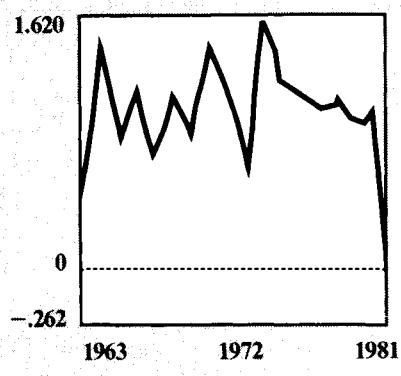
(billions of 1976 dollars)



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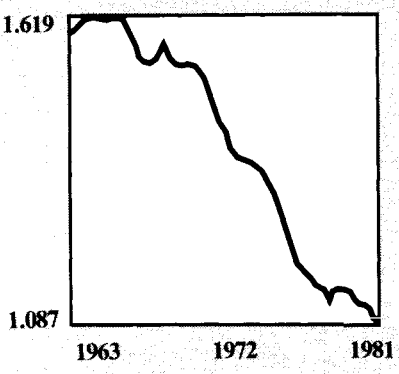
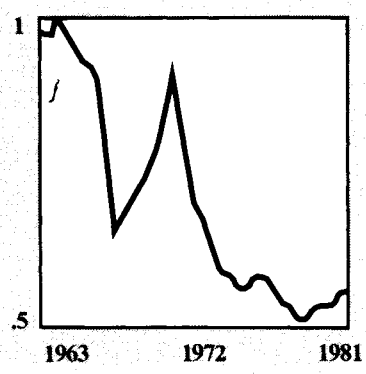
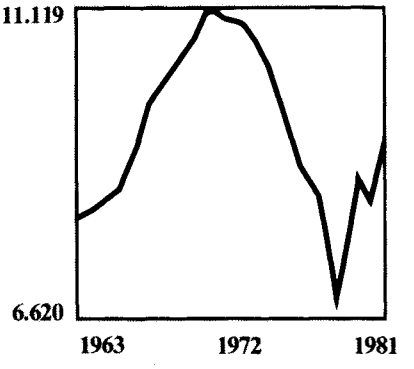


Sector surplus as percentage of total surplus

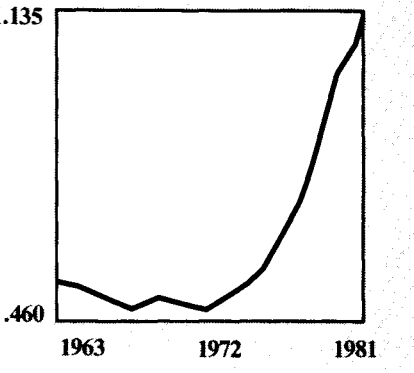


Oil & Gas

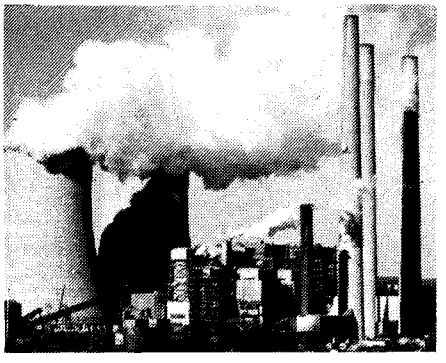
Surplus
(billions of 1976 dollars)



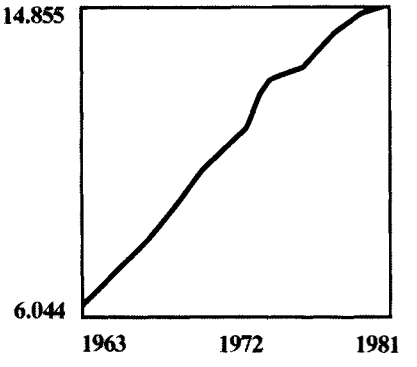
Consumption of productive workforce
(billions of 1976 dollars)



Electrical utilities



Surplus
(billions of 1976 dollars)



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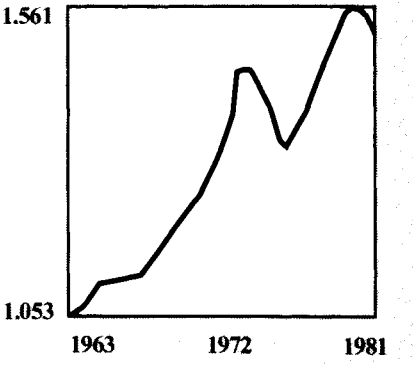
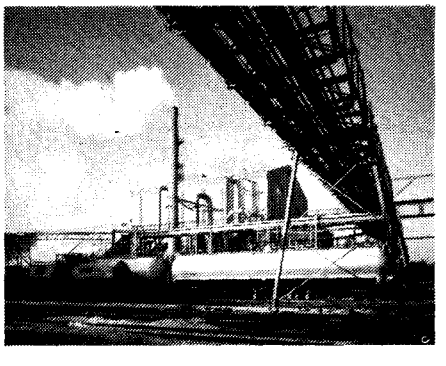
(billions of 1976 dollars)



Chemicals



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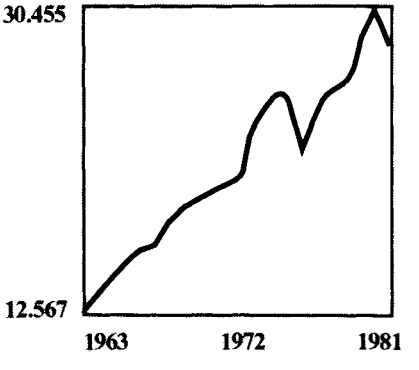
(billions of 1976 dollars)



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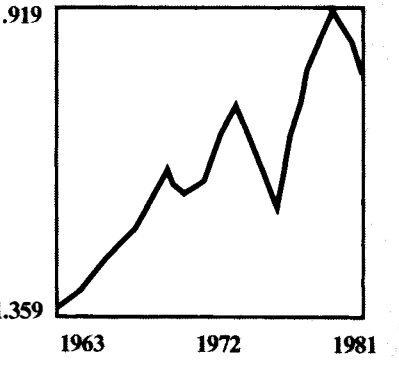
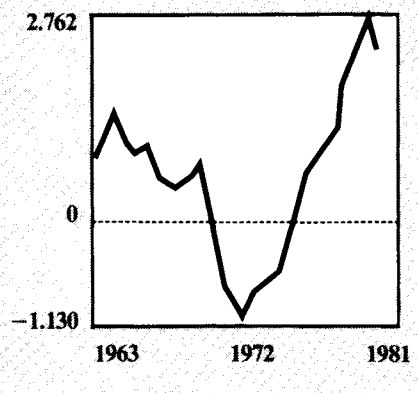
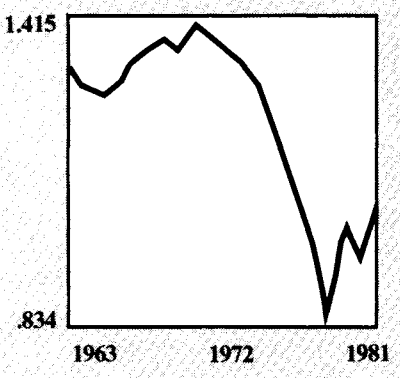


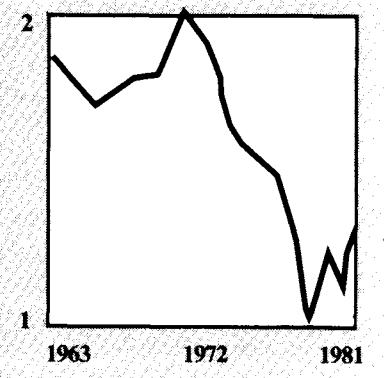
Net capital investment
(billions of 1976 dollars)



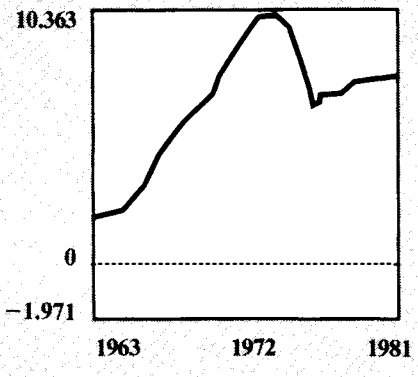
Ratio of surplus and labor inputs to total capital
(Gross profit)



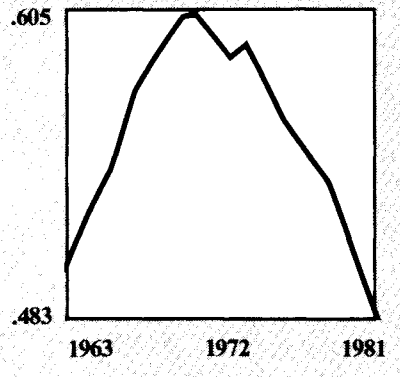
Sectoral surplus as percentage of total surplus



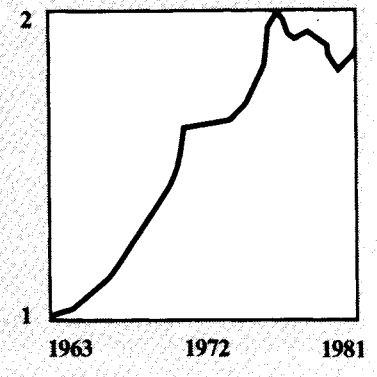
Net capital investment
(billions of 1976 dollars)



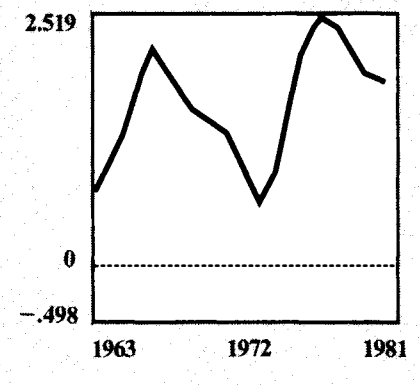
Ratio of surplus and labor inputs to total capital
(Gross profit)



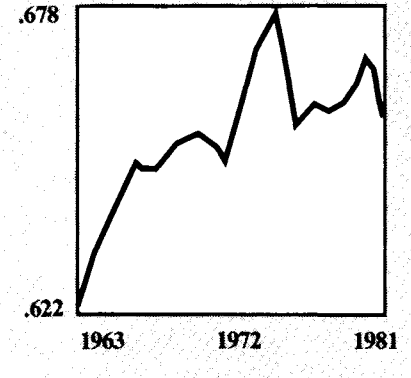
Sector surplus as percentage of total surplus



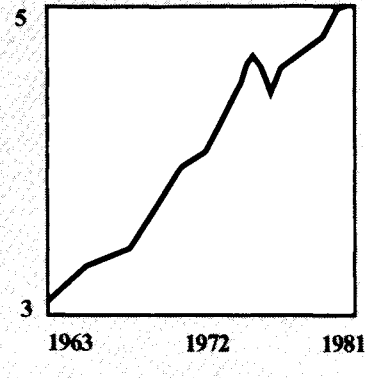
Net capital investment
(billions of 1976 dollars)



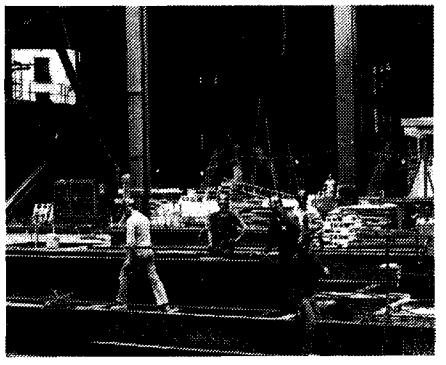
Ratio of surplus and labor inputs to total capital
(Gross profit)



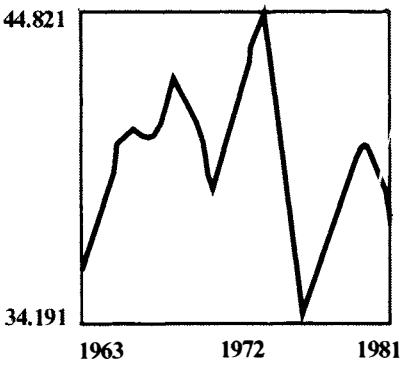
Sectoral surplus as percentage of total surplus



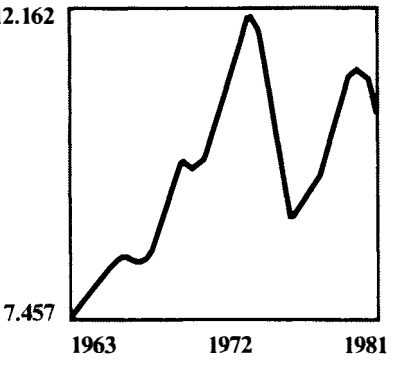
Construction



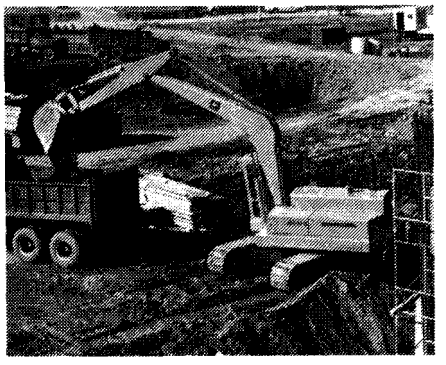
Surplus
(billions of 1976 dollars)



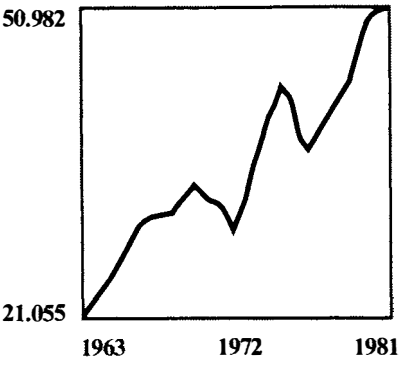
Consumption of productive workforce
(billions of 1976 dollars)



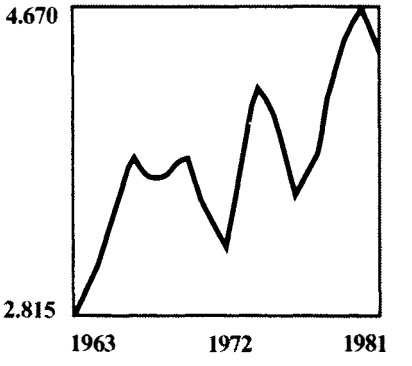
Nonelectrical machinery



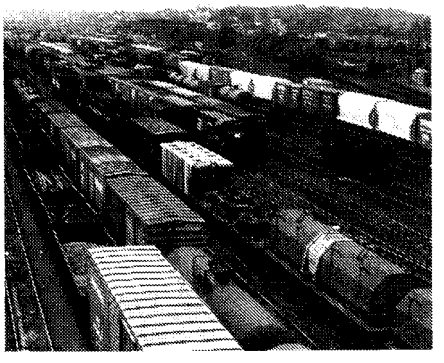
Surplus
(billions of 1976 dollars)



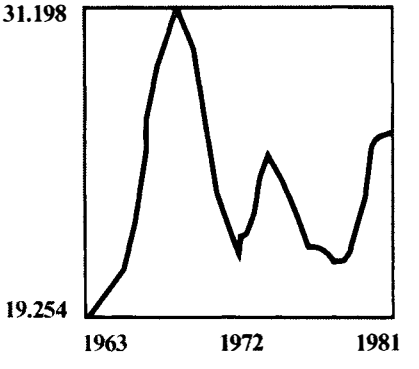
Consumption of productive workforce
(billions of 1976 dollars)



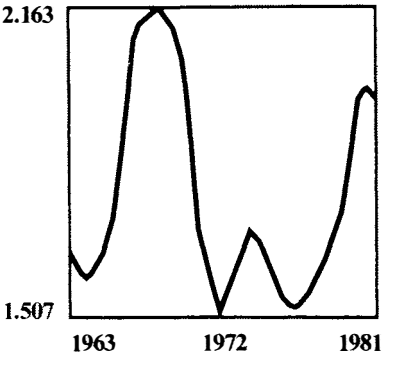
Transportation



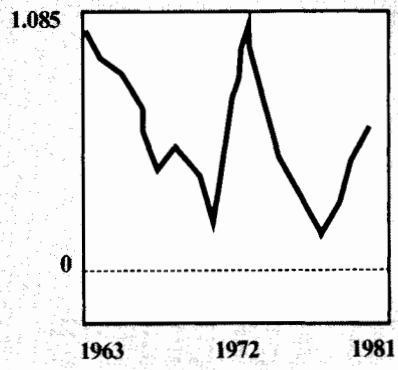
Surplus
(billions of 1976 dollars)



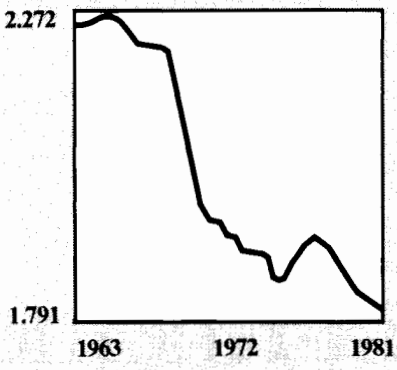
Consumption of productive workforce
(billions of 1976 dollars)



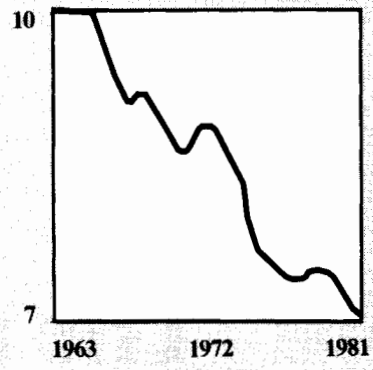
Net capital investment
(billions of 1976 dollars)



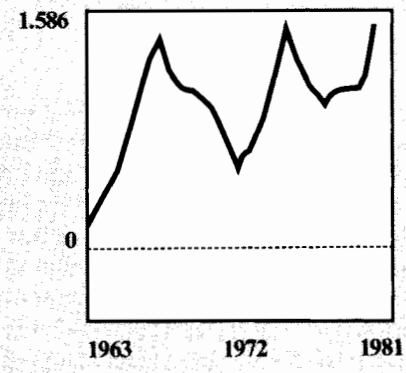
Ratio of surplus to total capital and labor inputs
(Gross profit)



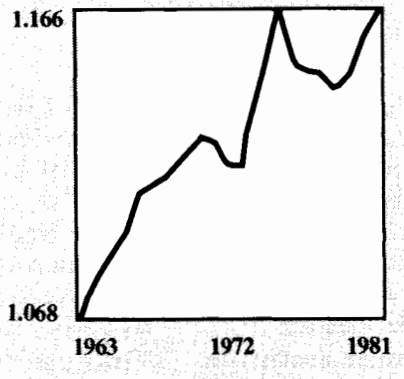
Sectoral surplus as percentage of total surplus



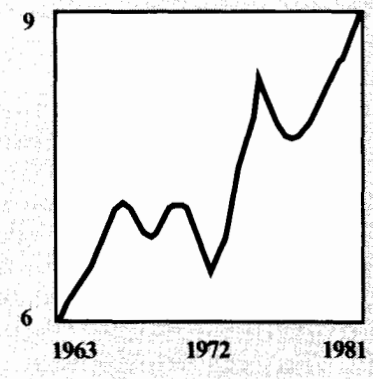
Net capital investment
(billions of 1976 dollars)



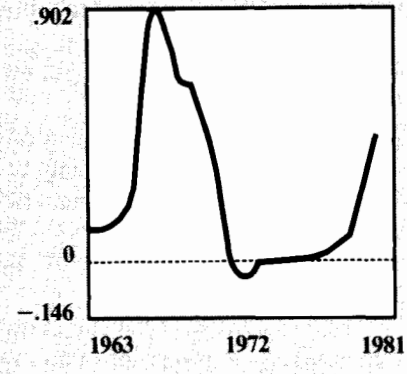
Ratio of surplus to total capital and labor inputs
(Gross profit)



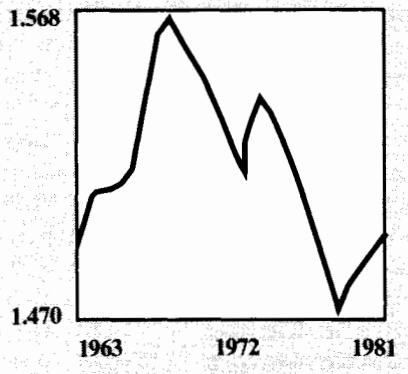
Sector surplus as percentage of total surplus



Net capital investment
(billions of 1976 dollars)



Ratio of surplus to total capital and labor inputs
(Gross profit)



Sectoral surplus as percentage of total surplus