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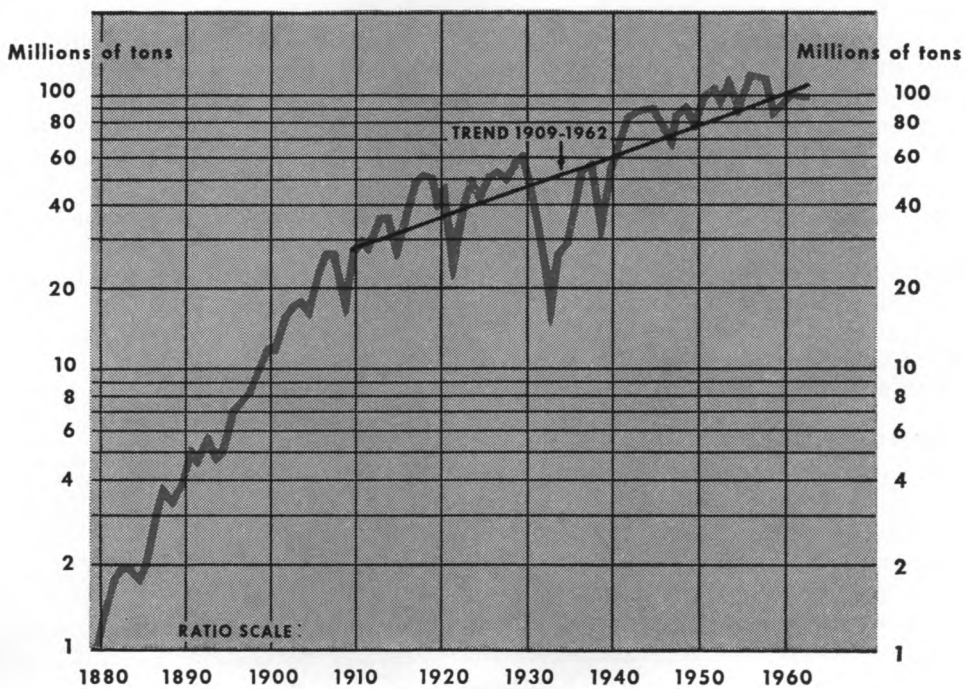
IN THIS ISSUE

STEEL INGOT PRODUCTION

1879-1962



Sources of data: American Iron and Steel Institute; Federal Reserve Bank of Cleveland.

Steel In Perspective

FOR THE PAST FIVE YEARS, beginning in 1958, the annual level of steel ingot output in the U.S. has been somewhat of a disappointment. While 1955 stands as the all-time record year for steel production, when 117 million tons of steel ingots were poured, the levels of steel output during 1956 and 1957 were fairly close to that record (115 and 113 million tons, respectively). In each of the four years from 1958 through 1961, a particular event or circumstance explained to some extent the reduced volume of steel output. To illustrate: recession conditions prevailed during part of 1958; a major steel strike occurred in 1959; and another recession cast its shadow over parts of 1960 and 1961.

During the past three years there were some signs that the demand for steel was losing ground to an extent that was not explained fully by the aforementioned circumstances and events. It was not until 1962, however, that these signs tended to come into sharper focus. During 1962, steel output remained sluggish while the economy at large demonstrated considerable vigor, chalking up sizeable gains in various business and financial series. Thus, in 1962 there was no recession and no strike which could have accounted for the fact that steel output was at about 98 million tons (or about 67 percent of capacity). Although emphasis is placed in this article on steel output in 1962, it should be kept in mind that changes in the factors affecting the level of steel output apparently had been stirring in previous years.

Measuring the Gap

The chart on the cover of this issue shows the trend of steel production from 1909 to 1962 (together with annual data for many earlier years). For a number of reasons, the years from 1909 to 1961 are appropriate for use in computing the trend of steel output. The period begins several years before the outbreak of World War I, so that distortions in the long-run growth rate which stemmed from that war are minimized. In addition, use of the 1909-1961 period allows the sharp rises in steel output which accompanied the two World Wars to be offset by declines in output during the two subsequent periods of demobilization. Finally, the years of the severe depression of the 1930's fall somewhat near the middle of the overall period, so that the effect of the unusually low levels of steel output during those years does not seriously distort the calculation of the growth rate.[1]

In 1962 the actual level of steel production was thirteen million tons below this trend line.[2] Chart I shows estimates of the following four factors which were responsible for the shortfall in steel output in 1962: (1) foreign trade in steel; (2) inventory policy; (3) subsitute materials; and (4) new products and new types of steel. The factor of foreign trade in steel reflects a deterioration in the competitive position of U. S. steel producers vis-à-vis foreign producers; the factor of inventory policy involves the recent tendency of steel users to reduce inventory levels; the factor of substitute materials reflects a shift in preferences to other basic materials by many steel users; and the final factor serves as an indication of the smaller amounts of steel which are needed to sustain a high level of industrial output. (It should be noted that the factor of inventory policy includes changes of a technical nature, which are not

(1) It is possible to use other time periods to compute the trend of steel production. However, for the reasons just discussed, the period selected is considered to be appropriate for the purposes of this article.

(2) Steel ingot output in the U. S. rose an average of 2.66 percent in each year from 1909 to 1961. The trend-level for the year 1909 was computed at 27.71 million tons. Accordingly, output based on trend would have amounted to 111.4 million tons in 1962, i.e., if the average rate of growth in steel production from 1909 to 1961 is taken as a guideline. The actual output for 1962 amounted to 98.4 million tons, indicating that there was a shortfall of 13 million tons between the expected level of output based on trend and the actual performance.

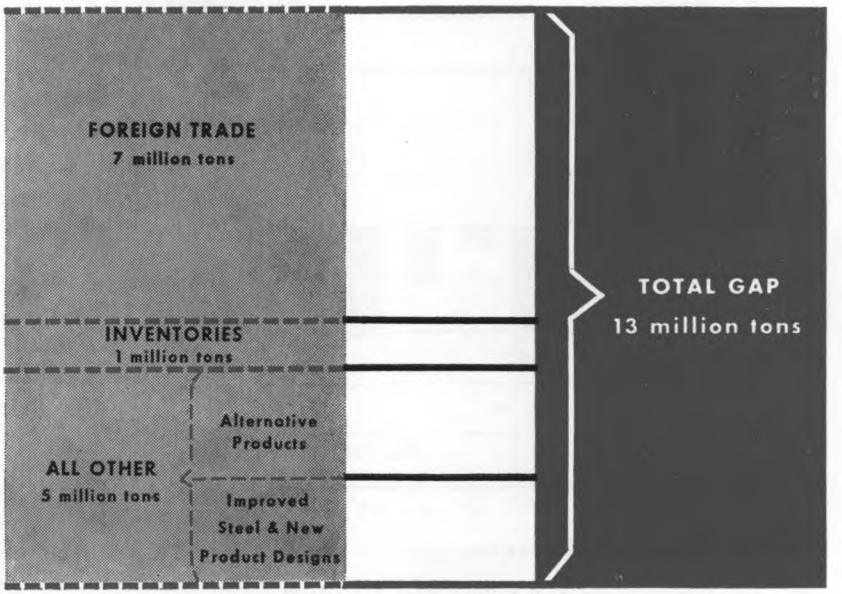
The growth rate in steel output was calculated using a computer program developed by the Federal Reserve Bank of Cleveland. The program is designated as "Average Rate of Change — Fit as a Straight Line Trend to Logarithms of the Data" (Least Squares Method).

necessarily associated with problems of output growth.)

As noted earlier, we have estimated that steel ingot output in 1962 fell short of a target based on trend by 13 million tons. In attempting to quantify the amount of loss which is due to each of the four factors, we have assumed that the loss due to all of the four factors totals 13 million tons. In figuring the loss which may be due to each of the factors, we can find reliable data for the first and second factors, and we can form a fairly good estimate for the loss due to the third factor. There are no over-all reliable data, however, for the amount of loss due to the fourth factor. In order to arrive at some estimate for that factor, we have added the first three factors together and have subtracted the total from the gap of 13 million tons; the resulting residual is the amount used for the fourth factor. Let us examine each of these four factors in some detail.

Chart 1.

PERCENT DISTRIBUTION OF THE COMPOSITION OF GAP BETWEEN TREND AND ACTUAL STEEL PRODUCTION IN 1962



NOTE: Gap caculation for 1962 is based on trend value of 111.4 million tons and an actual production of 98.4 million tons.

Imports Swing to a Plus

The recent change in the position of the U. S. from a net exporter to a net importer of steel products has been a major influence on the level of U. S. steel output. We have estimated that this factor accounted for slightly more than one-half of the 13-million-ton gap between the estimated trend value and the actual level of steel production in 1962, or a loss in domestic production of about 7 million ingot tons.[3]

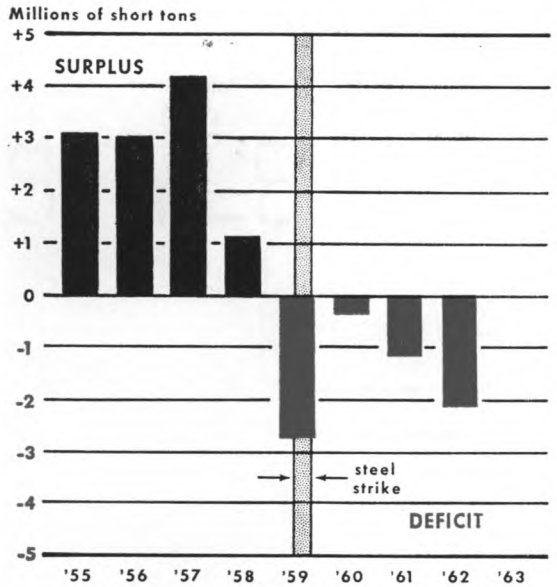
The historical trend of U. S. steel trade from the beginning of this century to 1957 showed a tendency toward a surplus of exports over imports throughout the period. Trade during the years immediately preceding and directly following the two World Wars was, of course, distorted due to the effects of those wars. Nevertheless, even after those periods are allowed for, the average annual surplus of 3.4 million tons during the years 1955-1957 was in line with expectations based on the long-term trend of U. S. steel trade. The trade surplus for those years has therefore been used here as a base of comparison with the trade position in 1962.

Beginning in 1958 the position of U. S. steel trade deteriorated steadily, so that by

(3) Domestic shipments of steel products account for somewhat less than three-quarters of ingot output, and that relationship has been used in converting the level of imports into the equivalent level of ingot output.

Chart 2.

U. S. BALANCE OF FOREIGN TRADE IN STEEL PRODUCTS



Source of data: American Iron and Steel Institute

1962 the record showed a deficit of 2.1 million tons. The swing from a surplus during 1955-1957 to a deficit in 1962 represented a deterioration in demand for 5.5 million tons in the form of steel products, or somewhat more in the form of steel ingots. Using the three-to-four relationship between steel products and ingot output cited in footnote 3, the deficit in 1962 can be interpreted as a loss of about 7 million tons of domestic ingot production for that year.

The swing toward deficit in U. S. foreign trade in steel has been associated primarily with the increased availability of foreign steel and with the low prices of foreign steel. Both factors reflect the favorable competitive position of many foreign producers in a wide variety of steel products. It is sobering to note that the loss of U. S. foreign trade in steel occurred at a time when world trade in steel rose sharply, reflecting a world-wide upsurge in demand for steel. World steel trade, which had amounted to only 15.9 million tons in 1950, rose to 42.1 million tons in 1960, and showed further significant gains during the past two years.

The rapid development of steel-making facilities in Western Europe and Japan sharply increased the supply of foreign steel which is currently available in the U. S. and other world markets; the present situation stands in marked contrast to conditions of only five years ago, when foreign steel was available in the U. S. only in limited supply.

Not only are many foreign steel products readily available in U. S. markets, but many foreign steel products are priced lower than comparable U. S. steel products. For example, the average prices of eight important steel imports fell below prices of comparable U. S. products in January 1958. That price gap widened steadily, until by the end of 1962 it was the largest on record. (Those eight products accounted for more than 70 percent of the total volume of steel imports during the years 1959-1961, and are used here as being indicative of the general price level of steel imports.[4] Significantly, in recent months there have been selective price cuts of certain U. S. steel products which face continued pressures from imports, in spite of the price rise of certain other steel products which was announced by major steel producers in April of this year.[5] A consequence of the foreign steel situation has been that U. S. producers lost portions of both foreign and domestic markets to foreign producers at a time when an expansion in the U. S trade surplus was especially essential to the continued growth of output of U. S. mills.

Steel Inventories Decline

The recent net decline in inventories of steel represents a technical adjustment, reflecting the changing relationship between the steel industry and steel users. Consequently, the decline in inventories does not have the deeper significance that is the case with the other factors. Moreover, the loss of

(4) See *Monthly Business Review*, Federal Reserve Bank of Cleveland, July 1962.
(5) For the example of staple wire products, see *Steel Magazine*, November 5, 1962, p. 125; for the example of pig iron, see *Steel Magazine*, November 12, 1962, p. 89.

steel output due to reduced inventory levels was comparatively small in 1962, amounting to one million tons, or less than one-tenth of the trend-actual gap.[6]

In recent years, and particularly in 1962, steel users apparently viewed large stocks of steel products as candidates for reduction whenever and wherever possible. The subsidence of the inflationary pressures on steel prices has weakened to some extent the incentive to hold large stocks. In fact, from 1958 to 1962, finished steel products showed small but perhaps significant declines in price. In addition, many firms sought to reduce steel stocks to minimum working levels, due to the fact that many steel products were available from steel producers with only a few weeks' lead-time in recent years; moreover, such reduced stocks could be handled with less working capital.

In contrast to the recent period of net subtractions from total steel stocks, it is widely recognized that during the earlier postwar years (1945-1959) there were, on average, small annual additions to stocks. During those years, steel was often difficult to obtain and steel producers usually posted annual price increases. The recent period of net reductions probably represents an adjustment on the part of users to changed market situations for steel. Although such adjustments may continue into the future, it is doubtful whether the magnitude of net inventory reductions is likely to be an important factor in the long-term growth rate of steel. (It could be conjectured that a trend toward an annual net reduction in steel stocks started in 1960.)

(6) The figure used here for total steel inventories in 1962 was developed from data from the Department of Commerce, which cover steel inventories held by manufacturers, wholesalers and producers from November 1961 to the present. At the end of December 1961, those stocks amounted to 19.8 million tons and dropped to 18.8 million tons one year later. We estimate that stocks were about .3 million tons higher than would otherwise have been expected at the end of December 1961, due to the stockpiling which had begun in preparation for a threatened strike, leaving a net annual drop during 1962 of .7 million tons. Using the three to four relationship of ingots to shipments, we estimate that the drop in steel stocks represented a loss of approximately 1.0 million ingot tons. Although figures from the Department of Commerce do not include data from such nonmanufacturing industries as construction and mining, no allowance has been made for those industries in the figures derived here, as trade sources indicate that those industries tend to hold only negligible stocks.

Alternative Materials

The Department of Commerce has recently estimated that the annual total steel tonnage lost to alternative materials amounted to 2 million tons in recent years.[7] We have estimated that the figure for 1962 is 2 to 3 million tons, with the additional loss due to a more widespread use of cement in the construction industry in 1962. The figures which support our estimate are from the Department of Commerce as well as from industry sources. It is important to note that, although the reduction in the demand for steel directly affects the steel industry, the loss does not necessarily represent a one-for-one loss in aggregate demand for products in the economy as a whole, due to the substitution of one material for another.

In calculating the loss of steel due to alternative materials from 1909 to 1961, we have assumed that the replacement of steel by other products and the replacement of other products by steel balanced each other for the period as a whole. This seems plausible because steel products replaced wood, brick, stone, and many other products during the early years of the period, while substitute materials have been replacing steel in later years. This situation suggests that the shift from steel replacing other materials to steel being replaced by other materials involves an over-all reduction in the ability of steel to compete with other materials.

In recent years *cement* has become an important competitor with steel in the construction industry. The marked rise in the use of prestressed concrete, in preference to the use of structural steel, has dampened the demand for steel in that industry. Although some steel is used in the process of making prestressed concrete, the amount is considerably less than is the case in steel ribbed buildings. Moreover, recent developments in the technique of making concrete indicate that concrete alone can serve as a material for the superstructure of large buildings at a price

(7) See *Survey of Current Business*, U. S. Department of Commerce, January 1962.

PERCENT DISTRIBUTION OF MARKETS FOR ALUMINUM AND STEEL PRODUCTS 1961

ALUMINUM PRODUCTS

Consuming Industry or Destination	Percent of Total Shipments
Building and Construction	25.1
Transportation	22.0
Consumer Durables	11.5
Electrical Goods	11.3
Machinery and Equipment	7.6
Containers and Packaging	7.1
Miscellaneous	8.8
Export	6.6
Total	100.0

Source: *Fortune Magazine*, November 1962

STEEL PRODUCTS

Consuming Industry or Destination	Percent of Total Shipments
Construction and Contractors' Products	25.2
Automotive, Rail and Other Transportation	22.6
Appliances, Utensils and Cutlery	2.6
Electrical Machinery and Equipment	3.0
Machinery, Industrial Equipment and Tools	5.7
Containers	10.0
Warehouses and Other Classification	28.3
Export	2.6
Total	100.0

Source: *Annual Statistical Report for 1962*, American Iron and Steel Institute

which is highly competitive with steel in many areas of the nation.

The use of *aluminum* in the construction industry has also expanded rapidly in recent years. In one instance the development of aluminum curtain walls has lightened the weight of several large new commercial buildings by more than thirty percent, as compared with conventional methods of construction. Consequently, smaller amounts of steel framework are needed to support such buildings.

In many markets steel and aluminum products are competing more strenuously with each other than they were a few years ago, particularly in the automobile and container industries. As the accompanying table shows, steel and aluminum compete in nearly identical markets, with the construction, transportation, and container industries, taken together, accounting for 58 percent of total steel products and 54 percent of total aluminum products shipped in the U. S. during 1961.

Prices of many types of aluminum products were reduced during 1962, which might add a further dimension to the competition between aluminum and steel products for markets. In fact, prices of several other principal nonferrous metals also declined during the year, as is shown in Chart 3, while prices of steel products remained nearly firm in 1962. (It is estimated that the selective price rise in steel products announced in April 1963, will boost the over-all average of finished steel products by about 1 percent.)

It is not certain that steel products have already sustained the major impact from competitive materials, as is emphasized by the development of new uses of *plastics* in the automobile industry. Replacement fenders for older automobiles which are made from a fiberglass type of plastic material, when available in Cleveland, cost 35 percent less than comparable fenders made from steel. Automobile fenders and other items for auto bodies which are not produced in a large volume, i.e., less than one-hundred thousand units, are more economically produced from a fiberglass type of material than from steel, due to the fact that considerable less capital equipment is needed in the process of manufacturing fiberglass items.

On the other hand, one of the leading manufacturers of fiberglass recently completed a study which indicated that the manufacture

of auto bodies for new cars in large quantities is comparatively more expensive than shells made from steel, due to the savings accruing from the techniques of mass producing the steel bodies. The study noted, however, that if there were substantial reductions in the weight of cars built with a plastic body, the difference in total cost to manufacturers between the two types of cars could be eliminated.[8]

New Products and New Types of Steel

From time to time, certain improvements in the quality of steel and/or in the design of products made from steel, have had the effect of reducing the volume of steel that goes into each finished-product unit. In recent years, changes in the design of products and an increased use of new types of steel have accelerated in nearly every industry.

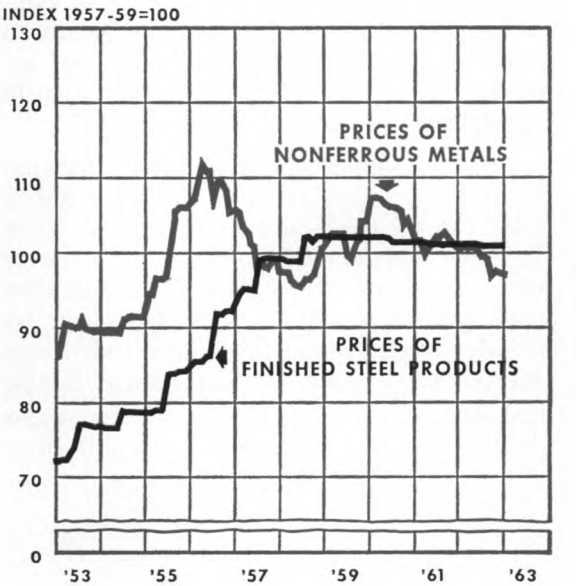
An example of that development is shown by the railroad engine; in the evolution of its design, massive bulk has given way to compact efficiency as a means of achieving increased power. From the early log-burning engines in the Nineteenth century to the enengines which were built during the years immediately preceding World War II, steam locomotives developed more pulling power largely by expanding in size and weight, which, in turn, gave rise to an expanded demand for steel by railroads. However, during the postwar years, nearly every major railroad has replaced the "iron horses" with diesel locomotives, which can muster approximately twice the pulling power per ton of engine weight, and consequently require proportionately less steel.

We have necessarily taken considerable latitude in an attempt to quantify the loss of steel output due to changes in the design of products or to changes in the demand for products made from steel. The figure we have used to reflect such shrinkage in demand for steel in 1962 amounts to a loss of 2 to 3 million tons for the year, and it represents the amount of the gap in steel output remaining after account is made for all other factors. While such an indirect measure is only an approximation, the fact that steel-consuming industries are using significantly smaller quantities of steel per unit of their own manufactured product is supported by other general observations. For example, the ratio of steel output to the Federal Reserve index of durable goods manufacturing showed a persistent tendency to decline from 1955 through 1962, even after allowance for steel imports and net changes of steel stocks. That decline indicates that in recent years, on average, manufacturers of durable goods (which consume more than two-thirds of all steel produced) have used smaller quantities of steel for each unit produced.

It is sometimes suggested that the attrition in the demand for steel which is due to improved products and an expanded use of new types of steel has largely been spent, and that further declines in the uses of steel due to

Chart 3.

Prices of nonferrous metals (mill shapes) have declined more than those of finished steel products since late 1961.



Source of data: Wholesale Price Index, Bureau of Labor Statistics

(8) See *The Economics of Fiberglas Reinforced Plastic in Automotive Bodies*, Owens-Corning Fiberglas Corporation, 1961.

those factors will likely be much more moderate. That view is supported by the fact that steel shipments to railroads and military equipment manufacturers have been responsible for a large part of the decline in shipments to steel users, and since shipments to those two industries have already been reduced to negligible levels, further attrition in the demand for steel is unlikely.

Other observers stress, however, that improvements in product design in many industries and the development of alloy steels are factors which are likely to continue to depress the demand for steel ingots. The latter view holds that there are major improvements on the drawingboards of designers which will further accelerate the trend toward lighter and stronger products in nearly every major steel-using industry, and that the full effect of such improvements has not yet been felt by steel producers.

In the longer run the core of the problem of attrition in the demand for steel may lie mainly in the changed nature of the industries of the nation which are rapidly expanding. It is sometimes maintained that one or more industries which are heavy users of steel must expand rapidly in order to stimulate continued growth of steel output. Such a spur was provided by the automobile industry in the early years of the 1920's and by the appliance and the container industries during the years which immediately followed World War II. Currently, however, there are not any rapidly expanding industries which are potential heavy users of steel. Thus there is a serious question as to whether domestic consumption of steel is adequate to sustain a steady and substantial growth of steel output.

Reprints of an article entitled "Federal Reserve Open Market Operations in 1962", which appears in the April issue of the *Federal Reserve Bulletin*, may be obtained by writing to the Research Department, Federal Reserve Bank of Cleveland, Cleveland 1, Ohio.

Consumer Credit

THE use of short- and intermediate-term credit by consumers in the U. S. has increased substantially in the postwar period. In the 15-year span from 1947 to 1962, total consumer credit outstanding at year-end multiplied fivefold, or from $11.6 billion to $63.4 billion. Apart from any consideration of consumer debt from the standpoint of individual management of personal finances, the pattern of consumer credit developments warrants attention in many business quarters as an indicator of consumer attitudes.[1] Inasmuch as changes in the trend of consumer credit reflect the willingness, or lack of willingness, of consumers as a group to take on debt to purchase goods and services, such changes are important to the purveyors of goods and services and indirectly to the economy as a whole. In this connection, consumer credit should be considered within the context of its influence on consumers' ability to spend.

While the over-all rise in total consumer credit has been extraordinary, the rate of expansion has not been steady throughout the postwar period. As would be expected, recessions and subsequent recoveries have had a noticeable impact on the growth trend of consumer credit; indeed, were this not so, the behavior of consumer credit would not merit much attention as an economic barometer of business activity. But in addition to these recurring interruptions, longer-range, or secular, changes in the behavior of consumer credit can be discerned when the recovery experiences of the four postwar business cycles are compared with one another. The variations in the behavior of consumer credit in postwar recovery periods have formed a pattern among themselves, delineated in Chart I, which may have significant implications.

As shown by the chart, which depicts changes in total consumer credit outstanding, seasonally adjusted, during the first 21 months after the trough month of each of the four postwar recessions, the rate of consumer credit expansion has been diminishing with each postwar recovery.[2] The largest percentage increase took place in the recovery period that followed the earliest postwar recession while the smallest percentage increase occurred in the most recent expansion period.

(1) Indicative of the attention paid to consumer credit, for example, is the fact that instalment debt is included in the business cycle analyst's toolkit, being considered as a "*lagging*" series.

(2) The data used in this article have been seasonally adjusted by the Federal Reserve Bank of Cleveland. Due to the seasonal adjustment process, these figures will not necessarily match those published in the *Federal Reserve Bulletin*.

Chart 1.

TOTAL CONSUMER CREDIT IN FOUR POSTWAR RECOVERY PERIODS

cumulative percentage change

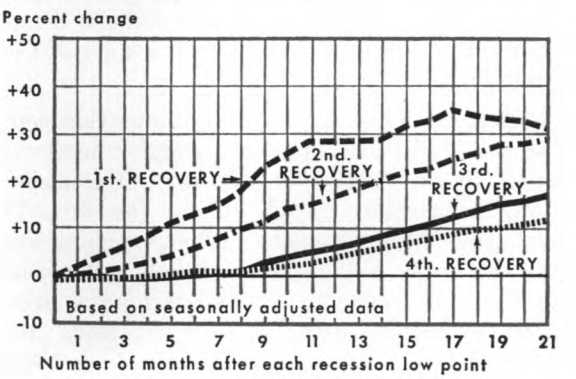
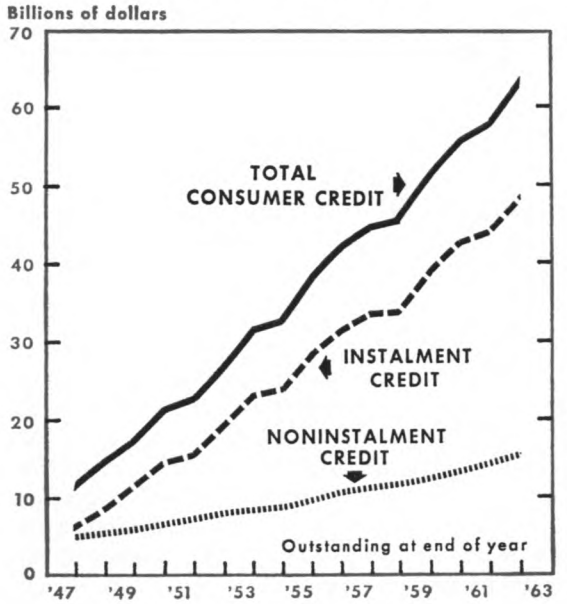


Chart 2.

GROWTH OF CONSUMER CREDIT IN POSTWAR YEARS



Although the total amount of consumer credit outstanding has moved upward in each of the postwar recovery periods, the rate of increase has receded each time. Furthermore, the time span between the start of business recovery and the upturn in consumer credit has tended to lengthen in each period. During the first two postwar recoveries, consumer credit surged upward immediately after the trough months of the recessions, whereas in each of the last two general business recoveries, consumer credit expansion did not occur for six or seven months after the start of the recovery.

A further look at the chart shows that consumer credit exhibited an irregular acceleration in the 1949-1951 recovery. Expansion was remarkably rapid during the first 11 months of the 21-month period, much slower in the latter 10 months as a whole, with some tailing off occurring in the last four months. In the other three recovery periods the growth of consumer credit was much more steady, once it got started. The over-all rate of expansion, however, became smaller with each successive recovery. Thus, consumer credit increased a net total of 31 percent during the first 21 months of recovery in the 1949-51 period, 29 percent in the comparable stage of the 1954-56 period, 17 percent in the 1958-60 period, and only 12 percent in the first 21 months of the current recovery.

Components of Consumer Credit

As commonly measured, total consumer credit consists of (1) instalment credit and (2) noninstalment credit. Real estate mortgage debt is not included.

Noninstalment Credit. Noninstalment credit has shown a steadier but slower rate of growth in the postwar years than has instalment credit. Consequently, over the period under review it has come to account for a declining share of all consumer credit, and it currently amounts to only about one-fourth of the total. Included in noninstalment credit are such items as single-payment loans, charge accounts, and service credit.

Instalment Credit. Instalment credit, the larger and the more volatile by far of the two major subdivisions of consumer credit, constitutes the chief variable in total consumer credit. It currently accounts for about three-fourths of the total and consists of such items as automobile paper, other consumer goods paper, repair and modernization loans, and personal loans. Instalment credit has expanded less and less with each postwar recovery, and thus has shown its smallest relative increase in the present recovery period.

There have been, however, some important variations in recovery rates among the components of instalment credit, of which the most noteworthy is the relative lag that has developed in automobile paper, the largest single component. As shown in Chart 3, auto paper experienced immediate and vigorous growth in both of the first two postwar recovery periods. During each of the last two recoveries, however, the amount of automobile

paper outstanding continued to decline even after general improvement had begun in the economy as a whole. Moreover, at the end of 21 months of business recovery, the net percentage rise in the volume of auto paper outstanding fell short of the corresponding rate of growth of total instalment credit. This lag in auto paper was in sharp contrast to what had happened in the first two postwar recoveries; as shown in the chart, in those periods the rate of increase in auto paper exceeded that of total instalment credit.

Instalment Credit and the Business Cycle

The diminishing rate of increase in instalment credit raises a question as to the reliability of the statistical series as a business indicator, at least in the same manner and to the same extent as formerly.

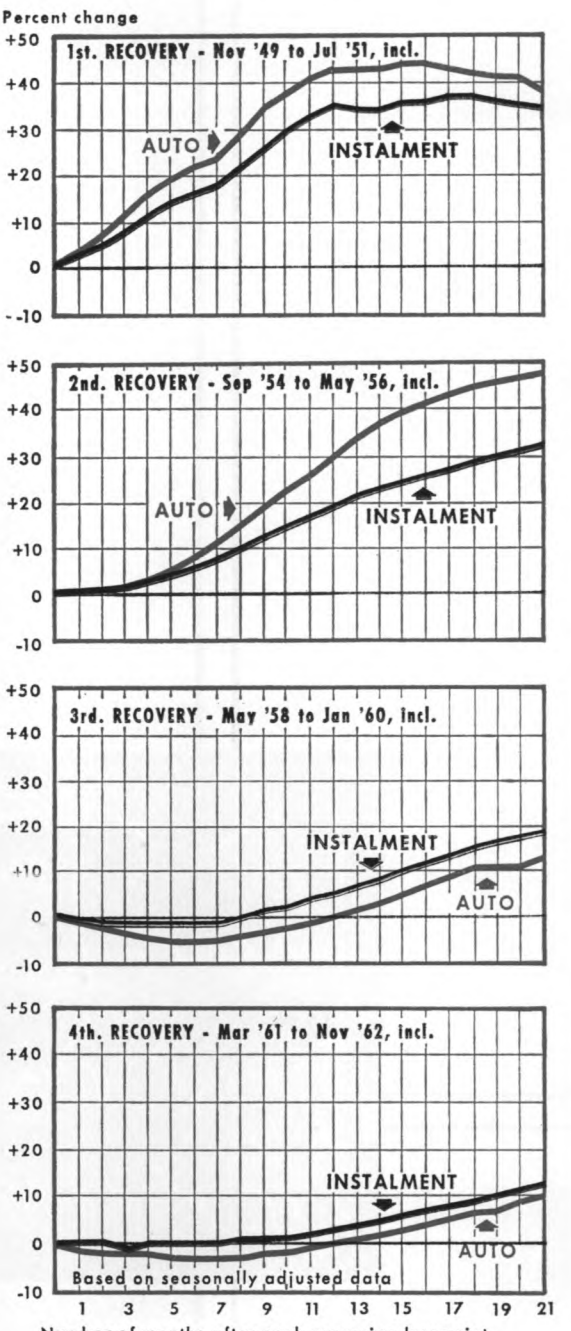
In the earlier postwar recoveries, instalment credit and the business cycle had a fairly clearcut and positive relationship, the logic of which may be summed up as follows: The repayment terms of instalment credit are inherently suited to the financing of larger items of consumer expenditures, and thus instalment credit provides a convenient and relatively early barometer of such expenditures in the aggregate.[3] Those larger expenditures (and therefore instalment credit) tend to be deferred in recessions, when public confidence is weak and income ceases to expand or actually falls off; conversely, they tend to be undertaken more readily in recovery periods, when public confidence is strong and disposable income is increasing.

In the latter two postwar recoveries, instalment credit has tended to become a "lagging laggard", thereby suggesting that the former relationship between consumer instalment credit and the business cycle may have become somewhat distorted. It is still, however, too early to judge the full implications of this development.

[3] Data for aggregate consumer durable expenditures are published as a component of Gross National Product; however, GNP data are available only for quarter-year periods and are necessarily released after a greater time lag than is the case with the monthly consumer instalment credit series.

Chart 3.
CONSUMER INSTALMENT CREDIT and AUTOMOBILE CREDIT IN FOUR POSTWAR RECOVERY PERIODS

cumulative percentage change



FOURTH FEDERAL RESERVE DISTRICT