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FEDERAL RESERVE BANK of CLEVELAND

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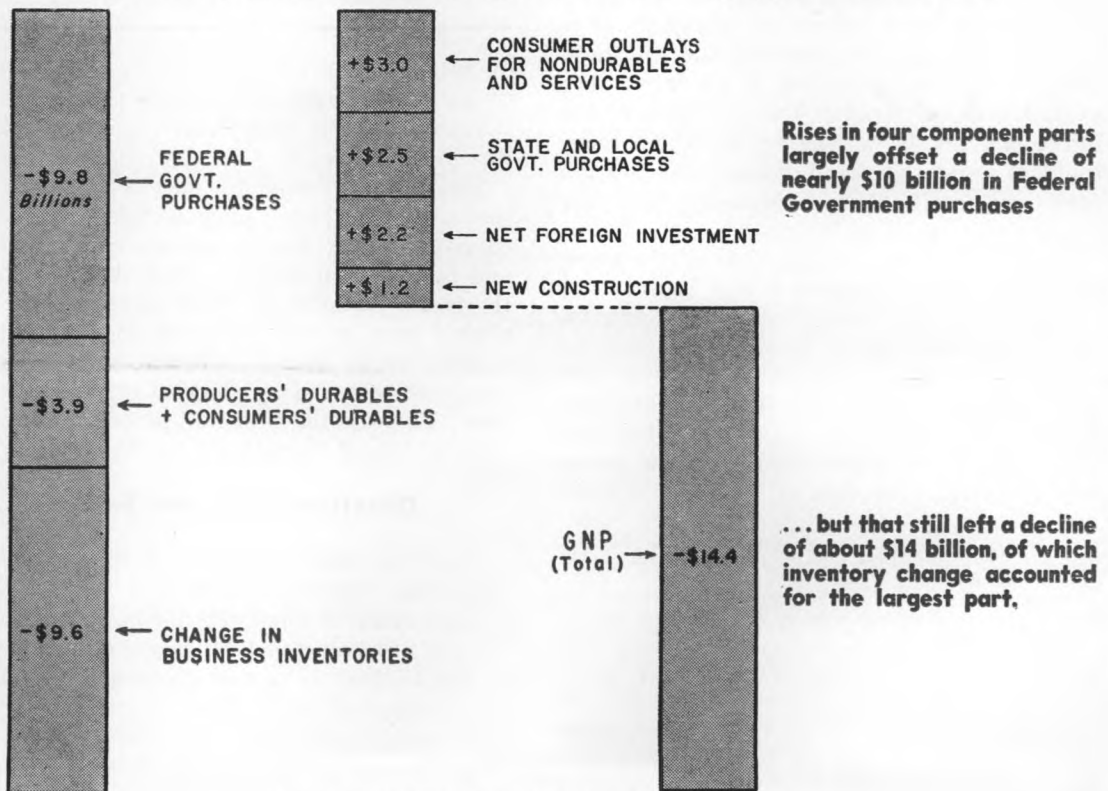
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Between the 2nd quarter of 1953 and the 2nd quarter of 1954, Gross National Product declined \$14.4 billion, expressed in seasonally adjusted annual rates.



(Based on preliminary estimates for 2nd quarter '54.)

Shifting Shapes of the National Product

OBSERVERS of business trends have come to be almost as much interested in the composition of the Gross National Product—the relative sizes of the various parts—as they are in the question of whether the aggregate is rising or falling. About two years ago, for example, the following question was widely propounded⁽¹⁾ and variously answered: “As soon as the volume of defense spending begins to be cut back, will there be an offsetting rise in other parts of the Gross National Product?”

Now that there has been some actual experience with reduction in defense spending, as well as in total federal expenditures, it is time to take another look at the question, with a view to answering it so far as the available data permit. The question is too important to be relegated to that large limbo of questions whose disposition takes the form of merely being superseded with the passage of time.⁽²⁾

Added point to a reappraisal of the question is given by the most recent business reports of the past month or two, which indicate a steadying of general business, or even a recovery, as contrasted with the previous moderate recession. To the extent that business news continues to confirm this tone of improvement, a punctuation mark is being set to the recession of 1953-'54. Conse-

(1) For one instance among many, see “The National Product Before and After Korea” in the September 1952 issue of this *Review*.

(2) Reference here is to the following too familiar sequence: (a) An important question is raised, and the factors in the answer are sorted out, but a positive answer cannot be given at the moment. (b) A decision is made to wait for more experience. “Time will tell; it will be interesting to see how it turns out.” (c) Time passes, experience is accumulated, but meantime attention has been shifted to different questions.

The fact is that time, itself, never tells anything; a conscious effort needs to be made to recapture the unanswered questions, provided they are still worth answering, as is the case with the topic under consideration.

The GNP Concept. The Gross National Product or Expenditure is a statistical estimate of the market value of the total output of goods and services currently produced in the national economy, without deduction for depreciation and other allowances for consumption of durable capital goods.

The main streams of the Gross National Product are the purchase of goods and services by consumers and by government (including federal, state and local), gross private domestic investment (including new construction, investment in producers' durable equipment, inventory changes), and net foreign investment.

All dollar figures for GNP or its parts used in this article, unless otherwise specified, are the official estimates of the U.S. Department of Commerce, National Income Division. For source of second-quarter 1954 estimates see Note at end of article.

quently, the characteristics and configuration of the '53-'54 recession become more susceptible of analysis than when the downswing was in full force.

The period selected for special emphasis in the remarks which follow is that which occurred between the second quarter of 1953 and the second quarter of 1954, during which the Gross National Product slipped from an annual rate of \$369.9 billion to an annual rate of about \$355.5 billions. Most of the drop had occurred by the first quarter of the year; between the first and second quarters, the GNP total remained practically stationary.

Offsetting Rises and Falls

From the second quarter of 1953 through the second quarter of 1954 the rate of federal government purchases for national security purposes dropped from an annual rate of \$54.3 billion to one of about \$45.7 billion, or a decline of \$8.6 billion expressed in annual rates. At the same time, total purchases of goods and services by the federal govern-

ment declined by a slightly larger annual rate, or \$9.8 billion.

Were there any other parts of the Gross National Product which were rising at the same time by a comparable magnitude? There were, as a glance at the cover chart will show. Thus, increased *consumer outlays for nondurable goods and services*, together with larger purchases by *state and local governments*, an increase in *net foreign investment*, and a rise in outlays for *new construction*, amounted in combination to \$8.9 billion in annual rates. The latter sum is slightly larger than the decline in national security expenditures by the federal government, and almost as large as the decline in total purchases by the federal government. In this sense and up to this point, there was an equivalent arithmetic offset to the effect on GNP of the cutback in defense expenditures.

It may be noted that the economic sectors in which such offsets occurred were in general the same as those to which observers two years ago were looking, with varying degrees of hope, for the basic answer to the problem of over-all demand following the period of defense expansion.

Defense expenditures and the offsets just mentioned, however, do not encompass the entire range of GNP. If they did, or if it were a case of "all others being equal", the adjustment to the defense cutbacks could be pronounced as having been fully and clearly made, at least during the four quarters under consideration. What actually happened was that certain other significant components of Gross National Product went into a decline. As a consequence, the aggregate of GNP showed a drop, which, although relatively moderate, was sufficient to confirm the generally accepted conclusion that business was undergoing a moderate cyclical recession.

Thus, the inventory account, which had shown an accumulation of business inventories during the second quarter of 1953 amounting to an annual rate of \$5.4 billion shifted to a *reduction of inventory*. During the second quarter of 1954 the reduction amounted to about \$4.2 billion, which was about the same as in the first quarter, but

which represented a net difference of \$9.6 billion from the annual rate during the second quarter of last year. Simultaneously, *producers' purchases of durable equipment* dropped over the interval of the year by an annual rate of about \$2.4 billion, and *consumer expenditures for durable goods* slipped by about \$1.5 billion in annual rate.

In combination, the decline scored by the groups of items just mentioned (inventory change and the parts of the GNP accounts measured respectively in terms of producers' purchases of durable equipment and consumer takings of durable goods) add up to about \$13.5 billion, or a sum very close to the total drop in Gross National Product, or \$14.4 billion, expressed in annual rates. (See cover chart.)

In striking a balance of the changes in component parts of the GNP during the past year, the selection of plus and minus items for pairing off against each other is, in the last analysis, the result of a somewhat arbitrary decision (in part, at least, on grounds of convenience in presentation) rather than an arrangement which is necessarily given by the nature of the items. Thus, as an alternative to the previous formulation, it could be stated that the rise in consumer outlays for nondurable goods and services, together with the other "plus" items mentioned above, had the effect of cancelling out almost the entire decline in the inventory account; this would leave the decline in federal expenditures as well as the recession in durable goods as the equivalent of the total GNP decline. It remains to be seen whether the underlying cause-and-effect relationship among the changes in the various items would point to one type of pairing rather than another as the more realistic way of striking the balance.

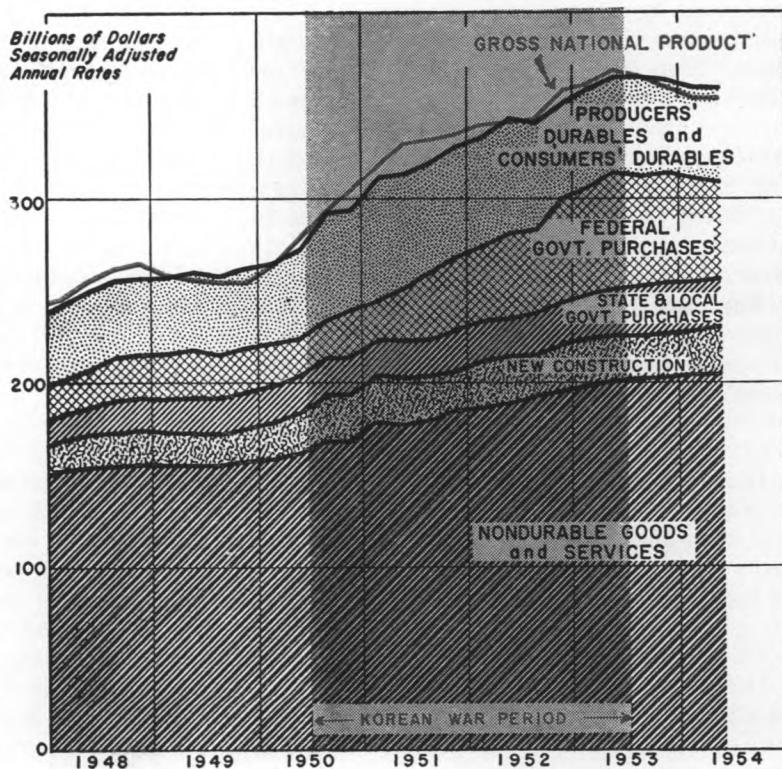
With the benefit of hindsight, all observers can now see that the question about "defense offsets", as it was raised about two years ago, was in some cases incorrectly formulated—especially insofar as the stated alternatives were too limited. Thus, it would frequently be asked, for example, whether certain named types of offset would be likely to oc-

cur or whether there would be a business recession. As it turned out, the named offsets did occur and the economy also experienced a moderate business recession. Many analysts probably missed the boat because of an understandable difficulty in forecasting the timing of inventory cycles. Occasionally, however, some observers would pose the question of what might happen if the downswing of a short-term inventory cycle should coincide in time with the early stage of defense cutbacks; on the whole, however, this possible conjecture of affairs went unnoticed in the early discussions of the problem.

The developments of the past year which were reflected in the shape of the Gross National Product can be understood better if they are viewed against a backdrop including at least the period of the Korean war, and preferably a somewhat longer span of time. Two accompanying charts are designed to assist in arriving at such a perspective. In different ways, the two charts are both concerned with quarterly movements in the Gross National Product and its parts from the first quarter of 1948 through the second quarter of this year, including the latest available data.

The Area Chart. The first chart depicts by means of shaded areas the relative sizes of five major components of GNP, moving through time. The sum of the five parts falls short of accounting for the total GNP, to the extent of the plus and minus adjustments

The three important segments of GNP nearest the base line of this chart have been rising during the past year, helping to offset declines in the two segments shown nearer the top.



for *inventory change* and for *net foreign investment*. The colored line at the top of the chart, which represents the GNP total, therefore, runs above or below the black line representing the sum of the five components, depending on whether the combined adjustment items are positive or negative. During the past year the combined adjustment items were negative, due to the substantial inventory liquidation which took place; consequently the line for total GNP during the 1953-54 recession cuts below the sum of the five parts shown on the chart. As between the two adjustment items, the one for inventory change has tended during the entire postwar period to be larger than the one for net foreign investment, and has frequently

moved in a direction opposite to that of the latter.⁽³⁾

It is apparent from the area chart that the part of GNP represented by federal government purchases (topmost shaded area) was on the rise during the Korean period, and fell off subsequently. The area representing the combination of producers' durable equipment and consumers' expenditures for durable goods (second from top) also showed some diminution in the most recent period. Each of the other three major components, shown nearer the base of the chart, lent strength to GNP during the 1953-54 period.

The rises in dollar totals during the Korean war period which are indicated on the area chart both for the GNP and for its component parts are, of course, associated in considerable measure with price increases. No attempt is made here to reduce GNP or its parts to estimated physical quantities.

Although the area chart serves the general purpose of providing a perspective on the relative sizes of the main parts of GNP, and their recent changes, it is difficult to use it for a close comparison of the various items. For the latter purpose, a charting of each major component of GNP, expressed as a percentage of the total, is more useful. In this type of chart, the effects of price increases tend in part to cancel out. Such a device is provided by the accompanying "share" chart.

Shares of the Total

Reading downward on the share chart means progressing from those parts of GNP which have recently been diminishing in relative importance to those which have been gaining ground within the past year.

(3) The consolidation of the two items on the chart is solely for the purpose of convenience in presentation. If the effect of inventory change had been separately plotted, it would appear more pronounced than can be seen from the areas of the chart representing the two combined adjustments.

The magnitude of the inventory-change item for each of the five calendar quarters from the second quarter of 1953 through the second quarter of 1954 was as follows: +5.4, +2.0, -4.2, -4.2, -4.2 (est). For the same periods the item of net foreign investment was as follows: -3.3, -1.8, -0.6, -1.1, -1.1 (est). These figures are seasonally adjusted annual rates, in billions of dollars. The item for inventory change includes the "inventory valuation adjustments" made by the Department of Commerce.

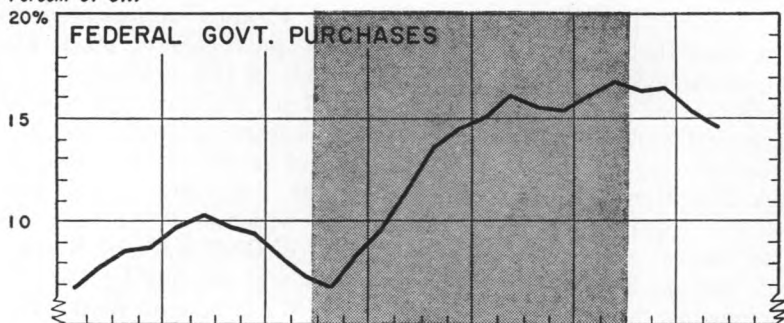
Federal Government Purchases. The share of Gross National Product represented by federal government purchases of goods and services rose as high as 16.8 percent for the second quarter of 1953. This includes the national security expenditures stemming from the Korean war and from the alterations in the general defense program. (The figure may be contrasted with the 42 percent representing the share of GNP made up by total purchases of goods and services by the federal government at the height of World War II.) The decline following the second quarter of last year brought the share of GNP represented by federal government purchases down to about 14.7 percent during the second quarter of this year.

Accompanying the decline in federal government expenditures, taxes were lowered and civilian purchasing power was freed for other uses. Some of the effects of the latter will appear in the items which follow. At the same time, however, the decline in federal government purchases, or the defense cut-backs which were associated with it, undoubtedly had some influence toward *reducing* some of the other components of GNP which are indicated on the share chart and which are discussed below.

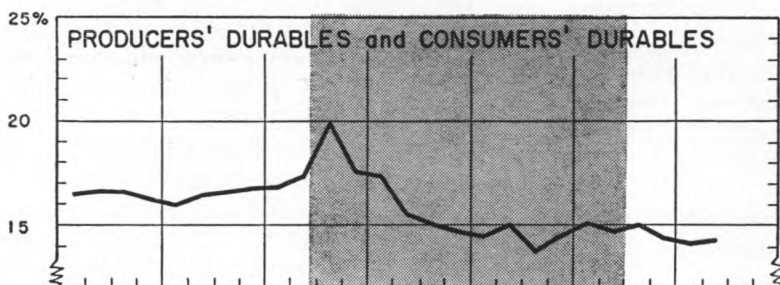
Producers' Durables and Consumers' Durables. A moderate decline in activity in the durable goods groups occurred between the second quarter of 1953 and the second quarter of 1954. (See second tier of the "share" chart.) The decline in producers' purchases of durable equipment, however, was slightly more pronounced than the decline in the consumer sector. The former amounted to a dip from 6.7 percent of total GNP to 6.2 percent, whereas the decline in the share represented by consumer expenditures for durable goods was a mere shading,—from 8.2 percent of GNP to 8.1 percent. (The last mentioned figure reflects in part a pickup in consumer takings of durable goods from the first to the second quarter of this year.)

In interpreting the line showing the sum of producers' durables and consumers' durables (taken as a share of total GNP) it

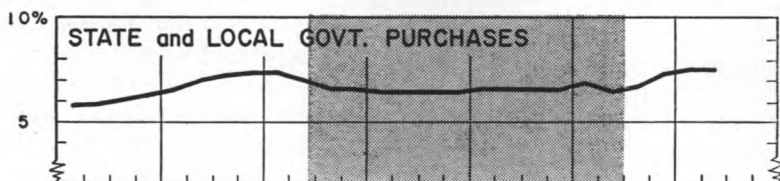
Percent of GNP



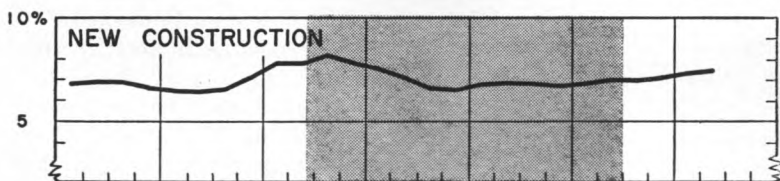
Federal government purchases, as a share of the Gross National Product, declined after the second quarter of 1953.



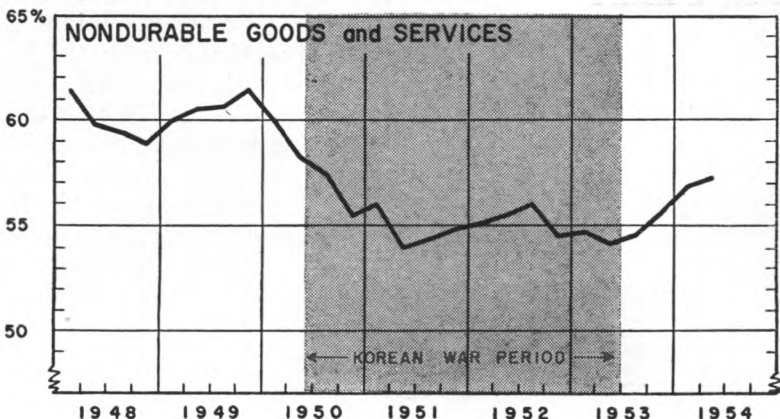
At the same time, the share of GNP represented by the durable-goods groups also declined slightly, although this share leveled off in the second quarter.



State and local government purchases represent a rising share of GNP.



New construction as a share of GNP has also been rising slightly in recent quarters.



The share represented by nondurable goods and services has picked up appreciably since a year ago.

should be understood that neither segment includes adjustment for inventory; allowance for inventory change is included elsewhere as part of the inventory account.⁽⁴⁾

Orders received by the machinery-producing industries, which make up such an important part of the producers' durable segment, are known to have been adversely affected during 1953-54 by the cutbacks in the defense program. This provides an illustration of the fact that the reduction in federal government expenditures had repercussions on some other parts of the GNP, on the down side. The downward push on the machinery industries from this quarter, however, may already be coming to a close, if the defense program totals are now tending to level off as many believe to be the case.

At the same time the tax cuts which were made possible by the reduction in federal expenditures were expected to, and apparently did, have some stimulating effects on numerous civilian types of investment or consumption, both on the part of producers and consumers. On the producers' side, this took the form of maintenance of investment in the modernization of equipment at a higher level than would otherwise have been the case. On the consumers' side it represented a force sustaining the market for autos, appliances and furniture at relatively high levels in the face of indications that market "saturation" was approaching in some lines.

On balance, the combined "durable goods" sector of GNP did lose some ground during the 1953-54 period, as previously indicated. The extent of lost ground would show up as appreciably larger, if the part of the inventory account applicable to durable goods were taken into consideration at this point.

In general it appears that the prospect for maintenance or expansion of the Gross National Product in the immediate future will probably depend in considerable part on the

durable goods segment at least holding its own, both in dollars and as a percentage share of the total. Much of the current discussion of business prospects turns around the "pros" and "cons" of this very point. The prospects for the automobile and appliance industries, as well as for heavy machinery, are at stake in this matter.

State and Local Government Purchases. This part of the GNP, which is depicted in the third tier of the share chart has been representing one of the "plus" offsets to the decline in federal government expenditures, as already noted. It is widely expected that this item will continue to constitute a rising share of GNP, particularly because of the unfulfilled needs for highways, hospitals, schools, and local facilities of all sorts. Such an expectation, of course, is based on favorable assumptions concerning the ability of the local governments concerned to handle the financial problems involved in the physical expansion of their various undertakings.

In many ways, both direct and indirect, the strong pace of state and local government expenditures has been influenced favorably by the reduction in national security expenditures by the federal government.

The stimulus to be expected from expenditures by state and local governments, although significant, cannot in the nature of the case be expected to be relatively large in terms of a share of total GNP.

New Construction. The share chart shows that "new construction" has been gaining during the past year or so as a fraction of total GNP. This reflects the well-known fact that the strength in construction has been one of the most important bulwarks of the economy during a period when the forecasts had been quite evenly divided in respect to the immediate outlook; thus, in some quarters the strength in construction has turned out to be a pleasant surprise. Like the durable-goods sector previously discussed, the construction sector as a share of GNP could readily be expected to go either way in the near future. It does not have so clearly discernible an upward trend, either in the sta-

(4) What is here called "producers' durables" appears in the Department of Commerce estimates as "producers' durable equipment," a subdivision of "Gross Private Domestic Investment". What we are here calling "consumers' durables" is the durable-goods subdivision of the Commerce estimates for "personal consumption expenditures".

The rearrangement of Commerce data is entirely for convenience in presentation.

tistical record or in the qualitative factors involved in the outlook, as state and local expenditures or as the nondurable goods and services sector yet to be discussed.

Nondurable Goods and Services. This is the largest single component of GNP plotted in the share chart. As a share of GNP, nondurable goods and services rose from 54.2 percent to 57.2 percent of the total from the second quarter of 1953 to the second quarter of 1954, at the time that total GNP was going down. The share rise was due to a substantial dollar gain in the services component, coupled with stability in the dollar totals of expenditures for nondurable goods. It is true that the services component includes a significant item for "rents", a part of which in turn represents the imputed rent on owner-occupied houses. Nevertheless, the maintenance of activity in nondurable goods, even exclusive of services, is a significant indication of underlying strength in the economy. The tax reductions associated with the federal expenditure cuts have been a favorable factor at this point, too.

Most observers believe that the combination of nondurable goods and services (as a share of GNP) is more likely to continue rising in the period ahead than it is to reverse its direction.

General Considerations. It has been indicated that the recent reductions in federal expenditures have had repercussions of both "plus" and "minus" types on various other parts of GNP. What bearing does this have on a proper interpretation of the chart shown on the cover?

The method of "pairing" or offsetting which underlies the cover chart, is, as previously stated, largely arbitrary. It would be incorrect to assume that the "plus" items on the right side of the chart were casually

linked exclusively with the "minus" items on the top left, and that the inventory account stands independently as the active force in the recent recession. The reasons why this would be incorrect stem from the fact that the cutting back of the defense program had certain direct repercussions on inventory change as well as other effects along lines already noted.

It does not follow, however, that an alternative arrangement of the items would be preferred. To show the rise in state and local government expenditures, for example, as a partial offset to the reduction of the general inventory account (rather than as a partial offset to federal government expenditures) would be arithmetically correct, but it would probably not indicate the lines of actual relationship even as well as the present chart.

However the parts of GNP are thought of, in relation to each other, there are solid grounds for satisfaction in the way the nation's economy has responded to the defense cutbacks following the Korean war. The record is not perfect; the adjustment has not been painless; important problems still lie ahead. All this is well known. But the statistical record fortifies a general impression that the economy's shock absorbers have been in good working order.

Note on Sources. The dollar values for all data shown above, both in the text and the charts, are drawn from the U. S. Department of Commerce estimates of Gross National Product and its parts, except for the second quarter of 1954, for which the official data were not available at press time. Second-quarter data are our estimates, based in part on the preliminary estimates made by the Council of Economic Advisers and in part on later information drawn from various sources.

The Commerce series utilized here reflect the revisions of quarterly data announced on July 14, 1954. Figures for quarterly periods beginning with the first quarter of 1952 have thus been incorporated on the revised basis. Revisions of quarterly data for periods prior to 1952 were in process, but had not been announced by the Department of Commerce at press time. However, an examination of some of the revised data for earlier periods, which became available after the charts had been completed, confirms a judgment that the "area chart" and the "share chart" accompanying this article would not be visibly affected by incorporation of revised data for all back periods affected. The chart on the cover is based entirely on the revised series.

Local Trends in Volume of Bank Debits

THE STATISTICAL series showing monthly volume of bank debits is one of many indicators of business activity used by analysts to measure the pace of business in particular localities as well as in the nation. In many instances bank debits are the only kind of comprehensive business indicator available at the local level.

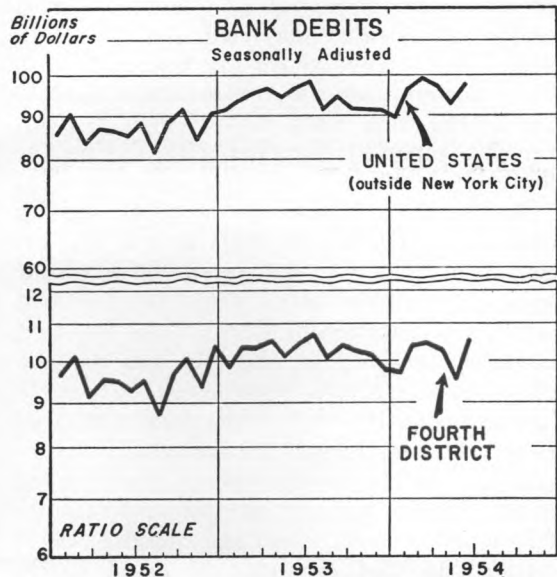
The debits being measured are charges to demand deposit accounts except those of the Federal government and of banks. They represent all check payments made for goods and services by individuals, by business, and by state and local governments; they include payments for property transfers and financial transactions, as well as tax payments by individuals and businesses. The debit series thus covers a very wide range of business and financial activity, serving as an indicator of the dollar volume of transactions through banks in a city, region, or the United States. As a measure of business trends exclusive of finance, however, the data on debits must be interpreted with caution.

Changes in the volume of bank debits so far this year have shown some tendency toward a recovery from the moderately reduced positions which characterized the second half of last year. An accompanying chart portrays the trends for the past three years, after allowance for seasonal variation, both for the Fourth Federal Reserve District and for the United States, exclusive of New York City. (The latter city is omitted because movements of bank debits there are affected by financial transactions to a significantly greater extent than in other parts of the country, thus making the New York

data somewhat less representative of general business trends.)

During February and March of this year, seasonally adjusted debits to demand deposits showed a strong increase, rising to a peak in March from the January low both for this district and for the nation. After the March peak, which was not as prominent here as in the case of the national total, debits declined through April and May. The debits total for June in this district, however, was second only to the all-time high of July 1953. Nationally, neither the decline in

The adjusted volume of bank debits so far this year has recovered somewhat from last fall's reduced positions.



May nor the June recovery were so strong as those reported here.

Bank Debits in Cities of the Fourth District

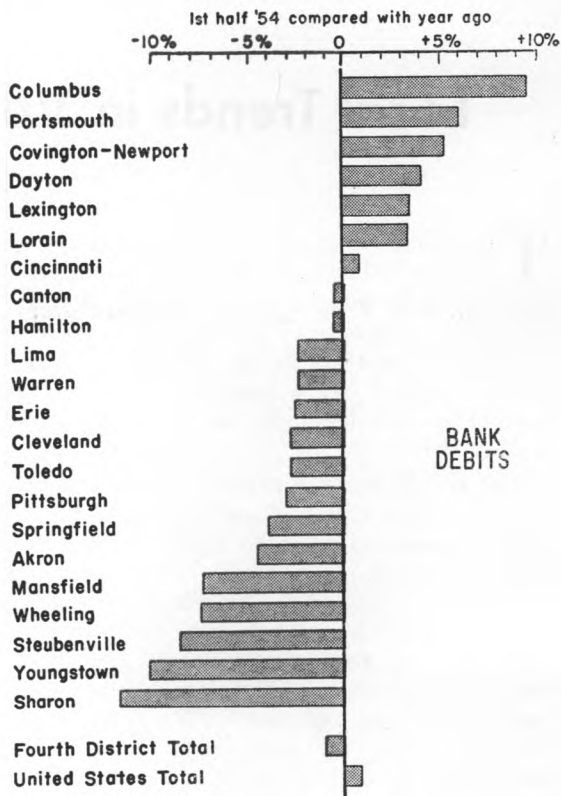
In this district, at least, the high June figure for bank debits indicates considerable business strength. Department store sales showed a marked improvement in June, and construction activity continued to be strong. Nevertheless, as indicated by the accompanying chart, a majority of reporting cities in the Fourth District have posted bank debit totals for the first half of the year which are below the volume of the year-ago period.

Demand deposit activity for the first six months of this year was substantially below a year ago in such steel-making centers as *Sharon* and *Youngstown*, and also (less conspicuously) in *Pittsburgh*. Other centers in the district in which various types of metal fabrication are important, such as *Toledo*, *Cleveland*, *Erie*, *Warren*, and *Lima* also show a year-to-year decline for the first half year, although the percentage decreases are more moderate in these cities.

Debits to demand deposit accounts at some centers in this district, however, were above the year-ago level during the first half of this year. The steel and manufacturing center of *Lorain* completed the six-month period 3.3 percent above the year-ago mark. This showing, however, represents a slackening in the very sharp rate of gain in debit activity reported for that city during the first half of 1953.

At *Columbus*, demand deposits activity during the first half of this year was 9.5 percent above the year-ago level. Part of the gain is probably attributable to increased activity in state accounts and to the fact that industrial activity in the city has not declined as sharply as elsewhere. *Portsmouth* has also posted a high debits total compared to a year ago, largely as the result of construction at the atomic energy plant in the area. Deposit activity at *Cincinnati* is up fractionally from year-ago totals. Debit strength in that city may be based partly

Cities of the Fourth District showed wide variations in change of bank debit volume from the first half of last year to the first half of this year.



upon the relatively strong showing of the soft goods industries during the first part of the year.

Factors Affecting Bank Debits

It was stated earlier that use of the bank debit series as an indicator of general business trends is subject to the qualification that the data include numerous types of special financial transactions. Further explanations of this point may be in order—especially as related to recent trends in the volume of bank debits.

Tax payments at the quarterly dates cause increases in debit totals not related to the actual level of business activity. A strong "bull" market in securities will also have

a heavy effect on the series, especially in New York City, but to some extent also in other financial centers. For some cities and areas, irregular increases in bank debits may be related to a large individual transaction such as the flotation of a large bond issue or the renewal of a large loan. Such circumstances may have a strong effect upon debit totals at the local level.

The movement of bank debits during the first half of this year was certainly related in part to financial transactions and tax payments. Total check payments in the United States, excluding six financial centers in addition to New York, show a relatively lower volume than the series depicted at the top of the first of the accompanying charts. Some financial factors also enter into debit volume outside the main financial centers, thus making it necessary to discount somewhat the business significance of increased debits volume when there is a high level of activity in the financial markets.

More specifically, the strength of debit volume in March and June must also be discounted when the effect of quarterly tax collections is taken into account. Under the Mills plan, corporations had to pay 45 percent of their taxes on their 1953 income in each of the first two quarters of this year. This factor increased bank debits for March and June of this year, but will result in lower debits for September and December than would otherwise be the case.

Recent indications, however, lead to the belief that the large volume of debits reported for June cannot be entirely discounted. More favorable showings by other business indicators tend to bear out the assumption of underlying debit strength. The gain in department-store and retail sales in June, the apparent stabilization of employment during the month and the apparent leveling of the index of industrial production, are factors which tend to corroborate a favorable evaluation of the recent trend in debits.



Better Management of Water Resources

By CLYDE WILLIAMS, *President and Director, Battelle Memorial Institute*

SINCE 1900, the country's consumption of water has increased sixfold, and continued sharp increases may be expected in the future. This seems certain, because of population growth, projected expansions in industrial operations and irrigation, and the greater use of water-consuming appliances in the home.

Increased demands for water must be met to keep our economy moving forward. They will be met, at first, through better management of existing water resources. Later, technological developments, such as rainfall control through cloud seeding and the recovery of fresh water from the ocean, will enable us to expand fresh water supplies. Better management is the problem at the moment.

Water is one of our most plentiful natural resources. Each day an average of 4,300 billion gallons of water falls on the United States as precipitation. Some 3,000 billion gallons a day return to the atmosphere through evaporation and transpiration (use by vegetation). Left is an average daily runoff of 1,300 billion gallons. The country captures and uses only about one-seventh of this runoff. Better management should enable us to increase the proportion.

Better management of water resources involves a wide variety of long-range, interrelated projects. These include flood control, irrigation, the development of storage reservoirs, surface and ground water conservation, soil conservation, re-use of water, and reduction of stream pollution.

Serious attention has been given to well-conceived programs of water management for many years. Before such programs come to maximum fruition, however, there are pressing needs for (1) more coordination between Federal agencies concerned, and (2) a greater community consciousness of the value of water. There are encouraging signs that progress is being made toward fulfilling both of these needs.

It is encouraging to note President Eisenhower's recent announcement of the creation of a committee of three Cabinet members to seek a more effective and better coordinated national water policy. According to reports, this committee will put greater emphasis not only on more coordination among government agencies concerned, but also among government and private interests.

A rapidly growing, nationwide movement is under way for more community action in regional watershed problems. Municipal and state officials, industrial leaders, and farmers are banding together in local water resource and development projects.

Many of the nation's farmers and some industries are voluntarily adopting practices that could gather momentum and eventually have widespread effect. What the farmer does is especially important because farm acreage, constituting about 60 per cent of the country's total land area, is the collector of much of our usable rainfall. What industry does

about conserving water is also of major importance. Industrial usage of water—already about 40 per cent of the nation's total consumption—will probably increase at a much more rapid rate in the years ahead than water usage for irrigation and domestic purposes.

Farmers have found that practices that reduce the rapidity of water run-off are good business. Such practices reduce soil erosion and retain water for crops, thus helping to increase or stabilize crop yields. Contour plowing, and contour plotting with grass or waste vegetation between plots, have become quite well established in some rolling and hilly sections of the country. These practices not only protect the farmer's soil, but help to prevent floods, build up underground water tables, and, by slowing run-off, make more water available to urban areas. Other practices, such as mulching, where feasible, and the use of grass and legumes between crop rows, where economical, also are used to reduce rapid run-off.

For reasons of economy or better community relations, an increasing number of industries are making considerable progress in the re-use of water. For example, one chemical concern reports that by recirculating its process water it has reduced its water requirements from 130 million gallons to 4 million gallons per day. One of the largest airplane manufacturers states that its water-conservation programs are saving 120 million gallons per month. Many similar examples could be found in other industries, notably in those making paper, petroleum, textile, and steel products.

Methods are being devised for the treatment of wastes that formerly went into streams untreated. The elimination or recovery of such wastes can greatly increase the supply of water suitable for downstream or municipal use. This is now an important factor in the industrial development of some areas where inadequate water supply but sufficient raw materials and labor exist. It is equally important to those concerns that put a high premium on friendly relations with their communities.

Many industrial plants and all domestic consumers are not only concerned with the quantity of water available, but also with its quality. Increasing attention is being given, therefore, to better management and more extensive development of underground water, which is usually cleaner than surface water. Underground water reservoirs provide huge natural fresh water storage facilities. Such storage facilities in the United States are reported to be greater than those of the Great Lakes.

Because water is an abundant, replenishable resource, there has been a lag in applying science and technology to its management and utilization. In recent years, however, the recurrence of water shortages in many sections of the country where adequate supplies were taken for granted has roused the nation from its complacency about the water situation. The future, therefore, should bring more aggressive, scientific management and development of water resources.

Editor's Note—While the views expressed on this page are not necessarily those of this bank, the *Monthly Business Review* is pleased to make this space available for the discussion of significant developments in industrial research.