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BUSINESS REVIEW

More Cash Flow—And Maybe New Machines
X=Excess Capacity



FEDERAL RESERVE BANK OF PHILADELPHIA

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is produced in the Department of Research. Bernard Shull was primarily responsible for the article "More Cash Flow—And Maybe New Machines," and Evan B. Alderfer for "X=Excess Capacity." The authors will be glad to receive comments on their articles.

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The principal dynamo of economic growth in the United States has sputtered in recent years. Business spending on plant and equipment—the main power source in any free economy—has failed to grow beyond the heights achieved in 1957. Through disappointing progress a search has been conducted for ways to stimulate investment. New depreciation guidelines and other proposals promise . . .

MORE CASH FLOW—AND MAYBE NEW MACHINES

The American economy has not lived up to its potential over the past several years. Growth has been slow and substantial amounts of excess capacity and unemployment have developed. Many observers trace the sluggishness to a slow-down in business investment. Some feel that higher levels of investment would increase income and demand at home and also permit American business to modernize and compete more effectively abroad; they believe that more investment, despite the existence of excess capacity, would place the economy on the road to faster growth.

Of the many factors that influence business investment, cash flow—frequently defined as retained earnings plus depreciation—has drawn increasing attention. To increase investment, the argument goes, first increase cash flow.

TO INCREASE CASH FLOW

A number of policies and proposals have been designed recently to increase cash flow—to provide business with more cash which can be used for investment in productive capital. The basic ingredient of all these proposals is tax relief, particularly for firms that are growing.

Depreciation allowances

Depreciation is an invisible expense. Machines wear out and become obsolete as time passes. We can no more see machines depreciate than we can see time pass. Not even a slow-motion camera would help. But it happens all the same.

The Federal Government recognizes the gradual and continuous expense of depreciation and provides for it in the tax laws. The law permits a deduction in the computation of taxable income of a reasonable amount for the exhaustion of tangible (and some intangible) property.

The amount of depreciation a firm can deduct in any given year depends in part on the original cost of its equipment. But the allowance will also vary with the number of years over which its equipment is depreciated and the computing method used. The Federal Government pretty much regulates both time and method.

The useful lives of thousands of fixed assets—from locomotives to honing machines and from dip barrels to chairs—had been estimated, prior to last month, in the Internal Revenue's *Bulletin F*. Newly published depreciation rules set out useful lives estimates for about 75 classes of property that should encompass all the assets

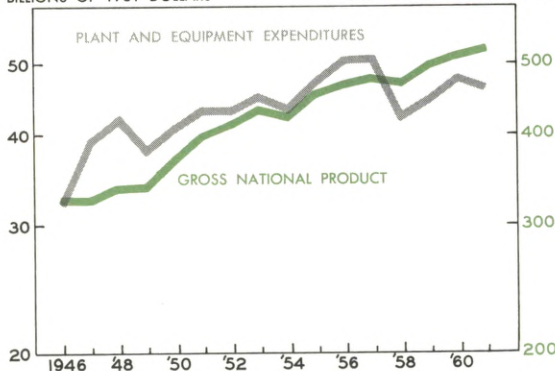
CHART I

INVESTMENT AND GROWTH

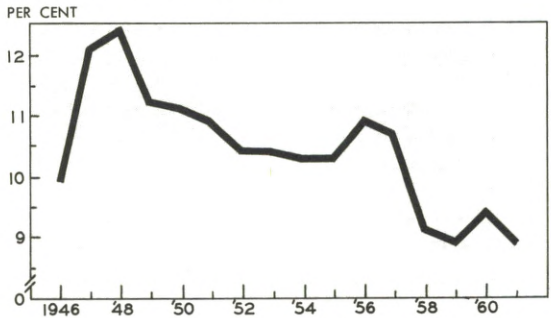
Business spending on plant and equipment spurted after World War II and through the mid-fifties. It reached a peak in 1956 and 1957 and has been sluggish since. Gross national product—an over-all measure of economic growth—appears to have been significantly affected by the slow-down in investment. From 1946 to 1957, GNP increased at an average rate of 3½ per cent a year; since 1957, its rate of growth has slowed down to a little over 2¼ per cent.

RATIO SCALE
BILLIONS OF 1961 DOLLARS

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The RATIO OF PLANT AND EQUIPMENT SPENDING TO GNP has been generally dropping since 1948. Currently the ratio is lower than in 1946. Some observers feel that for the economy to grow faster, more than 9 per cent of GNP must be devoted to investment.



Plant and equipment expenditures include nonresidential construction and producers' durable equipment.

Both GNP and plant and equipment expenditures are in constant 1961 dollars.

Source: Department of Commerce.

previously specified.

The new guidelines have, on average, decreased the number of years over which equipment and machinery may be depreciated. The

Treasury has estimated that the revision will increase depreciation allowances by about \$3.4 billion this year, and save businessmen about \$1.5 billion in taxes.

There are several types of depreciation methods permitted under the tax laws. One, so-called "straight line" depreciation, directs businessmen to write off an equal proportion of the cost each year—for example, 10 per cent of the original cost each year. For an asset costing \$10,000 and having a 10-year life, this would amount to \$1,000 each year.

Accelerated methods permit businessmen to write off larger proportions in the early years and smaller proportions in the later years. Several accelerated methods are permitted under the law. However, the currently permissible methods do not allow so rapid a write-off as is permitted in many countries of the Western World.

If the Government would permit larger proportions of an asset's value to be written off earlier, firms owning the assets would generally take immediate increases in their depreciation allowances. This would reduce their taxable income and increase actual cash available, even though reported earnings, reflecting the increase in depreciation expense, would decline.

Immediate increases in depreciation allowances—whether due to shorter useful lives estimates or more rapid acceleration—might only postpone tax payments, not reduce them permanently. Abnormally high depreciation when the asset is new could be offset by abnormally low depreciation when the asset is old.

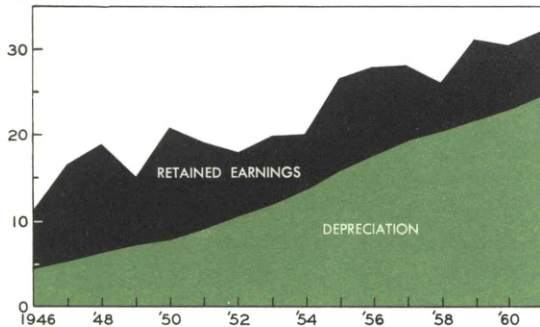
For a growing firm that continually increases its investment, however, depreciation allowances should be systematically higher each year. A growing firm should be able to postpone abnormally low depreciation allowances indefinitely. An economy in which growing firms

CHART II

THE EXPANSION OF CORPORATE CASH FLOW

Corporate cash flow—retained earnings plus depreciation allowances—has grown from \$11 billion to \$32 billion since the end of World War II. The growth of these internally generated funds is almost completely due to the constant expansion of depreciation. Retained earnings have fallen in recession and risen in prosperity, but they were about the same in 1961 as they had been in 1946.

BILLIONS OF DOLLARS



Source: "Sources and Uses of Corporate Funds," Department of Commerce.

dominate should also systematically incur higher depreciation under these conditions.

Consequently, adjusting depreciation requirements under the law *could* provide a systematic expansion of cash flow, through tax relief, during periods of advance. But if investment is stable or declining for any period of years—for a firm or for the economy as a whole—these same adjustments would reduce depreciation allowances and cash flow to levels lower than they otherwise would have been.

The investment tax credit

The recently proposed investment tax credit is another tax-relief measure designed in part to increase cash flow of the growing concern. A bill currently before Congress provides that businesses may deduct up to 7 per cent of the cost of most newly purchased equipment from their tax liability. There is no provision for new plant.

This measure would encourage a specific type

of investment—investment in new tools and machines. The idea is that this type of investment should be especially encouraged; some believe it is mainly associated with innovation—technological advances and new products which contribute most to rapid economic growth.

The Treasury feels that the tax credit would stimulate new investment far more per dollar of tax revenue lost than any alternative type of tax relief. It estimates that this measure would reduce corporate taxes by well over \$1 billion in the first year of its operation. The tax credit would become a permanent part of the tax code.

General tax reduction

Depreciation revisions and the investment tax credit are designed primarily to help the growing firm by paying a premium for faster growth. A general reduction of corporate tax rates would help all firms and, presumably, encourage a larger number to become growing firms. This kind of tax relief would not be tied to any specific corporate activity.

WILL CASH FLOW INCREASE INVESTMENT?

Like most important questions, the answer to this one is not clear-cut. There are pros and cons, and the pendulum of opinion swings back and forth with the expert testimony that appeared in last night's paper. Twenty-five years ago a consensus held that cash retained by corporations out of earnings was being hoarded and thereby injuring economic recovery—and a tax was levied on retained earnings. Today many insist that an increase in retained earnings and corporate cash would not be hoarded but invested, and tax relief is the order of the day.

The current debate: affirmative . . .

The issue turns on what will be done with the

cash; the hope is that it will find its way into investment. This hope is based on the belief that the supply of capital funds is limited relative to investment opportunities.

The word "limited" requires some explanation. Some firms—for example, small or new businesses—simply may not be able to raise the total amount of funds they feel they could profitably use. This is, of course, an absolute limitation.

But perhaps more often, the *cost* of raising funds is prohibitively high—so high that when the cost is taken into consideration, the investment project no longer seems profitable. Cost is the limiting factor.

No matter what funds are used—no matter how they are obtained—there is always a cost. A firm may obtain funds by floating new stock. But underwriters must be compensated; frequently a large cost is involved here. Moreover, the firm must be prepared to pay dividends to its new as well as old shareholders; dividends, unlike interest, are not tax deductible—they are paid out of after-tax income. Floating new stock can be very expensive.

A firm may obtain funds by borrowing in the capital markets or from banks. Interest must be paid currently, and ultimately the loan must be repaid. The interest payments, especially on long-term borrowing, represent a fixed cost that may become extremely burdensome during periods of economic decline; and loan repayments may become difficult also if the investment does not succeed. Actual costs and potential dangers are involved in borrowing.

A firm may get cash by selling financial assets, such as Government securities. Here, too, a cost is involved, for the firm gives up interest income when it sells Governments. Moreover, it gives up some liquidity; and it therefore gives up some flexibility in meeting contingencies or

taking advantage of opportunities that may arise.

Even when internally generated cash—cash flow—is used for investment, a cost is incurred. The shareholders might have received the cash in dividends; and by investing it, they incur the loss of an immediate increase in income.

Real dollar costs, such as interest payments, potential costs, such as are incurred in floating bonds, and the costs of giving up alternative opportunities such as are involved in selling Governments and plowing back profits are the costs of investment funds.

It is generally felt by financial analysts that the cost of financing internally is considerably lower than any other kind of financing; and the cost of financing rises after internally generated funds are exhausted.

Businessmen have additional reasons for favoring internal financing. They generally prefer to remain independent of outside influence; they are frequently reluctant to make outsiders insiders, be they lenders or new owners. Moreover, it's often easier to finance internally. External financing will typically require numerous conferences and elaborate preparation; internal financing may require only that an increase in dividends *not* be voted.

So it seems to follow that an increase in cash flow will decrease the average cost of funds, help overcome business reluctance, and encourage investment. There is some evidence to support this view.

Businessmen have stated in a number of surveys that they prefer to finance new capital internally.¹ And they do seem to finance a large proportion of capital internally. They act as if they consider internal financing cheaper and generally preferable.

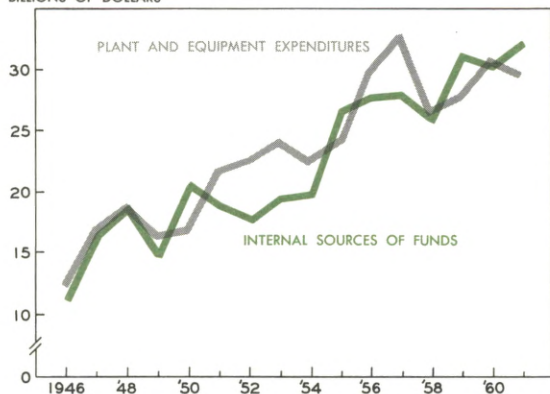
¹ For a discussion of these surveys, see *The Investment Decision* by John R. Meyer and Edwin Kuh, Harvard University Press, 1959.

CHART III

INSIDE FUNDS FOR INVESTMENT

Funds generated internally by corporations—cash flow—and corporate investment have grown in step over the postwar period. Year-to-year changes have not always been in the same direction, but both have grown from about the same level and by about the same amount.

BILLIONS OF DOLLARS



Internal sources of funds include retained earnings and depreciation allowances.

Source: "Sources and Uses of Corporate Funds," Department of Commerce.

Moreover, cash flow and investment seem to have been closely related during the postwar period. Mainly due to rapid and persistent increases in depreciation, internal funds have grown considerably from a little over \$11 billion in 1946 to \$32 billion in 1961. As is shown in Chart III, internal funds have grown from about the same level and by about the same amount as plant and equipment expenditures.²

Of course, the internally generated funds could have been partly used to build up inventories and extend credit to customers. There is no way of distinguishing the dollars used for investment from dollars used for other purposes.

² A simple linear correlation of the data for these years indicated that about 83 per cent of the variance in investment was explained by internal funds. Similar conclusions are reached in more elaborate correlation analyses in *Variability of Private Investment in Plant and Equipment*, Part I of material submitted to the Joint Economic Committee, January 1962, p. 68. Other evidence supporting the contention that cash flow strongly influences investment is summarized by James Duesenberry in *Business Cycles and Economic Growth*, 1958, pp. 87-90.

But this money and investment have grown in a comparable fashion.

To this extent, then, the statistical analyses seem to confirm what businessmen say. Cash flow appears to have been one of the important factors influencing the investment decision in recent years.

. . . and negative

In spite of what, on the surface, appears to be substantial evidence, the case is not airtight. It still requires a good jump to conclude that a boost in cash flow today will result in a substantial increase in investment tomorrow.

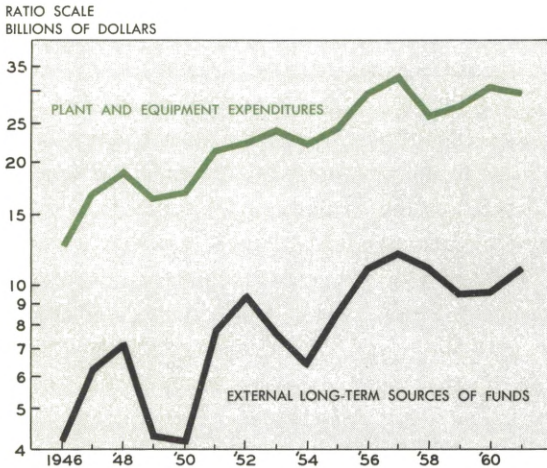
First of all, how important is the cost of investment funds? Only a few years ago most businessmen and economists believed that capital costs were relatively unimportant. These costs generally represent a small proportion of the total cost of obtaining, maintaining, and replacing new plant and new machines. Many believed that even substantial variations in the cost of funds would not significantly affect the total cost of new investments. Moreover, businessmen seemed to require high prospective returns on new investment—partly, perhaps, to cover the risk of an uncertain future. For this reason also, even significant changes in the cost of funds could hardly be decisive. So while many businessmen have stated a preference for cash flow, many at the same time have also stated that they do not consider the costs of money a significant factor in determining their investment expenditures.

The easiest though perhaps not the only way to reconcile these apparently conflicting views is to conclude that many businessmen would rather use internal funds, but do not feel restrained very much by having to borrow if the profit outlook is really good. Executives at one firm we talked to explicitly said that they do not feel their investment is limited in any fashion by the

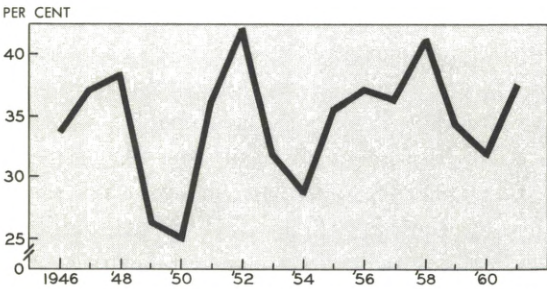
CHART IV

OUTSIDE FUNDS FOR INVESTMENT

External funds obtained by corporations—from new stock, bond, and other long-term financing—have grown at about the same rate as corporate spending on plant and equipment over the postwar period.



The RATIO OF EXTERNAL LONG-TERM FUNDS TO PLANT AND EQUIPMENT EXPENDITURES has averaged almost 35 per cent during the postwar period. The ratio has fluctuated considerably, generally falling in recession years and rising in years of expansion; but no downward trend has been evident.



Source: "Sources and Uses of Corporate Funds," Department of Commerce.

type of financing they would have to do. If the investment project was a good one and they had to borrow, they would. Yet this particular firm hasn't had to borrow long-term for many years, though it has invested a considerable amount. It has been able to finance practically all its investments internally. The firm appears to

have a preference for internal funds, but the preference may not be crucial.

This interpretation of the ideas businessmen have expressed from time to time in surveys seems to conform to their behavior in the postwar period. Although long-term financing—mainly bond and stock flotations—has accounted for a relatively small proportion of corporate investment, it has not declined in importance over the postwar period; it has grown at least as rapidly as investment, as shown in Chart IV.³

In addition, there appears to be a fairly strong association between changes in investment and changes in external long-term financing. When corporations have increased their investment, as can be seen in Chart V, they have typically increased their long-term borrowing.⁴

The relationship between external financing and investment is obvious. Businesses would rarely borrow long-term if not to invest; long-term borrowing clearly permits investment. The relationship between changes in cash flow and investment, on the other hand, is somewhat less clear. While it is true that increases in cash flow can be used to increase investment in fixed assets, it is also true that increases in investment probably result in increases in cash flow—more profit and more depreciation. Moreover, with general economic advance, both investment and cash flow would tend to rise hand-in-hand, and

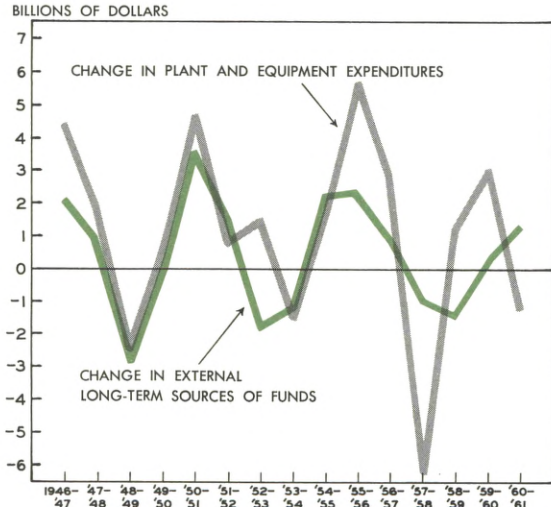
³ In recent years, sources of corporate funds have consistently exceeded uses. The discrepancy might suggest some upward bias in external funds, but this seems of minor importance. On this point see "Business Credit Demands—Problems of Interpretation" in the July-August issue of the *Monthly Review* of the Federal Reserve Bank of Kansas City.

⁴ A simple correlation of changes in long-term financing and changes in corporate expenditures for plant and equipment in the postwar period indicates that about 43 per cent of the variance in the investment variable is explained by changes in external long-term financing. Considering the number of observations and the extent of the association that resulted, the existence of some association between investment and external financing can be accepted with considerable confidence. The association is further improved if the changes in investment and borrowing from 1957 to 1958 are not considered. In 1958, plant and equipment expenditures fell by over \$6 billion while long-term borrowing declined by \$1 billion. About 49 per cent of the variance in investment is explained when 1958 is eliminated.

CHART V

FINANCING INVESTMENT EXTERNALLY: SOME UPS AND DOWNS

During the postwar period, increases and decreases in investment have generally been accompanied by increases and decreases in external long-term financing. In 11 of the 15 years of comparison, the two have moved in the same direction.



Source: "Sources and Uses of Corporate Funds," Department of Commerce.

one could not be thought of as necessarily pulling the other after it. Despite the statistical association found between cash flow and investment, it is not a simple matter to determine which is cause and which is effect or, in fact, whether both are simply not effects of a more important factor—the profit outlook.

The postwar milieu

In the postwar period, as can be seen in Chart VI, there have been three years in which internal funds have risen very rapidly, and these years have been followed by striking increases in investment.⁵ Retained earnings plus depreciation of corporations increased \$5.9 billion, \$6.8 bil-

⁵ The lead, however, is not consistent. In only seven of the 15 postwar years has investment moved in the same direction as cash flow the year before.

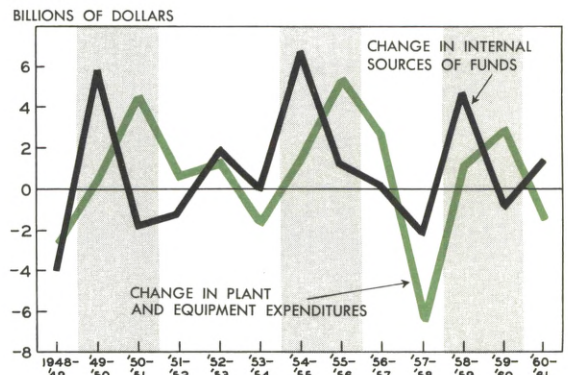
lion, and \$5.1 billion, in 1950, 1955, and 1959, respectively. In the following years, 1951, 1956, and 1960, corporate expenditures for plant and equipment increased considerably—\$4.7 billion, \$5.7 billion, and \$3.1 billion, respectively.

But these were special years. Let's look at them more closely. Nineteen-fifty, 1955, and 1959 were years of economic recovery from recessions. During those years, cash flow increased rapidly because profits were increasing rapidly. Probably the increases in profits were mainly due to the increasing utilization of capacity, and the spreading of burdensome overhead costs over larger amounts of sales. During those early years of recovery, plant and equipment expenditures changed very little. The increased
(Continued on Page 12)

CHART VI

CASH FLOW AND INVESTMENT IN THREE ACTS

In each of the three periods highlighted on the chart, internal sources of funds—cash flow—increased substantially in the first year and corporate spending on plant and equipment increased substantially in the following year. The first year, in each case, was a year of recovery from recession. The expansion in investment in the following year may have been helped by the previous increase in cash flow; but it was also probably spurred on by improvements in the outlook for business and profit expectations.



Internal sources of funds include retained earnings and depreciation allowances.
Source: "Sources and Uses of Corporate Funds," Department of Commerce.

THE SEVERAL FACE

Cash flow, like Eve, has more than one face. Each unique appearance is determined in the eye of the beholder. Several categories of beholders, having several different purposes, have created different images.

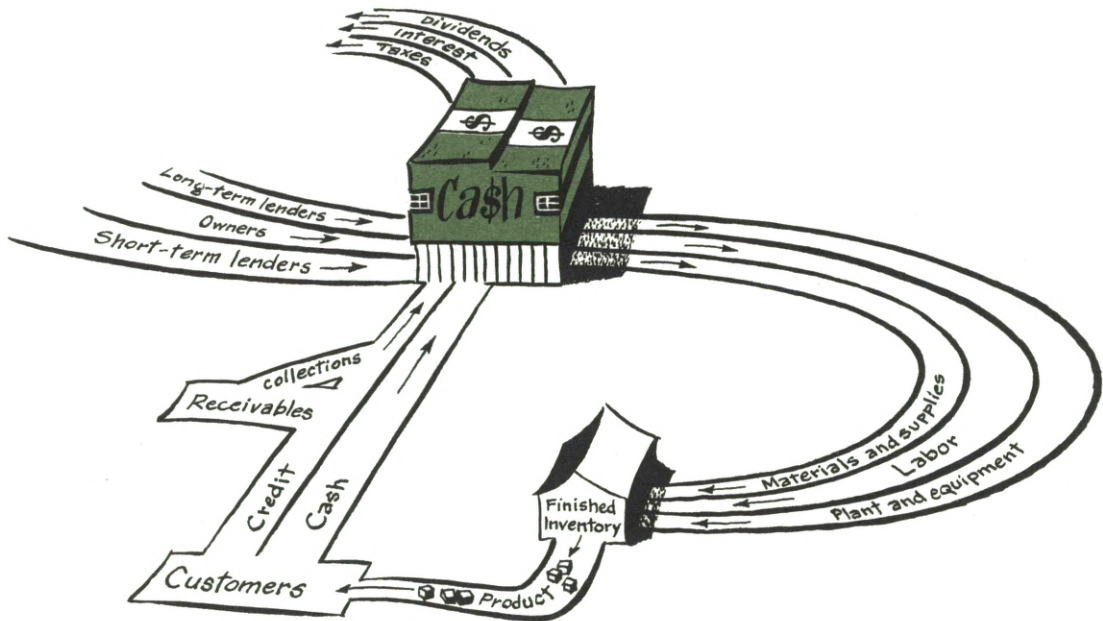
There is a basic idea, however, from which the varying notions of cash flow spring. Think of a flow—some element moving smoothly and continuously like blood through our bodies. So we can conceive of cash flowing smoothly and continuously through a business. Cash is obtained from several sources and converted into productive factors and finally goods and services; these are then converted in the market place back to cash.

The accompanying diagram depicts a general-

ized flow. Cash receipts flow into the business from lenders, owners, and from sales; cash is paid out for labor, capital, and materials in the process of building a finished inventory; cash is returned with the help of customers. Part of the cash must be paid out again immediately—in wages, for example, and in interest; part is earmarked on the books to cover specific expenses but cash need not be paid immediately; depreciation is a major expense of this sort. If a profit is earned, income taxes must be paid and perhaps dividends to stockholders.

Corporate managements can record the amount of cash coming from the various sources and the amount spent for various purposes. With the help of their records, they can frequently

CIRCULATION OF CASH THROUGH A BUSINESS



S OF CASH FLOW

project future cash flow with some success. Such statements and projections play an important part in corporate budgeting; they help management determine the effects of its current and prospective policies on its cash position; and permit management to adjust accordingly so that neither shortages nor substantial excesses of cash occur. Corporate treasurers, in particular, find cash-flow projections invaluable in deciding how much cash should be invested in what kind of securities. Moreover, many lenders will require a projected cash flow statement before making a loan to business. These projections help lenders evaluate the prospects of scheduled loan repayments.

Fund or cash-flow statements are frequently condensed. Such statements—usually entitled "Sources and Uses of Funds" or something similar—start with net earnings after taxes and frequently after dividends. These earnings are typically reported on an accrual basis. They include noncash expenses and receipts. The large and easily available noncash expenses, such as depreciation and depletion are usually added back in more or less to adjust earnings to a cash basis. The figure that results—earnings plus depreciation and depletion allowances—may be considered a hopeful approximation of cash received during the period from internal operations. Funds received from external sources are composed of borrowing and equity financing.

This, then, is approximately the total amount of cash that has flowed into the business over a given period of time, net of the amount required for operations. It may have been used to

acquire inventories, or finance customers, to purchase new machines, or new plants, to repay debts, or to build up holdings of Government securities. It may just have been kept as cash. To these several uses, the cash inflow is appropriately allocated.

Such source and use statements have supplemented balance sheet and income reports for years. They have been of help to management's boards of directors and, more recently, to stockholders in tracing the operations of the firm.

In recent years, security and financial analysts have frequently restricted the term "cash flow" to cash from internal operations—net earnings (before or after dividends) plus depreciation and depletion. Security analysts are often concerned with the evaluation of the stock prices of various companies. Current and prospective earnings are the most important factors in such evaluation. But in some industries, various companies use different accounting techniques which make their reported earnings non comparable. Adjusting incomes to an approximate cash basis sometimes provides a better comparison.

Financial and economic analysts are currently concerned about the rate of economic growth. Business investment, an important determinant of growth, has been sluggish in recent years. Since businesses need funds to invest, and since internally generated cash is a relatively cheap source, economists have given this part of the total flow considerable attention in recent years. This is the face of cash flow that has found its way from the scholarly journal to the financial and editorial pages of the morning newspaper.

(Continued from Page 9)

cash flow helped to build up inventories, finance an expansion of trade credit, and increase holdings of Government securities; a little of it was simply kept in cash.

The expansion of investment in the years following those early recovery years seems closely associated with the dynamic improvement accompanying the recovery—improvement in the economic outlook, improved profit anticipations, the elimination of excess capacity, and the turnover of inventories.

A large proportion of *total* investment was no doubt financed with current cash flow; but the additional amounts that made those years “growth years” were probably financed with the help of long-term borrowing and previously accumulated liquid assets—substantial amounts of Government securities were liquidated in 1956 and 1960. Some of the assets liquidated were no doubt acquired through cash flow of former years. Nevertheless, when the investment outlook was good, businessmen did not restrict themselves to current cash flow. They appear to have used whatever funds were available.

The early postwar years were buoyant ones. Cash flow and investment grew together in a milieu of optimism and expansion. The atmosphere seems somewhat different today; whether or not an increase in the supply of corporate cash can induce a significant expansion of investment in this different climate cannot easily be foretold by either theoretical speculation or statistical analyses that look to the past. An increase in cash, brought about by tax relief not specifically tied to new investment, can be used in a number of ways. It can be used to increase dividends; it can be used to build up inventories and extend trade credit; it can be used to increase liquidity, and then in the following years used

to increase promotional expenditures or wages. It should be recognized that there are many possible leakages between increased corporate cash flow and increased expenditures for plant and equipment.

Needed: a new milieu

In the depressed 1930's business investment was at very low levels. By current standards, the cost of financing was also low. But the risks were high and the returns uncertain. Many businessmen apparently reasoned that they needed a large margin of error. Even sound investment opportunities had a way of going sour. Unless the expenditure promised a very good return, they could not afford to invest. In the 1930's, there were relatively few investments that promised a good return.

Immediately after World War II, businessmen also seemed to demand high returns on their investments. Surveys indicated that they expected their investments to pay for themselves very quickly. Perhaps they were still uncertain as to the future. But the difference in the late 1940's was that there were substantial numbers of investment opportunities that met the requirements.

Today it appears that many firms are not requiring so high a return on their investments as was true in the late 1940's and 1930's. There is not so much uncertainty as during the 1930's; but there also does not seem to be the abundance of high-yielding projects that existed in the late 1940's. To judge from profit margins and current returns on equity, prospective yields on investments have probably fallen significantly in many industries over the past decade.

When anticipated returns are relatively low and investment projects are not expected to pay for themselves for many years, the cost of money

looms more important than it otherwise would. Businessmen tend to become sharp-pencil calculators who carefully evaluate the potential net gains of alternative projects. So, in these terms, the cost of money is probably more important in today's environment than it was 10 or 15 years ago. So, also, in these terms, anything that increases the availability or reduces the cost of capital funds, such as increased cash flow, would be of some merit.

But how much benefit an increase in cash flow can be is difficult to say. Important factors that significantly affect the supply of capital funds have been favorable for investment for some time. Total cash flow has exceeded total corporate investment by about \$5.4 billion over the past three years. Rates on long-term borrowing have been relatively moderate by historical comparison, and loan funds appear to have been available for some time. Corporate holdings of liquid assets have increased significantly over the past year and many, though not all, observers believe that corporate liquidity is at least adequate.

Perhaps, then, concern with the prospective yields on new investment is more basic than the current concern with the cost of capital funds. The current tax-relief measures should tend to improve prospective yields as well as increase cash flow. After-tax receipts should be higher; the pay-back period on new investments should be shorter. The Federal Government, through its tax policy, can improve profitability.

But it cannot create profitability. Profitable opportunities and ideas must exist first. There were slumps in investment and business depressions long before there was a Federal income tax.

Tax relief, then, can be considered a help but

not a panacea in an economy with excess capacity and where the profit squeeze has developed primarily because of the rapid growth of many costs.⁶

THE PROMISE OF INVESTMENT

If investment is to grow, the forces underlying growth must be understood. Cash flow—the supply of cheap, readily available funds—may be an important factor. But investment, in the past at least, has typically responded in a vigorous fashion to hopes and needs—the hope to earn larger amounts of profit and the need to stay competitive to survive. Increasing foreign competition has intensified the need to renovate plant and equipment. But hope has typically been the major emotion behind past investment booms in the United States. From the railroad expansion of the 19th century to the postwar boom from which we have recently emerged, the hope of making large amounts of money has stirred the business imagination.

The hope of profit depends ultimately on actual or anticipated market demands for the products or services that business is producing and on new products that meet strongly felt needs. If investment has increased at too slow a rate in recent years, it has more likely been “limited hope” rather than limited cash flow that has been the roadblock. The proposed measures to stimulate cash flow meet this barrier by promising the reduction of one of many costs. In the current environment where demand seems somewhat deficient, the question, “can these measures help” can only be answered with a maybe.

⁶ See “The Great Corporate Profits Mystery” in the *Business Review* of January 1962.

X=EXCESS CAPACITY

Stone-cold blast furnaces, silent coal tipples, smokeless chimneys piercing the skyline, empty freight cars sitting on grass-covered sidings, vacant lofts in center city, unoccupied hotel rooms, the railway club car we had to ourselves from St. Louis to Indianapolis, and the cabby asleep in his taxi at a wayside station—all these look like excess capacity.

If all the furnaces were aglow and all the chimneys belching smoke, and all the taxis jostling fares there would be a greater flow of G.N.P. and less concern about growth, capital investment, and excess capacity. Disappointment over these interrelated aspects of our economy is commanding widespread attention among businessmen, legislators, commentators, and thoughtful people everywhere. An example is the recent Congressional hearings on "Measures of Productive Capacity."

Some troubles in solving for X

Theoretically, the calculation of excess capacity looks easy. Let X equal excess capacity; Y equal what we *can* produce; and Z equal what we *do* produce; then $X=Y-Z$. Just substitute the Federal Reserve Board's index of industrial production for Z , what we do produce, and the only thing remaining to solve for X is to ascertain Y : what we *can* produce. The Y looks so unassuming but, as we shall see, it requires a tremendous amount of assuming before we can solve for X .

Before tackling big Y —what the economy can produce, let's tackle little y , what one industry can produce; steel, for example. How much steel can be produced depends, first of all, on the kind of steel. The walnut-paneled-office con-

cept of steel is likely to be, well, steel. Steel, however, is a rather complex chemical compound cooked up in colossal cauldrons according to particular recipes. After solidification into ingots, the steel undergoes much additional processing to get the right sizes and shapes for razor blades, boiler plate, tail fins, etc. Whatever the industry's capacity, it would be greater if all steel were alike. The point is that capacity is influenced by the size and nature of orders, about which certain assumptions must be made in estimating steel capacity.

How much any one plant can turn out is influenced also by the condition and balance of the plant. Old, substandard, or obsolescent machinery limits capacity. Most steel mills are integrated so as to get the economy of continuous flow from smelting to refining, teeming, soaking, rough rolling, finish rolling, trimming, heat treating, and other finishing operations. Thus, the capacity of a mill depends in part upon how well the departmental capacities are geared into each other lest there be internal bulges and bottlenecks. Furthermore, in the calculation of its capacity, the question is asked, should the coke industry (which feeds fuel to the steel industry) include only its modern by-product ovens or should coke capacity include also the obsolete beehive ovens that are fired up only in cases of national emergency?

How much an industry can produce also depends on how hard it works. Working time in manufacturing industries shows a surprising variation. The latest monthly report of industrial activity in our district, for example, shows that the chemical industry averaged 42.1 hours a week and, at the other extreme, the apparel in-

dustry worked only 35.8 hours. Whether by convention or pressure of demand, some plants operate single shift, others double shift, and some three shifts. Technology imposes on some branches of the steel and paper industries continuous work around the clock. Such irregularity of work schedules further complicates estimation of capacity, and again certain assumptions must be made.

Despite all the talk about automation, most machines do not run themselves. Capacity is very much influenced by the supply and efficiency of labor and its continuity on the job. How much could be produced would be enhanced materially if periodic disagreements between labor and management could be settled without work stoppages.

Factory organization and managerial ability also affect capacity. An industrial consultant of wide repute once made the remark that only 10 per cent of the country's plants were well run; that the others operated with varying degrees of inefficiency and ineptitude. If the below-average managers were to imitate their abler operators, capacity could be improved considerably.

The amount of raw material available and its quality have a bearing on capacity. Plants processing agricultural products readily come to mind as an illustration. A plant that processes a highly perishable vegetable like tomatoes must have enough capacity to handle a bumper crop, but there is much idle capacity if the crop is decimated by drought, flood, or other catastrophes of Nature. Or, a plant may have its capacity curtailed if it is geared for the processing of high-grade raw materials and is forced to accept inferior materials through some emergency beyond its control. For example, if a tannery's supply of hides deteriorates, it can't turn out its customary amount of good leather.

The fog overhanging the concept of capacity thickens as we encounter other realities of economic life. One of these is seasonality. The sun's rhythmic shuttle between Cancer and Capricorn causes periodic stresses and excesses of capacity in many industries, notably textiles and apparel where the irregularities are further accentuated by styles and fashions. Moreover, the capacity of an industry may undergo sudden expansion or contraction as a result of, say, tariff legislation, collapse of demand for the industry's products, or other contingencies.

Some success in solving for X

Notwithstanding all the difficulties, some trade associations—notably pulp and paper, petroleum refining, and steel—make monthly estimates of capacity operations in their respective industries. The steel industry, however, no longer publishes estimates of capacity operations and it is not quite clear whether publication was discontinued because of technical difficulties or for reasons of public relations.

Though considerably more difficult to estimate, indexes of capacity operations for aggregates of manufacturing industries are also available. The Federal Reserve Board makes estimates of capacity and output for Major Materials. Included in the index are such items as steel, cotton yarn, paper, and synthetic rubber. The Board has also developed an index of manufacturing capacity as part of a study of the determinants of quarterly capital spending by manufacturers. The Wharton School of the University of Pennsylvania arrives at excess capacity by comparing the Federal Reserve Board's index of industrial production with "capacity" obtained by stretching a straight trend line between the latest peaks of industrial production. Though confined primarily to manufacturing, the Whar-

ton School's index also includes mining and utilities. McGraw-Hill goes directly to the leading manufacturers in each industry with a questionnaire, asking for capacity change and the current rate of operations. McGraw-Hill assumes that output was at 100 per cent of capacity at the end of 1950, and is interested more in measuring capacity trends rather than ascertaining an absolute level. The National Industrial Conference Board index is based on deflated values of both fixed capital and value of shipments of manufacturing corporations. *Fortune* magazine's measure of capacity in use is based on the relation between total stock and total output.

As might be supposed, the different methods employed by these pioneers of a comprehensive index of capacity utilization do not produce identical results. Though the range is too wide to suit the statisticians, it is not too alarming, considering the obstacles of the hunt and the elusiveness of the quarry. The capacity of all of our manufacturing industries is not merely a matter of physics and chemistry, but also economics. All industries compete with each other for materials, for labor, for capital, and for the grand prize—markets. Furthermore, they must keep within the rules of the game; they must make profits or they cease to compete, and that too affects capacity. It is not only a matter of engineering but also economics. The problem of calculating capacity borders on metaphysics.

Still more difficulties

The courageous efforts to measure capacity of manufacturing industries are admirable, but manufacturing contributes only about one-fourth of the total stream of national income. To measure the capacity and excess capacity of the economy, we must ply the other major income

streams with Plimsoll line and plummet, and shoals of a different character are encountered in agriculture, construction, mining, and the services such as communications, finance, government, insurance, and trade.

In agriculture, for example, assumptions must be made about weather and insect pests. In mining, assumptions must be made with respect to underground reserves and water seepage. Each trade has its own peculiar problems and uncertainties.

Another aspect of capacity to produce is human capital. Nobody denies that capacity is increased when the existing stock of productive equipment is augmented by the construction of new plants and the installation of new machinery and equipment. But how about investments in human capital?

Enormous sums, both public and private, are spent annually on education. While much of this is regarded as consumption, such expenditures are also an investment in human capital, and the investment greatly increases the capacity of the labor force to produce. According to preliminary estimates by Theodore W. Schultz, the stock of education in the labor force rose about eight-and-a-half times between 1900 and 1956, in contrast with a rise of four-and-a-half times in the stock of reproducible capital, both in 1956 prices.

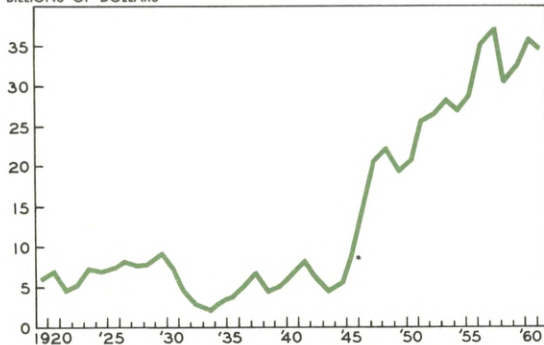
The money that people in the labor force spend to improve their health, and expenditures for internal migration to take advantage of better job opportunities are also examples of investment in human capital with beneficial results upon capacity to produce.

Not all excess is excessive

The widespread interest in capacity probably grows out of the widespread complaint about

BUSINESS EXPENDITURES ON PLANT AND EQUIPMENT

BILLIONS OF DOLLARS



* New series.

excess capacity. It afflicts big industries like petroleum and small industries like mushrooms and broilers. Steel was recently reported to be operating around 50 per cent of capacity. The coal industry has much excess capacity; many mines are unable to operate profitably most of the time, but operations are eagerly resumed the moment the market improves. The railroads are burdened with excess capacity because they have lost much business to motor trucks, pipelines, and air transport; and overcapacity is chronic in agriculture, judged by the billions spent annually to buy and store the surplus. The present state of affairs may be unusual, but excess capacity seems persistent except in times of national emergency.

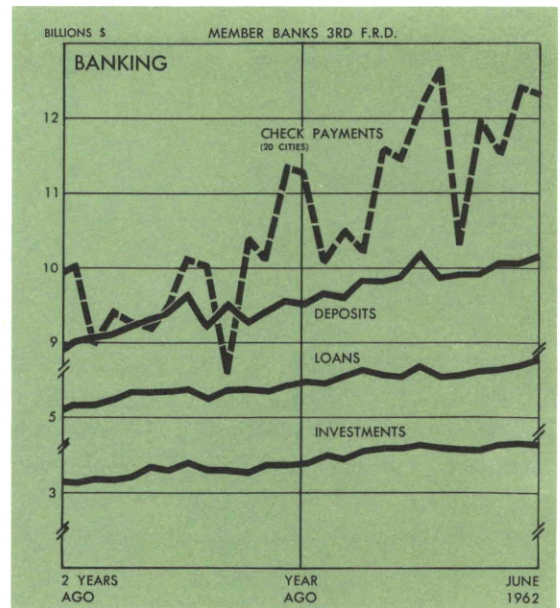
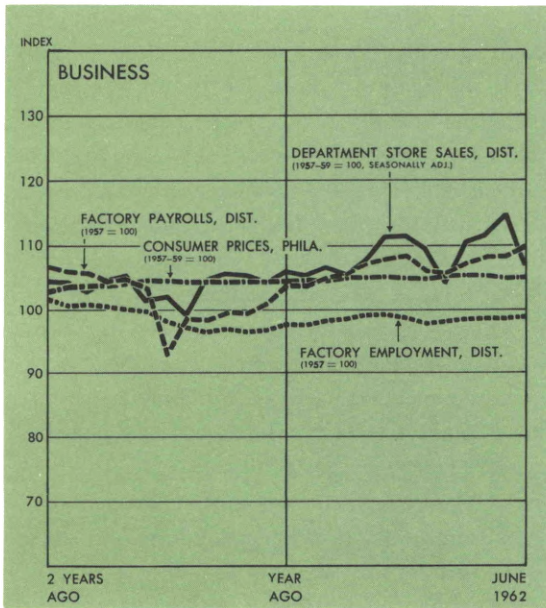
Upon examination of the chart showing business expenditures on new plant and equipment over the years, one gets the impression, even

after allowing for changes in the value of the dollar, that business has been on a capacity-expanding binge ever since the end of World War II. Expenditures in the early postwar years were largely in the nature of reconversion and catching-up with investment that had to be postponed during the war. In recent years, most of the spending has been for modernization rather than for expansion of capacity. Of course it is conceivable that in the process of modernization some elements of expansion seep in. When a company replaces obsolescent machinery with new equipment the chances are that the modernized plant has not only lower-cost capacity but also enlarged capacity.

Regardless of when and how it came about, idle capacity, both men and machines, is a stern reality and a drag on the economy currently lacking vigor. Some surplus capacity in a more or less free competitive economy is almost inevitable. Indeed, it is a necessary and healthy condition. Without any reserve, the economy would not have the flexibility required to accommodate sudden changes in demand or supply. Some surplus is needed to meet emergencies.

The question is: how much of the excess is excessive? That is a question that defies a precise answer until we get a more precise measure of capacity. The perfect measure may never be attained, but the progress already made by the several explorers is commendable and encouraging.

FOR THE RECORD...



SUMMARY	Third Federal Reserve District			United States		
	Per cent change			Per cent change		
	June 1962 from		6 mos. 1962 from year ago	June 1962 from		6 mos. 1962 from year ago
	mo. ago	year ago	mo. ago	year ago	mo. ago	year ago
MANUFACTURING						
Production.....	0	+7	+12	+1	+7	+11
Electric power consumed.....	+1	+3	+4	.....	.....	.....
Man-hours, total*	+0	+1	+2	+1	+3	+4
Employment, total.....	+1	+6	+7	.....	.....	.....
Wage income**.....	+27	+31	+26	-3	+8	+16
CONSTRUCTION**	+11	+22	+15	+12	+24	+14
COAL PRODUCTION						
TRADE***						
Department store sales.....	-7	+1	+5	-3	+2	+6
Department store stocks.....	0	+8	.....	+2	+9	.....
BANKING						
(All member banks)						
Deposits.....	+1	+6	+6	+2	+8	+8
Loans.....	+1	+5	+4	+1	+9	+7
Investments.....	0	+7	+8	+1	+9	+10
U.S. Govt. securities.....	-1	+7	+10	0	+3	+7
Other.....	+2	+8	+5	+4	+24	+20
Check payments.....	-1†	+9†	+15†	-1	+8	+11
PRICES						
Wholesale.....	.....	.....	.....	0	+1	0
Consumer.....	0†	+1†	+1†	0	+1	+1

LOCAL CHANGES	Factory*				Department Store†				Check Payments	
	Employment		Payrolls		Sales		Stocks		Check Payments	
	Per cent change June 1962 from		Per cent change June 1962 from		Per cent change June 1962 from		Per cent change June 1962 from		Per cent change June 1962 from	
	mo. ago	year ago	mo. ago	year ago	mo. ago	year ago	mo. ago	year ago	mo. ago	year ago
Lehigh Valley...	0	+4	+1	+12	.....	.....	.....	.....	0	+12
Harrisburg.....	+1	-1	+6	+3	.....	.....	.....	.....	-1	-2
Lancaster.....	+2	+4	+5	+13	-8	0	+4	+6	-3	+11
Philadelphia...	0	0	+1	+4	-7	+2	0	+10	-2	+10
Reading.....	0	+5	-1	+10	-7	+2	+9	+25	-1	+5
Scranton.....	+1	+3	+5	+12	-5	-4	0	+4	-1	-2
Trenton.....	+1	+3	+3	+9	-9	-5	-2	-2	-17	-9
Wilkes-Barre...	0	+1	-1	+10	-8	-1	+2	+2	-1	+2
Wilmington.....	+1	+3	+2	+6	-5	+3	-3	+8	+14	+22
York.....	+2	0	+3	+2	-1	+4	0	+2	+1	+1

*Production workers only.
 **Value of contracts.
 ***Adjusted for seasonal variation.

†20 Cities
 ‡Philadelphia

*Not restricted to corporate limits of cities but covers areas of one or more counties.
 †Adjusted for seasonal variation.