PATTERNS OF INDUSTRIAL CHANGE IN THE USA SINCE 1960: A PRELIMINARY SUMMARY

Claire P. Doblin

November 1983
WP-83-103

INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS
A-2361 Laxenburg, Austria

PREFACE

Comparative intercountry and intertemporal studies play an important role in IIASA's research into economic structural change and growth. By comparing and analyzing the experiences of a number of industrialized countries in the recent past we hope to both improve our understanding of historical phenomena and extend our ability to formulate hypotheses concerning probable future developments. Studies of the growth patterns in six countries over the last 20-25 years are already underway and more will be added to the list soon.

In this paper Claire Doblin summarizes the preliminary results from the first national case study, which focuses on structural change in the US economy since 1960. Using data for the disaggregated, 3-digit SIC level, she identifies the major "winner" and "loser" industries over the period studied. The analysis traces the changing shares in total national production, output, and capital equipment for each of 127 industries. As well as revealing familiar trends toward newer technologies that are less capital and labor intensive than their predecessors, Dr. Doblin examines in some detail the importance of the age and structure of capital equipment stocks in each industry.

Anatoli Smyshlyaev
Patterns of Economic Structural
Change and Industrial Adjustment

ABSTRACT

This analysis of industrial changes in the USA is the first in a series of case studies on structural changes since 1960. Generally, this has been a period of economic growth in the USA, but no means all industries have shared in it to the same extent. Measured by means of index numbers, the growth of total national production represents the national average. Industries with slower growth than that for total industrial production may be viewed as underperformers, and those with faster growth as over-performers. The growth differential is also reflected in the percentage shares held by individual industries in total output (sales values and value added) and capital stock (equipment). The analysis covers 127 US industries at the disaggregated 3-digit SIC level. The major results are that the combined share in total output (sales values at 1972 prices) by the underperformers receded from 61% in 1960 to 50% in 1980; or from 55 to 43% in terms of value added (also at 1972 prices). The most prominent 'losers' are: food (dairy, grain mill, and bakery products); primary metals (steel); transportation equipment (automobiles); and stone, clay, and glass products (cement). With the addition of industries that were still growing faintly in the 1960s, but more slowly than the average in the 1970s, for example, textile mill products, metal fabrications, and others, the combined share of the losers eroded from 78% of total output in 1960 to 67% in 1980 (sales values) or from 73% in 1960 to 62% in 1980 (in terms of value added), whereas the share of the 'winners' moved up from 20% in 1960 to 32% in 1980 (sales values) and from 26% in 1960 to 37% in 1980 (value added). The growth industries include nonelectrical machinery (office and computing machinery; refrigeration and service machinery), electrical and electronic equipment (especially electronic equipment and accessories and communication equipment, as well as radio and TV equipment), investments, and chemicals (drugs and pharmaceuticals, soap and toiletries--but not

industrial inorganic chemicals). Only one industry, furniture and fixtures, did not change its output share over the period studied.

The age and structure of the stock of capital equipment held by the manufacturing industries also reflected some of the structural changes in output. Primary steel and textile mills were found to have the oldest equipment. But not all of the losers in output were losers in terms of capital stock growth. This reflects the investment activity since the 1970s and may indicate a more promising future for currently depressed industries that have been retooling, such as automobiles and, at one time, coal processing.

Overall, the structural changes reflect the decline of the more basic industries using long-established technologies that are both labor- and energy-intensive but low in value added, and the growth of industries with new and more sophisticated technologies based on innovation, which are high in value added. This demonstrates that over the last 20 years US industry has continued on the path towards higher industrialization. The impact on the economy as a whole may be a slowdown in the growth (not an absolute decrease) of energy demand by the industrial sector, if and when a substantial recovery occurs.

CONTENTS

PATTERNS OF INDUSTRIAL CHANGE IN THE USA SINCE 1960: A PRELIMINARY SUMMARY

Claire P. Doblin
International Institute for Applied Systems Analysis,
Laxenburg, Austria

1. INTRODUCTION: Broad structural changes in GDP

Structural changes in the economy of the USA at a very broad level of aggregation become visible through changes in the shares of GDP held by the various sectors. Since 1960 about one-third of GDP has derived from the total industry sector (mining, manufacturing, construction, utilities), while two-thirds has been generated by services (see Table 1)[1/].

Structural changes between these two broad sectors were rather slow; the share of industry in total GDP decreased from 33.6% in 1960 to 31.6% in 1980 (31.7% in 1981); the share of services rose from 62.0% in 1960 to 65.5% in 1980 (65.3% in 1981), while agriculture continued its downward slide from over 4% in 1960 to 2.7% in 1980 (2.9% in 1981). This means that the displacement of agriculture, and the change between total industry and total services, were already fairly advanced in 1960. Whatever structural changes occurred after 1960, at this broad level, were relatively minor. However, within the sectors major changes occurred. For instance, within transportation there was a rapid

---

1/ Note that Tables 1-14 are collected together at the end of the paper.

decline of railroads while aviation grew quickly, and within the total service sector there was an important shift as the "finance, insurance, and real estate" sector grew at a faster rate than services as a whole. Some of the structural changes, as well as those that occurred within the industry sector, had an impact on the nation's total energy consumption, which rose at a slower pace than GDP in times of economic upswing and fell harder than GDP during recessions.

2. MINING: Output and Labor

The growth of the mining sector lagged behind total industrial growth in the sixties and seventies, as measured by value added and Federal Reserve Board (FRB) production indices.

As regards labor, measured in terms of BLS statistics of all employees, one notices that the (slow) growth of output in the 1960s was paralleled by a decline of labor; this was a continuation of a trend already seen in the 1950s. However, in the seventies the still relatively slow growth of output went alongside a considerable increase of labor (see Table 2). In fact, the growth indices for the late seventies show that labor grew nearly as fast as gross investment. This apparent contradiction in the growth trends of output, labor, and capital in the mining sector during the seventies may be explained by several factors. In the sixties the coal industry had decreased employment through "attrition", meaning no replacement of retired miners. With increased demand and the move of coal mining to the West, younger and less experienced miners were called into service who could not replace the old work force on a 1:1 basis. Besides, more stringent safety rules required the employment of more labor. (This topic may be explored further in future in the light of studies performed at the University of Pennsylvania.)

Also during the seventies, the sudden surge of prospecting for oil and gas and other infrastructural investments for fuel mining that are not necessarily included in the FRB and other production indices contributed to raise employment. Note also the growth of labor and output in coal, oil and gas, and metal mining shown in Tables 3-5.

3. MANUFACTURING: Output

3.1. Data Sources for Output and Capital

Within the manufacturing sector, the structural changes are reviewed in the areas of output and capital, both denominated in dollar values at constant 1972 prices. The structural change in the demand for labor will be the subject of a future study. The main source for output is the shipment or sales values compiled by the US Department of Commerce, Bureau of Industrial Economics (BIE) from the census and annual surveys. These were checked, where feasible, against the Federal Reserve production indices and, at a broad level of aggregation, against National Accounts value added. The sales values were also checked against the national income without capital consumption, which is the nearest thing to value added with a narrow classification. Except for chemicals, both values followed much the same structural change trend. There was, however, some difference in the level of percentage shares. For the sales values, percentage shares were higher for food and beverages, petroleum (refining), and coal products, while those of nonelectrical machinery, electric and electronic equipment, and instruments were lower; the opposite held true for the national income measures. See Table 6 for details.

The capital formation data (annual gross fixed investments for equipment and structures) were also checked against National Accounts and the Survey of Expenditures on New Plant and Equipment in the Survey of Current Business. All data on capital formation and capital stock were estimated by the BIE, their classification corresponding with the classification of output, down to the 3-digit SIC level. This unique information was sent from the BIE to IIASA in the form of computer printouts during April 1983.

3.2 Structural Output Changes at the 2-Digit SIC Level: An Overview

Between 1960 and 1980, the index for total manufacturing (1970=100, with sales values in 1972 prices) increased from 69.1 in 1960 to 131.9 in 1980. The growth of total manufacturing may

be considered as a national average; deviations from this national average can be viewed as underperformance by industries growing more slowly than the total, or as overperformance by industries growing faster than the total. The growth performances of the various industries are also reflected in the shifts in their percentage shares of total manufacturing output; see also Table 6, sales values.

There was only one industry whose growth was similar to that of total manufacturing, and consequently its share of 1.37% did not change during the 20-year period. This is SIC 25 - furniture and fixtures. The other industries may be subdivided into three groups; for each of these groups, the observed changes in percentage shares reflect different underlying structural changes:

1. Erosion since 1960. These are the industries whose growth was continuously slower than that of the national average, over the period 1960-1980. They include SIC 20 - food and beverages; 21 - tobacco products; 23 - apparel; 24 - lumber and products; 29 - petroleum refining and coal products; 31 - leather and products; 32 - stone, clay, glass products; 33 - primary metals; 37 - transportation equipment; and 27 - printing and publishing. The combined share in total manufacturing of these industries eroded from 60.99% in 1960 to 49.66% in 1980.

2. Erosion since 1970. The growth of these industries was only a little faster than the national average in the sixties, followed by a slowdown to less than the national average in the seventies. Industries included are SIC 22 - textile mill products; 26 - paper and allied products; 30 - rubber and plastics; 34 - metal fabrications; and 39 - miscellaneous. The share of these industries in total manufacturing increased from 17.11% in 1960 to 18.76% in 1970, falling subsequently to 17.30% in 1980.

The combined shares of the industries in groups 1 and 2 together eroded from 78.10% in 1960 to 66.96% in 1980.

3. Continued growth since 1960. These are the winners, and they include SIC 28 - chemical and allied products; 35 - machinery (except electrical); 36 - electric and electronics equipment; and 38 - instruments. The share in total output of these industries rose from 20.52% in 1960 to 31.65% in 1980.

3.3 Structural Output Changes at the 3-Digit SIC Level

There can be many reasons for an industry's stagnation, decline, or growth. These might be growing affluence and with it a change in tastes and diets (less starchy products), a change in fashion (fewer cigars), and habits (newspapers and books forced out by television), or cheaper imports from abroad, like those that hit the leather and shoe industry and exacerbated the plight of the automobile and the aging steel industries. What were the innovations, and which were the new industries that blossomed in the sixties and particularly in the seventies?

For an answer to some of these questions, one has to look at the industries beyond the 2-digit SIC level. Not all industries within the 2-digit group follow the same growth trend; each has its own particular reasons for rising or falling. Some of the main findings are summarized below.

The largest major group, in terms of sales values, is SIC 20 - food and beverages. Its share in total manufacturing fell from 17.84% in 1960 to 14.82% in 1980, or from 16.24% to 12.76% if beverages are excluded. Food and beverage sales at constant 1972 prices grew from $83.4 billion to $123.3 billion, or by 58.6% between 1960 and 1980. With beverages excluded, the growth was 50%. Over the same period population increased 26%. Therefore, food sales, whether or not beverages are included, grew faster than population, but not as fast as total manufacturing. Besides rising affluence, there were changes in tastes and diets, and hence dairy, grain mill (flour), bakery, and sugar products all decreased their share in total manufacturing. The drop was less acute for preserved fruits and vegetables; and a slight increase, possibly at the expense of dairy products, was achieved by fats and oils. At the same time, beverages experienced a strong growth, but not enough to offset the fall in other foods.

Within SIC 22 - textile mill products, the downward movement of cotton and wool that had started long before the 1960s continued through the seventies and eighties. In the sixties this decrease was somewhat offset by the then still-continuing growth of younger textile industries, such as man-made fiber weaving and knitting mills. However, in the seventies, these once "younger"

industries also weakened, ceasing to record a strong growth rate. It is likely that they succumbed to competition from abroad. This was also the fate of the much smaller leather and leather goods industry, SIC 31 - leather goods, and especially leather footwear, as well as the rubber and plastics footwear that are part of SIC 30. The relative decrease of SIC 32 - stone, clay, and glass products, was caused by corresponding decreases in SIC 324 - hydraulic cement, SIC 325 - structural clay products, and SIC 327 - concrete, gypsum, and plastic products. These heavy construction materials may well have been replaced by other, lighter materials.

To some extent, the switch to other, lighter materials was also to blame for the severe setback of SIC 33 - primary metals. Their shares in total manufacturing sales dropped from 9% in 1960 to little over 6% in 1980. The fall was steepest for iron and steel (SIC 331 and 332); plagued by overaged equipment and foreign competition, the share dropped from 5.21% in 1960 to 2.95% in 1980. The situation was somewhat different for some of the nonferrous metals; the forthcoming IIASA study on aluminum may throw some light on this phenomenon.

Some part of the decline of the primary metals industry was caused by the changing fortunes of SIC 37 - transportation equipment. The sales values of this industry fell from 13.2% of total manufacturing in 1960 to 10.8% in 1980. From second place (after food) in 1960, it fell to third place in 1980, after food and non-electrical machinery. Within the transportation equipment industry, the development was uneven. Hardest hit were SIC 371 - motor vehicles and equipment, 372 - aircraft and parts, and 376 - guided missiles and space vehicles. Their combined share in total manufacturing sales tumbled from 12.2% in 1960 to 9.6% in 1980. However, in absolute values there was still considerable growth, though it lagged behind that of total manufacturing. The index implicit in the sales values and the FRB production index show that the output of SIC 37 reached its last peak in 1978/79 (see Table 6). For SIC 371 - motor vehicles, an all-time peak was reached in 1978 when the 1970 = 100 based indices hit 186.3 (sales values) and 184.1 (FRB). In 1979 came a slight setback--the indices fell to 171.2 (sales values) and 173.2 (FRB). It is indeed

remarkable that despite five years of energy crisis, the production of motor vehicles--though limping behind the national average--should still have grown to levels comfortably above those of 1973 and 1970. This growth is consistent with that observed for gasoline consumption, where the 1970 = 100 based index climbed to an all-time record of 126.9 in 1979[1/].

However, within the motor vehicles industry, the various components followed different development paths. While the production of large automobiles was seriously depressed by the oil price explosion, the manufacture of smaller models has enjoyed an unprecedented boom since 1967 (when separate indices were first compiled) and through 1978, giving way to mild setbacks in the following year. Some of the relative decline of the transportation industry spilled over into the rubber industries; SIC 301 - tires and inner tubes, with sales values stagnating in the sixties, slipped from 0.68% of total manufacturing in 1970 to 0.60% in 1980.

Now to the growth industries. The share of SIC 218 - chemicals and allied products in total manufacturing sales rose from 5.74% in 1960 to 7.13% in 1970 and 7.97% in 1980. The trend is somewhat different for value added, where the shares in total manufacturing also rose from 5.8% in 1960 to 7.0% in 1970, but subsequently dropped to 6.3% in 1980. The divergence may be due to time lags or the use of different classifications. In any case, in terms of sales values the various chemical industries displayed contrasting growth rates. The sharp increase in the share of total manufacturing of SIC 282 - plastic and synthetic materials, from 0.74% in 1969 to 1.46% in 1980, and SIC 283 - drugs, from 0.66% to 1.36% must be compared with the relative decline of SIC 281 - industrial inorganic chemicals, whose share in sales volume dropped from 0.94% to 0.77% of total manufacturing sales between 1960 and 1980. For the growth differences of various chemical industries see Table 8.

1/ See C. Doblin, *The Growth of Energy Consumption and Prices in the USA, FRG, France and the UK, 1950-1980.* IIASA Research Report, RR-82-18, May 1982.

It is well known that chemicals and allied products are among the most energy-intensive industries. According to the 1970 census that provided detailed data, this industry took 21% of the total fuels and electricity (in kWh equivalents) purchased by the manufacturing sector, more than any other 2-digit SIC industry. The industrial inorganic chemicals industry alone purchased 15% of all the energy sold to the manufacturing sector. Hence the relative decline of industrial inorganic chemicals may have affected the United States' energy consumption at least as much, if not more than, the decline of steel. For the manufacturing industries' energy input of fuels and electricity purchased, see Tables 11 and 12.

The growth of SIC 35 - nonelectrical machinery, is evident from the fact that its share in total sales values moved from 7.51% in 1960 to 11.41% in 1980 (see Table 6). This means that nonelectrical machinery moved from fourth place after food, transportation equipment, and primary metals in 1960 to second place after food in 1980. There were of course variations in growth patterns within SIC 35 (see also Table 9). The strongest growth was achieved in total manufacturing sales, which rose from 0.53% in 1960 to 1.09% in 1970, and to 3.52% in 1980 (!). Growth was also strong for SIC 358 - refrigeration and service machinery, which moved from 0.59% in 1960 to 0.95% in 1970, before tapering off to 1.04% in 1980.

Reflecting on the slow growth of some of the industries discussed earlier, such as primary metals, it was found that SIC 354 - metal working machinery and SIC 355 - special industry machinery experienced a continuous decline of their shares in manufacturing sales from 1.17% (metal working) and 0.95% (special industry) in 1960 to 1.10% and 0.64%, respectively, in 1980. The growth of other machinery, such as SIC 351 - engines and turbines, and SIC 356 - general machinery, was rather weak from 1960 to 1970, followed by stagnation.

SIC 36 - electric and electronic equipment increased its share in total manufacturing sales from 5.45% in 1960 to 7.25% in 1970 and to 9.32% in 1980. The industry's share in manufacturing moved from seventh place in 1960 (after food, transportation,

primary metals, nonelectrical machinery, metal fabrications, and chemicals) to fourth position in 1980 (after food, nonelectrical machinery, and transportation). Much of this growth was achieved through innovation in SIC 366 - communication equipment, which increased its share in total manufacturing from 1.42% in 1960 to 2.13% in 1970 and to 2.57% in 1980, and especially in SIC 367 - electronic components and accessories, whose share rose from 0.63% in 1960 to 1.06% in 1970 and to 2.54% in 1980 (see Table 10).

Compared to these star performers, the growth of yesteryear's innovation industry, SIC 365 - radio and television, was weak. Its share in total manufacturing rose from 0.34% in 1970 to 0.89% in 1980. At the same time, SIC 363 - electric household appliances, also a former growth industry, showed only weak growth in the sixties, followed by stagnation in the seventies. Weak growth in the sixties, followed by a drop in the seventies, occurred in SIC 361 - electric distributing equipment, SIC 362 - electric industrial apparatus, and SIC 364 - lighting and wiring equipment. The combined share of these three industries fell from 1.83% in 1960 to 1.79% in 1980. No doubt their falling fortunes were due to the slack in some of the industries whose shares in total manufacturing sales had themselves decreased.

By way of summarizing the structural changes discussed above, the ranking of the seven industries that command two-thirds of total US manufacturing output (sales values at constant 1972 prices), together with their respective percentage shares, is as follows:

SIC		1960	1980	SIC	
20	Food	17.84	14.82	20	Food
37	Transportation equip.	13.19	11.41	35	Nonelectrical mach.
33	Primary metals	8.95	10.83	37	Transportation equip.
35	Nonelectrical mach.	7.51	9.32	36	Electric & electronic equipment
34	Metal fabrications	6.96	7.97	28	Chemicals
28	Chemicals	5.74	6.36	33	Primary metals
36	Electric & electronic equipment	5.45	6.20	34	Metal fabrications
		65.64%	66.91%		

The change in the place held by an industry between 1960 and 1980 is a clear reflection of the structural changes that have taken place.

4. MANUFACTURING: Capital

4.1 Capital Formation (Gross Fixed Annual Investments)

4.1.1 Total manufacturing (equipment and structures)

Because of heavy annual and cyclical fluctuations, it is advisable to compile average growth rates. This was done for annual gross investments at constant prices for equipment and structures, and also for equipment only, for the years 1960-1969, 1970-1979, and for 1970-1973 and 1974-1979 (see Table 13). The table shows that investments in equipment tended to grow at a faster rate than those in structure throughout the period studied. A second observation is that the growth rate was higher in the sixties (7.57% structures and equipment, 8.23% equipment only) than in the seventies (4.15% structures and equipment, 5.41% equipment only). This is consistent with GDP growth rates.

All the same, it is worth noting that in the early seventies (1970-1973) the investment growth rate had slumped to 1.59% for structures and equipment and 3.71% for equipment only. But during the years of rampant inflation (1974-1979), investments perked up considerably: the average annual growth rate was 5.86% for equipment and structures and 6.55% for equipment only.

4.1.2 Selected industries, investments (equipment), and output in the seventies

Investments during the sixties are reflected in the capital stock figures; the following notes relate only to the investments made during the seventies.

Considerable divergence was noted between the growth of investments for the manufacturing sector as a whole and individual industries. Some industries' investment growth trailed behind that of the sector, for example, SIC 20 - food and kindred products, especially if beverages are included, and SIC 33 - primary metals, most notably SIC 331 - blast furnaces and basic steel

products. The output of these industries also lagged behind that of the sector.

Following the first oil price explosion, a number of industries stepped up their investments to a higher level, which then remained high throughout the period of severe inflation. These included: SIC 26 - paper and allied products, which may have switched to energy-saving equipment; SIC 29 - petroleum and coal products, whose output slumped in the late seventies; and SIC 37 - transportation equipment, especially SIC 371 - motor vehicles, where output also slumped in the late seventies. The investment surge in the automobile industry started slowly in 1972, and preceded the first oil price explosion: it reflects the industry's changeover to smaller models. Other industries whose investment growth was paralleled by rapidly expanding output are SIC 35 - nonelectrical machinery and SIC 36 - electric and electronic equipment.

4.2 Capital Stock Growth (Equipment)

4.2.1 Total manufacturing sector

The value in 1972 prices of the gross capital stock of equipment used in the manufacturing sector grew from $139 billion in 1960 to $331 billion in 1980. In terms of index numbers (1970 = 100), this was an increase from 65.4 in 1960 to 155.7 in 1980. For total capital stock (equipment and structures), the corresponding increase was from 67.2 in 1960 to 139.4 in 1980.

The growth of capital equipment was faster than that of structures; it was also faster than that of manufacturing output, which rose from 69.1 in 1960 to 137.9 in 1980 (in terms of gross value of sales) or from 61.5 in 1960 to 137.9 in 1980 (as measured by FRB production indices). Obviously, both output and capital grew faster than labor.

4.2.2 Individual industries (equipment only)

The capital equipment held by individual industries, expressed as percentages of that for the total manufacturing sector, is shown in Table 14 for the years 1960, 1970, and 1980. For

year-by-year data, see IIASA computer printouts. The industries in Table 14 are grouped according to whether their shares in total equipment in the manufacturing sector have decreased or increased. Only one industry, SIC 25 - furniture and fixtures, showed no change with its share remaining at about 0.70% throughout; this "stability" is similar to that of the industry's share in outputs, as discussed in Section 3 above. The main industry groups are as follows:

1. Industries whose share in the stock of manufacturing equipment decreased continuously from 1960 to 1980. The share of this group in total manufacturing equipment fell from 55.51% in 1960 to 46.15% in 1980. A comparison of Table 14 with Table 6 indicates that all the industries whose share in capital stock eroded were underperformers in the sense that their production growth trailed the national average. Consequently, their shares in total manufacturing output (sales values and value added) also decreased. These industries are SIC 20 - food and beverages; SIC 21 - tobacco products; SIC 22 - textile mill products; SIC 23 - apparel; SIC 24 - lumber and products; SIC 26 - paper and products; 27 - printing and publishing; SIC 31 - leather and products; SIC 32 - stone, clay, and glass products; SIC 33 - primary metals; and SIC 34 - fabricated metal products.

2. Industries whose share in manufacturing equipment increased continuously from 1960 to 1980. This group includes the four industries whose share in total manufacturing output rose continuously over the period studied: SIC 28 - chemicals; SIC 35 - nonelectrical machinery; SIC 36 - electric and electronic equipment; and SIC 38 - instruments. The increase of the capital stock (equipment) in the chemicals industry is remarkable, though not all of its components shared in this growth: for example, the share of SIC 281 - industrial inorganic chemicals fell from 2.37% in 1960 to 1.69% in 1980. Yet total chemicals moved to first place in the 1980 ranking of manufacturing capital (equipment), topping primary metals whose share had dropped from 14.19% in 1960 (first place) to 10.64% in 1980 (second place).

The continued growth of the share in total manufacturing capital stock of SIC 30 - rubber and plastics products, which lasted until 1976, was not matched by a growth in the industry's

share in manufacturing output. A backlash from the automobile industry may also be seen in the share of capital stock of SIC 301 - tires and inner tubes, which decreased from 1.19% in 1970 to 0.94% in 1980.

3. Industries whose share in manufacturing equipment decreased in the sixties, but increased in the seventies. This group includes SIC 37 - transportation equipment, whose share in total capital stock (equipment) dropped from 8.46% in 1960 to 7.82% in 1980, along with relative sales values. While the share of sales from this industry in total manufacturing was still dropping between 1970 and 1980, there was a growth in the industry's equipment holdings from 7.82% in 1960 to 9% in 1980. This largely reflects the switch to production of smaller cars and the impact of the growth in annual investment since 1972.

For SIC 29 - petroleum and coal products, the share in total manufacturing equipment fell from 3.1% in 1960 to 2.1% in 1966 and 1967. It then rose slightly to 2.4% in 1970, and to 2.9% in 1980. This new growth in the seventies, at the same time that shares of sales values in total manufacturing were falling, may reflect the growth of investment for coal processing.

4.2.3 The age of capital stock

The growth of annual investment in capital stock is reflected in the age structure of the stock (equipment). According to the estimates prepared by the BIE, the industry that in 1980 had the oldest capital stock (equipment), measured in 1972 prices, was SIC 33 - primary metals. As much as 36% of this industry's equipment was 10 years old or even older.

Primary metals were followed closely by SIC 22 - textile mill products, where 35% of the equipment was 10 years or more old. Another aging industry is SIC 31 - leather and leather products, with 33% of the capital equipment in the 10 years plus age bracket. All of these industries have been lagging in growth, not only in terms of capital equipment but of output as well - and much of their misery has been due to lack of competitiveness.

On the other hand, some industries with relatively young capital stock (equipment) did not enjoy healthy sales growth

over recent years. This is true for example of SIC 29 - petroleum and coal products, where in 1980 barely 19% of the equipment was 10 years old or older, and over 50% was four years old or less. The same is true for SIC 37 - transportation equipment, where 22.2% of the equipment in 1980 was 10 years old or older, whereas 47% was four years old or less. However, these industries may have more potential for a future come-back, and, in the case of automobiles, may be better protected against foreign imports.

Other industries with a relatively young capital equipment stock seem to have good prospects for continued sales growth. This applies to SIC 35 - nonelectric machinery, where in 1980 only 23.7% of the equipment was 10 years old or older, while 47.3% was four years old or even younger. It may also be true for SIC 36 - electrical and electronic equipment, where in 1980 47% of the equipment was four years old or younger and only 22% had reached the age of 10 years or more.

5. OUTLOOK

Much still remains to be done in the analysis of structural changes based on manufacturing output and capital stock (equipment). For example, input-output analysis and the establishment of capital/output ratios have not as yet been tackled from these data. Before going any deeper into this time-consuming task, one might want to consider the results of the admittedly superficial analysis carried out so far. This has demonstrated that over the last 20 years, US industry continued on its way to higher industrialization. This meant moving away from primary industries and those based on long-established technologies, and a shift towards more sophisticated industries and technologies in which the US still has an edge.

The analysis has also identified the long-term losers, whose shares in total manufacturing output and capital have been receding since 1960. Among them steel, basic chemicals, textiles, and leather are prominent examples. Will the 20-year slide continue for these and other industries: for example food, which is affected by changes in taste as well as increasing affluence; or stone, clay, and glass, which suffers from an increasing general

preference for lighter materials as does steel, to some extent? What are the chances for a come-back for transportation equipment and the petroleum and coal products industry? How much more can drugs and pharmaceuticals, office and computing machinery, and electronic equipment expand? Equally important, to what extent can the losses (output and capital) of the losers be compensated by the gains of the winners? This is a question of particular relevance to labor, and it will be reviewed in a forthcoming report.

Table 1. USA: The Structure of the US Economy
GDP - Value Added

	Total GDP	Agricul-ture	Industry Sector[a]					Services[a]
			Total	Manufact.	Mining	Constr.	Utilities	
			In Percent					
1950	100.0	5.5	33.6	24.7	2.1	5.5	1.3	60.9
1955	100.0	4.9	34.9	25.4	2.0	5.8	1.7	60.2
1960	100.0	4.4	33.6	23.5	1.8	6.3	2.0	62.0
1961	100.0	4.2	33.0	22.9	1.8	6.1	2.1	62.8
1962	100.0	4.0	33.5	23.5	1.8	6.1	2.1	62.6
1963	100.0	3.9	34.4	24.5	1.8	6.0	2.1	61.7
1964	100.0	3.7	34.8	24.9	1.7	6.0	2.1	61.5
1965	100.0	3.6	35.4	25.7	1.7	5.9	2.1	61.0
1966	100.0	3.2	35.5	26.1	1.7	5.6	2.1	61.3
1967	100.0	3.2	34.5	25.3	1.7	5.3	2.2	62.3
1968	100.0	3.1	34.9	25.5	1.7	5.4	2.3	62.0
1969	100.0	3.0	34.9	25.7	1.7	5.2	2.3	62.1
1970	100.0	3.2	33.4	24.2	1.8	5.0	2.4	63.4
1971	100.0	3.2	33.3	24.0	1.6	5.2	2.5	63.4
1972	100.0	3.0	34.0	24.9	1.6	5.1	2.5	63.0
1973	100.0	2.8	35.1	26.2	1.5	4.8	2.4	62.1
1974	100.0	2.9	33.6	25.3	1.6	4.3	2.4	63.5
1975	100.0	3.0	31.8	23.7	1.5	4.0	2.5	65.2
1976	100.0	2.8	32.8	24.8	1.5	4.1	2.4	64.4
1977	100.0	2.7	33.0	25.1	1.4	4.1	2.4	64.3
1978	100.0	2.6	33.1	25.2	1.4	4.1	2.4	64.3
1979	100.0	2.7	33.1	25.3	1.4	4.0	2.4	64.2
1980	100.0	2.7	31.6	24.3	1.5	3.7	2.4	65.5
1981	100.0	2.9	31.7	24.3	1.5	3.5	2.4	65.3
Values at 1972 Billion Dollars								
1970	1077.6	34.4	359.6	261.2	18.9	53.4	26.1	683.6
1981	1447.2	43.4	468.8	359.2	22.3	52.0	35.3	935.0

Source : US Department of Commerce. The National Income and Product Accounts of the US, 1929-1976. Supplement to Survey of Current Business, September 1981; p.228, updated with Survey of Current Business, July 1982.

a = Utilities are included with Industry and excluded from Services.

Table 2. USA - The Growth of the Mining Sector, since 1950

	Output		Labor[a]		Capital[b] (Equipment and Structures)	
	Gross Output (Value of Shipment)	Production (FRB Index)	Number of Employees	Persons Engaged in Production (Nat.Accounts)	Gross Invest-ment	Gross Capital Stock
	Index Numbers, 1970 = 100					
1950	.	56.9	144.6	152.2	70.1	49.6
1955	.	69.4	127.1	132.8	93.7	62.8
1960	.	71.6	114.3	114.6	89.1	75.6
1961	.	72.0	107.9	108.9	92.3	78.2
1962	.	74.1	104.3	105.9	94.2	80.7
1963	.	77.0	101.9	102.7	91.8	83.0
1964	.	80.1	101.8	102.1	109.5	86.3
1965	.	83.1	101.4	102.4	106.4	89.1
1966	.	87.5	100.6	101.8	113.9	92.3
1967	.	89.1	98.4	99.2	95.6	94.0
1968	.	92.9	97.3	98.2	105.0	96.1
1969	.	96.5	99.4	99.5	111.9	98.6
1970	.	100.0	100.0	100.0	100.0	100.0
1971	.	97.9	97.8	98.4	102.3	101.4
1972	.	100.8	100.8	99.8	109.2	103.2
1973	.	102.2	103.0	101.8	120.9	105.6
1974	.	102.8	111.9	111.5	131.2	108.6
1975	.	100.5	120.7	119.3	129.3	111.4
1976	.	101.8	125.0	124.7	129.4	116.6
1977	.	105.3	130.5	131.2	149.6	118.1
1978	.	110.5	136.6	140.4	171.4	123.6
1979	.	111.9	153.8	151.0	178.3	129.5
1980	.	118.3	164.8	165.6	177.3	134.9
1981	.	126.7	181.7	181.4	.	

1980: Mining Sector
Number of Employees (BLS): 1027
Persons Engaged (National Accounts): 1040
Capital: Gross Investments (Eq.+ Str.) at 1972 Prices $10^6$$: 15 322
Gross Capital Stock (Eq.+ Str.) at 1972 Prices $10^6$$: 161 958

Table 3. USA - Mining Industries, Structural Changes. Coal.

	Output		Labour		Capital
	FRB Production Index	Coal Production Quantities (Tonnage) (DOE)	Number of Employees (BLS)	Persons engaged in Production (Nat.Accounts)	Data currently not available
	Index Numbers, 1970 = 100				
1950	98.3	94.1	.	330.3	
1955	83.1	80.1	.	178.5	
1960	73.3	70.9	128.3	126.2	
1961	70.8	68.6	111.2	112.4	
1962	73.2	71.7	104.7	106.9	
1963	79.4	77.9	102.7	103.4	
1964	83.2	82.3	101.5	101.4	
1965	86.9	86.0	97.5	99.3	
1966	90.0	89.2	94.6	96.6	
1967	92.6	92.2	95.7	96.6	
1868	90.9	90.9	91.2	92.4	
1969	93.6	93.2	93.2	93.1	
1970	100.0	100.0	100.0	100.0	
1971	91.9	91.5	100.3	101.4	
1972	98.1	98.3	110.9	111.0	
1973	97.0	97.7	111.5	110.3	
1974	98.5	99.6	123.7	123.4	
1975	105.0	106.8	146.6	146.2	
1976	108.5	111.8	155.1	155.2	
1977	112.9	113.8	155.3	163.4	
1978	106.2	109.4	144.5	160.0	
1979	125.6	127.5	178.4	173.8	
1980	135.8	135.4	169.7	170.3	
1981	130.8	134.5^{p}	153.2	155.2	
1982	.	134.5^{p}	.	.	

Absolute Values:

1980: Coal, total production (anthracite, bituminous and lignite) = 135.4 x 10^{6} short tons
Number of employees (BLS) = 246 300
Persons engaged in production = 247 000

p = preliminary

Table 4. USA - Mining Industries, Structural Changes. Oil + Gas.

	Output				Labour		Capital
	Activity FRB-Indices		Production Quantities		Oil+Gas Extraction		
	Oil+Gas (Extraction +Prospecting)	Well Drilling (Oil+Gas)	Crude Oil	Natural Gas,Dry	Number of Employees (BLS)	Persons engaged in Production (Nat.Accounts)	currently not available
	Index Numbers, 1970 = 100						
1950	50.4		63.9	34.1	98.5	100.4	
1955	67.9	94.4	70.6	43.0	105.3	127.2	
1960	69.8	83.3	73.2	58.2	114.5	116.9	
1961	71.5	86.1	74.6	60.3	112.2	114.0	
1962	73.4	91.1	76.1	63.1	110.3	112.1	
1963	76.3	91.5	78.3	67.0	107.1	108.5	
1964	78.5	97.2	79.2	70.5	107.8	108.1	
1965	81.1	100.7	81.0	72.8	106.3	106.6	
1966	85.4	99.4	86.1	78.4	104.3	105.1	
1967	89.6	92.3	91.4	82.8	102.1	103.3	
1968	93.7	101.6	94.7	88.0	102.0	103.3	
1969	97.0	110.0	95.9	94.4	103.6	104.0	
1970	100.0	100.0	100.0	100.0	100.0	100.0	
1971	99.4	100.2	98.2	102.9	97.8	97.8	
1972	101.8	119.7	98.2	102.9	99.2	97.8	
1973	101.9	135.3	95.6	103.4	101.4	100.0	
1974	102.5	174.8	91.1	98.6	111.1	111.4	
1975	101.5	205.7	86.9	91.6	121.7	120.2	
1976	100.4	212.5	84.6	90.9	128.0	127.6	
1977	105.7	257.9	85.6	91.2	141.2	138.6	
1978	111.6	291.0	90.4	91.0	158.9	158.8	
1979	109.1	280.5	88.7	93.6	175.6	172.1	
1980	119.4	374.4	89.2	93.3	207.2	207.4	
1981	131.5	483.3	89.0	92.3	254.1	253.7	
1982	.	.	90.0^{p}	84.8^{p}	.	.	

Absolute Values:

1980: Crude Oil and lease condensate production: 3138 x 10^{6} Barrels (DOE) (= 18.25 x 10^{15}BTU) (Quadrillion BTU)
Nat.Gas net, dry production: 19.60 "Trillion" cubic feet (= 20.11 x 10^{15}BTU (DOE)
Number of Employees (BLS) in Oil+Gas Extraction: 559 700
Persons Engaged (Nat.Accounts) in Oil+Gas Extraction: 564 000

p = preliminary

Table 5. USA - Mining Industries. Iron Ore; Copper Ore; Lead + Zinc Ores.

	Output (FRB Indices)				Labour (BLS)				
	Iron Ore	Copper Ore	Lead + Zinc Ore	Metal Mining	Iron Ore	Copper Ore	Lead + Zinc Ore	Metal Mining Employees Total	Metal Mining Production Workers Only
	Index Numbers 1970 = 100								
1950	.	.	.	57.2	136.5	70.3	NA	103.9	115.1
1955	90.6	59.9	88.5	69.1	131.5	78.7	NA	108.8	114.6
1960	83.5	62.8	71.8	84.5	127.7	77.1	NA	100.5	102.7
1961	68.3	68.2	75.6	78.0	103.5	79.0	NA	93.7	95.2
1962	70.7	71.6	75.6	79.5	96.9	77.7	NA	88.2	89.6
1963	71.5	70.6	78.1	78.3	92.7	75.5	NA	85.4	87.5
1964	83.8	72.3	84.5	85.1	94.6	73.8	NA	85.2	87.5
1965	87.9	78.6	88.6	87.0	99.6	81.7	NA	89.8	92.7
1966	93.8	83.1	86.2	91.3	100.0	86.9	NA	92.7	95.4
1967	89.2	55.9	81.9	75.8	98.5	69.2	NA	84.9	84.3
1968	92.7	69.7	82.8	84.1	97.3	76.6	NA	87.9	86.5
1969	97.3	90.6	97.5	94.8	98.1	91.6	NA	95.6	95.6
1970	100.0	100.0	100.0	100.0	100.0	100.0	NA	100.0	100.0
1971	93.0	88.7	96.2	91.4	96.9	93.5	NA	92.8	91.2
1972	84.8	95.5	96.1	90.1	84.6	101.9	NA	88.6	87.4
1973	100.4	100.4	93.3	98.7	90.8	109.8	NA	93.7	92.2
1974	98.5	93.3	98.4	95.2	91.5	119.1	NA	102.3	100.7
1975	94.0	82.1	90.9	87.8	90.4	106.3	NA	100.2	96.9
1976	94.0	93.4	88.9	93.1	94.2	100.0	NA	100.9	96.5
1977	66.3	88.3	84.6	80.0	74.2	91.6	NA	96.8	90.6
1978	98.1	86.9	73.5	91.7	93.1	81.7	NA	100.4	96.0
1979	104.5	92.5	68.7	96.3	95.4	90.7	NA	108.3	102.8
1980	86.2	75.3	72.9	82.8	83.1	81.7	NA	105.3	98.1
1981	93.0	96.9	63.1	93.3	81.5	98.9	NA	111.6	104.1

Absolute Values

1980:(BLS) Number of Employees:

Iron Ore: 21 600
Cropper Ore: 30 000
Other Metals: 46 600
Total Metal Mining: 98 200

Production Workers only:
Total Metal Mining: 73 900

Table 6. The Changing Structure of Output in Manufacturing Industries, 1960, 1970 and 1980, measured by sales values and value added.

SIC		SALES VALUES AT 1972 PRICES/VALUE ADDED AT 1972 PRICES					
		1960 %	1970 %	1980 %	1960 %	1970 %	1980 %
1.	Erosion since 1960						
20	Food & Beverages	17.84	15.68	14.82	10.3	9.0	8.1
21	Tobacco	1.24	0.83	0.66	0.9	0.8	0.8
23	Apparel	3.96	3.62	3.34	3.9	3.9	3.9
24	Lumber	2.92	2.82	2.67	3.4	3.3	2.9
29	Petrol & Coal	4.01	3.96	3.90	3.1	3.1	2.4
31	Leather	1.26	0.88	0.57	1.4	1.1	0.8
32	Stone, Clay & Glass	3.12	2.77	2.43	3.8	3.3	2.9
33	Primary Metals	8.95	8.11	6.36	8.9	7.0	6.2
37	Trans.Equip.	13.19	11.94	10.83	12.8	11.6	9.7
27.	Printing	4.50	4.08	4.08	6.1	5.6	5.6
		60.99	54.69	49.66	54.6	48.7	43.3
2.	Erosion since 1970						
22	Textile Mill	3.19	3.53	3.34	3.1	3.5	3.2
26	Paper	3.61	3.82	3.72	3.5	3.7	3.4
30	Rubber & Plastics	1.89	2.69	2.63	2.0	2.7	2.8
34	Metal Fabric.	6.96	7.19	6.20	7.6	7.8	7.4
39	Miscellaneous	1.46	1.53	1.41	1.8	1.7	1.7
		17.11	18.76	17.30	18.0	19.4	18.5
	Groups 1 & 2	78.10	73.45	66.96	72.6	68.1	61.8
3.	Growth since 1960						
28	Chemicals	5.74	7.13	7.97	5.8	7.0	6.3
35	N-E Machinery	7.51	8.81	11.41	10.1	11.5	14.4
36	Electr.& Electronic	5.45	7.26	9.32	7.2	9.0	11.9
38	Investments	1.82	1.99	2.95	2.6	2.8	4.0
		20.52	25.19	31.65	25.7	30.3	36.6
4.	No change						
25	Furniture	1.37	1.34	1.37	1.7	1.6	1.6

Source: Sales values at 1972 Prices from U.S. Commerce Department, BIA Computer Printouts. Value added see National Income without Capital consumption adjustment by industry, in current prices in U.S.Commerce Department, BEA, the National Income and Product Accounts of the United States 1929-1976 Statistical Tables and Survey of Current Business, No.7, July 1982.
Data in current values converted to constant prices with deflators implicit in sales values provided by BIA.

Table 7. Transportation Equipment Industries, Output.

	SALES VALUES			FRB			Production Indices					
	SIC37 Transport. Equipm. Total	SIC371 Motor Vehicles +Equipm.	SIC374 Railroad Equipm.	Transpor-tation Equipm. Total	Motor Vehicles +Parts	Autos	Large Autos	Small Autos	Personal Use Trucks	Busi-ness Trucks	Mobile Homes	Rail-road Equip-ment
					Index Numbers		1970 = 100					
1960	76.3	80.2	61.1	73.1	80.9	87.1	.	.	.	.	26.9	73.5
1961	70.5	68.7	47.6	68.7	71.0	73.9	.	.	.	.	22.7	43.8
1962	81.7	85.5	59.4	79.4	86.5	94.8	.	.	.	.	28.4	54.3
1963	88.7	94.4	72.7	87.2	95.7	105.5	.	.	.	.	34.6	70.4
1964	93.5	101.7	94.8	89.4	98.3	107.3	.	.	.	.	44.4	94.7
1965	108.5	124.4	115.2	106.3	125.6	139.7	.	.	.	.	50.8	114.0
1966	113.6	122.7	129.1	114.0	123.4	134.1	.	.	.	.	56.2	131.7
1967	108.1	103.4	110.5	111.7	108.3	115.5	127.4	45.2	74.5	109.6	60.5	112.9
1968	120.4	122.8	86.6	124.1	130.3	139.6	152.7	62.2	100.0	130.2	79.7	92.2
1969	119.4	124.1	108.8	121.1	126.2	131.4	140.5	77.4	108.6	127.6	103.9	111.7
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	113.5	129.4	103.1	109.4	128.5	133.9	128.9	162.9	134.9	114.1	123.4	105.6
1972	117.2	137.7	100.1	120.9	147.1	148.5	139.9	198.2	188.7	132.9	149.3	108.8
1973	133.9	159.2	109.8	132.2	161.2	159.7	147.1	231.6	233.9	150.5	145.8	107.9
1974	118.7	133.7	119.3	121.5	138.9	124.6	98.2	277.5	231.3	138.5	85.7	134.8
1975	110.1	121.0	115.8	108.8	120.4	116.7	83.9	307.2	219.9	97.6	56.6	132.5
1976	128.6	155.3	95.4	124.1	153.8	152.4	114.0	375.9	302.2	122.1	66.8	87.4
1977	142.2	178.8	104.4	136.5	174.5	171.4	139.6	355.6	350.0	160.5	71.7	101.5
1978	148.9	186.3	122.1	148.0	184.1	171.6	127.9	424.9	385.6	172.9	73.7	133.1
1979	145.0	171.2	157.1	151.3	173.2	157.9	106.2	406.9	304.6	161.0	74.3	185.3
1980	119.7	123.7	141.2	130.6	128.9	119.6	69.0	414.0	151.1	98.0	60.4	176.1
1981	.	.	.	129.7	132.5	119.4	69.3	410.6	166.2	95.3	66.6	86.3
1982	.	.	.	117.2	119.0	.	.	.	.	.	.	.

Table 8. Chemical and Allied Industries, Growth of Output.

	SIC282 Plastics Materials, Synthetics SALES VALUES	SIC283 Drugs SALES VALUES	FRB	SIC284 Soaps, Toilet Goods SALES VALUES	FRB[a]	SIC286 Agricult. Chemicals SALES VALUES	FRB	SIC281 Industr. In-Org. SALES VALUES	SIC286 Industr. Organic SALES VALUES
				Index Numbers 1970 = 100					
1960	55.6	44.9	40.4	52.4	54.5	58.7	54.4	77.7	43.9
1961	57.1	47.6	43.8	55.1	58.1	59.8	55.8	77.7	47.7
1962	64.2	51.9	48.9	58.8	61.1	65.0	60.7	81.1	54.2
1963	70.8	55.2	54.0	65.5	66.5	72.6	65.9	85.0	60.1
1964	80.2	58.3	57.1	69.7	70.6	80.1	76.0	91.5	65.9
1965	90.3	65.4	65.3	74.4	75.2	85.2	80.7	91.1	74.9
1966	100.4	71.0	72.4	80.1	81.3	92.0	89.1	92.8	80.9
1967	101.2	78.8	78.4	84.2	85.5	97.7	92.7	94.9	79.1
1968	112.9	84.6	84.3	90.6	91.5	101.1	90.5	97.3	88.8
1969	110.8	93.3	93.3	94.0	93.1	110.9	98.3	103.6	94.7
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	101.7	106.2	106.0	100.4	81.3	97.0	95.9	95.8	107.6
1972	156.6	116.5	122.0	113.2	85.5	110.7	100.9	108.6	120.4
1973	182.5	125.8	133.4	121.2	91.5	124.4	117.7	115.7	135.7
1974	180.0	135.7	140.9	125.3	95.1	147.2	134.0	123.1	127.3
1975	160.1	138.2	136.5	119.2	100.0	132.5	151.9	104.9	103.5
1976	180.5	150.9	150.2	127.5	97.6	137.2	171.8	117.7	122.4
1977	203.6	156.4	167.8	132.6	111.5	144.0	186.4	127.0	141.9
1978	217.9	164.5	173.0	141.1	110.4	144.9	196.3	133.3	145.7
1979	231.4	167.8	186.8	137.8	109.6	152.0	205.4	126.8	148.6
1980	208.6	176.7	192.7	134.6	109.2	156.7	213.6	121.1	131.2
1981	.	.	209.5	.	122.3	.	223.6	.	.

[a]The FRB index of production relates to soap only.

Table 9. SIC 35 Non-Electric Machinery, Growth of Output

	SALES VALUES	FRB	SALES VALUES							
	SIC35 Total Non-Electr. Machinery		SIC357 Office+ Computing	SIC352 Farm+ Garden	SIC353 Construc- tion	SIC358 Refrige- ration	SIC354 Metal Working	SIC355 Special Industry	SIC356 General Industry	SIC351 Engines+ Turbines
	Index Numbers 1970 = 100									
1960	58.9	54.5	33.3	65.1	63.7	43.2	69.6	76.8	66.0	51.7
1961	58.3	53.1	35.3	69.0	59.9	44.9	66.3	76.8	64.0	49.6
1962	63.5	59.5	38.4	72.0	64.8	48.9	75.5	79.8	70.3	55.3
1963	68.6	63.5	50.0	81.3	71.6	54.5	76.8	78.8	76.5	58.2
1964	76.6	72.4	55.9	90.1	81.5	59.2	86.6	88.9	85.3	64.7
1965	84.4	81.4	61.5	97.3	89.5	66.4	97.5	98.4	97.4	69.5
1966	97.2	94.6	84.8	115.6	96.6	76.1	110.8	110.9	107.6	77.6
1967	97.4	95.8	66.8	111.3	97.9	88.1	112.4	107.1	103.6	80.6
1968	98.8	97.5	87.6	107.3	98.8	89.3	108.4	108.1	98.9	86.2
1969	104.8	104.7	104.4	99.8	103.9	102.9	109.7	107.6	105.1	101.7
1970	100.0	96.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	97.5	111.1	104.3	99.5	97.5	109.8	84.9	92.3	93.7	107.4
1972	110.4	128.1	116.2	118.1	110.0	136.1	92.4	107.8	103.7	113.8
1973	127.0	134.2	135.2	141.3	125.7	153.1	111.5	121.0	118.3	127.6
1974	134.2	119.8	161.7	156.2	136.7	140.9	116.3	121.8	120.8	134.0
1975	120.3	128.8	152.8	152.5	126.5	108.2	98.4	107.4	111.9	115.2
1976	126.6	137.5	181.6	155.0	121.6	129.9	97.6	105.9	114.5	125.7
1977	139.4	147.1	221.5	161.9	136.1	144.8	107.9	95.6	124.5	137.5
1978	154.2	156.8	276.3	152.0	152.5	159.5	118.6	100.7	129.7	149.3
1979	168.9	155.9	348.9	181.4	151.9	162.7	125.9	101.1	137.8	146.3
1980	170.8	164.0	424.6	157.6	142.4	144.5	124.8	99.7	132.1	132.5
1981	.	142.7								

Table 10. SIC 36 Electric and Electronic Equipment, Growth of Output

	SALES VALUES	FRB	SALES VALUES						
	SIC36 Total Electric and Electronic Equipment		SIC367 Electronic Components +Accessories	SIC366 Communi-cation Equipm.	SIC365 Radio and TV Equipm.	SIC361 Electric Distributing Equipm.	SIC363 Electric Household Appliances	SIC364 Lighting Wiring Equipm.	SIC362 Electric Industrial Apparatus
	Index Numbers 1970 = 100								
1960	51.9	47.7	40.9	46.2	38.7	60.4	57.5	65.3	63.2
1961	56.1	50.7	41.6	58.6	42.2	61.1	58.5	66.2	62.6
1962	63.9	58.2	48.7	70.2	50.4	65.4	64.0	71.0	68.7
1963	66.8	59.8	49.0	73.6	53.9	65.5	70.7	72.2	72.1
1964	69.5	63.3	52.1	70.8	60.8	69.4	77.3	77.4	80.0
1965	80.0	75.6	69.9	78.1	77.3	77.7	85.5	85.3	92.0
1966	91.6	90.6	90.0	87.0	99.4	89.0	90.4	91.8	104.9
1967	95.0	92.5	101.0	92.9	95.7	92.8	93.1	91.0	103.5
1968	100.7	97.6	98.6	101.0	107.9	92.8	101.8	96.8	104.8
1969	105.0	103.5	105.6	105.1	108.7	101.2	104.2	104.3	108.8
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	98.9	99.6	100.6	92.8	110.9	102.3	99.0	98.7	96.6
1972	108.7	113.0	123.1	94.7	122.8	110.4	112.7	112.7	103.5
1973	121.9	132.4	148.9	99.7	141.1	123.3	124.9	122.8	122.2
1974	119.7	133.0	144.7	102.6	132.7	117.7	119.2	113.8	126.1
1975	104.4	107.8	124.4	95.1	121.7	95.9	105.5	88.7	102.6
1976	115.6	124.7	155.1	97.2	140.4	96.5	115.7	102.5	110.0
1977	135.1	134.5	192.7	112.2	171.8	112.5	130.2	109.7	116.6
1978	148.6	147.5	224.9	125.6	192.0	120.6	132.1	114.3	129.2
1979	164.5	161.9	281.0	145.6	190.5	124.8	139.0	121.6	133.0
1980	169.5	159.9	315.8	159.1	194.5	122.2	130.4	112.4	123.7
1981	.	165.0							
1982	.	156.6							

Table 11. USA: Manufacturing Industries, Energy Input (purchased fuels and electricity), 1971

SIC	Industry	Purchased Fuels and Electricity, Equivalent of Kwh 10^9 Kwh	= %
281	Industrial chemicals, inorganic	579.4	15.05
282	Plastic material, synthetics	132.4	3.44
287	Agricultural chemicals	24.1	0.63
28-(281;282;287)	Other (drugs, soap, paints,etc.)	78.3	2.03
28	Total chemicals and allied products	814.2	21.15
331+332	Primary Iron and steel	491.9	12.78
33-(331+332)	Nonferrous and misc. primary metals	225.9	5.87
33	Total primary metals	717.8	18.65
29	Petroleum and coal products	467.0	12.13
26	Paper and allied products	385.5	10.01
32	Stone, clay and glas products	382.4	9.93
20	Food and kindred products	302.2	7.85
371	Motor vehicles and equipment	72.9	1.89
37-(371)	Other transportation equipment	40.8	1.06
37	Total transportation equipment	113.7	2.95
357	Office and computing machinery	7.9	0.21
35-(357)	Other nonelectrical machinery	99.7	2.59
35	Total nonelectrical machinery	107.6	2.80
22	Textile mill products	106.6	2.77
34	Fabricated metal products	103.1	2.68
36	Electrical equipment, supplies	80.2	2.08
30-(307)	Rubber and products	41.2	1.07
307	Misc. plastic products	26.5	0.69
30	Total rubber and misc. plastic products	67.7	1.76
24	Lumber and wood products	66.6	1.73
27	Printing and publishing	30.6	0.79
38	Instruments and rel. products	20.1	0.52
23	Apparel and other textile prod.	19.4	0.50
25	Furniture and fixtures	18.1	0.47
39	Misc. manufacturing	17.8	0.46
...	Ordnance and accessories	13.9	0.36
31	Leather and leather products	10.0	0.26
21	Tobacco manufactures	5.5	0.14
	Total Manufacturing	3850.1	100.00

SOURCE: Compiled from US Department of Commerce, Bureau of the Census. 1972 Census of Manufactures; Fuels and Electric Energy Consumed. Special Reports Series (July 1973); MC 72(SR)-6.

Table 12. USA Manufacturing Industries. Input of Purchased Fuels and Electricity, and Output of Sales Values and Value Added (%)

SIC	1971 Purchased Fuels and Electricity	Sales Values 1972 Prices	Sales Values Current Prices	Value Added (national income)[a] Current Prices
28 Chemicals and allied	21.15	7.11	7.30	7.36
33 Primary metals	18.64	7.67	7.68	6.68
29 Petroleum and coal products	12.13	3.95	4.01	3.06
26 Paper and allied	10.01	3.77	3.78	3.69
32 Stone, clay, glass	9.33	2.81	2.80	3.38
20 Food and kindred	7.85	15.71	15.43	8.94
37 Transportation equipment	2.96	13.20	13.22	13.10
35 Machinery except electric	2.79	8.37	8.44	10.51
22 Textile mill products	2.77	3.66	3.57	3.38
34 Fabricated metal products	2.68	6.85	6.80	7.49
36 Electrical equipment, supplies	2.08	6.99	7.15	8.93
30 Rubber and plastic products	1.76	2.90	2.93	2.99
24 Lumber and wood products	1.73	2.86	2.67	2.98
27 Printing and publishing	0.79	3.98	4.01	5.53
38 Instruments and related	0.52	1.97	2.01	2.87
23 Apparel, other text. prod.	0.50	3.70	3.72	3.92
25 Furniture and fixtures	0.47	1.37	1.38	1.63
39 Misc. manufacturing	0.46	1.50	1.50	1.81
.. Ordnance and accessories	0.36	..	..	..
31 Leather and leather products	0.26	0.83	0.77	0.97
21 Tobacco manufactures	0.14	0.82	0.82	0.79
Total manufacturing	100.00	100.00	100.00	100.00

In absolute values: Kwh equivalents	constant dollars of 1972	current dollars
3850.1×10^9 Kwh	694.5×10^9 $	671.8×10^9 $	226.5×10^9 $

[a] National income without capital consumption adjustment.
SOURCE: Purchased fuels and electricity (equivalent of Kwh), see Table 21; sales values at constant and current prices, see US Department of Commerce, BIA, computer printouts; value added (national income without capital consumption adjustment), see Department of Commerce, BEA. The National Income and Product Accounts, 1929-1976; statistical tables.

Table 13. Capital Formation in the Manufacturing Sector (at 1972 Constant Prices)

	Growth Rate	
	Equipment and Structures	Equipment only
	%	%
1960-1969	7.59	8.23
1970-1979	4.15	5.41
1970-1973	1.59	3.71
1974-1979	5.86	6.55
1970-1980	4.32	5.42

Table 14. The Changing Structure of Capital Stock (Equipment) held by Manufacturing Industries in 1960, 1970 and 1980

Industries whose share in Total Holdings of Equipment	SHARE IN EQUIPMENT AT 1972 PRICES HELD: 2 digit SIC Groups 1960 %	1970 %	1980 %		3 digit SIC Groups 1960 %	1970 %	1980 %
Decreased continuously:							
20 Food & Beverages	9.66	8.25	7.70				
22 Textile Mill Products	4.93	3.88	3.15				
23 Apparel	1.15	1.06	0.96				
24 Lumber	3.25	2.75	2.87				
27 Printing & Publishing	4.17	3.65	3.56				
31 Leather & Products	0.40	0.30	0.22				
32 Stone, Clay, Glass Products	4.87	4.21	4.08				
33 Primary Metals	14.19	13.84	10.64	331 Blast Furnace & Basic Steel	9.78	9.08	6.05
34 Fabricated Metal Products	5.40	5.34	5.30				
26 Paper & Allied Products	7.11	7.55	7.32				
21 Tobacco Products	0.38	0.35	0.35				
	55.51	51.18	46.15				
Increased Continuously:							
28 Chemicals	11.84	13.23	14.40	281 Industrial Inorganic	2.37	2.27	1.69
35 Non-electrical machinery	6.47	7.11	8.56	283 Drugs	0.78	0.73	0.93
36 Electric & Electronic equip.	4.06	5.39	6.30	367 Electronic Components	0.51	1.34	1.95
30 Rubber & plastic products	2.63	3.49	3.64	301 Tires, inner tubes	1.09	1.19	0.94
38 Instruments	1.25	1.45	1.78				
39 Miscellaneous	0.67	0.71	0.85				
	26.92	31.38	35.53				
Decreased in 60s, increased in 70s:							
29 Petroleum & coal products	3.10	2.38	3.45	371 Motor Vehicles & Equipment	5.94	4.95	6.49
37 Transportation equipment	8.46	7.82	9.00				
No change:							
25 Furniture & Fixtures	0.70	0.68	0.69				
Unidentified	5.31	6.56	5.18				
1980 Value of Total Manufacturing Equipment Stock in Billion $ (1972)	$139.1	$212.6	$331.0				

a) Peaked in 1976 (3.82%); declined subsequently.

Source: Compiled from U.S. Department of Commerce, BIE Computer Printouts.