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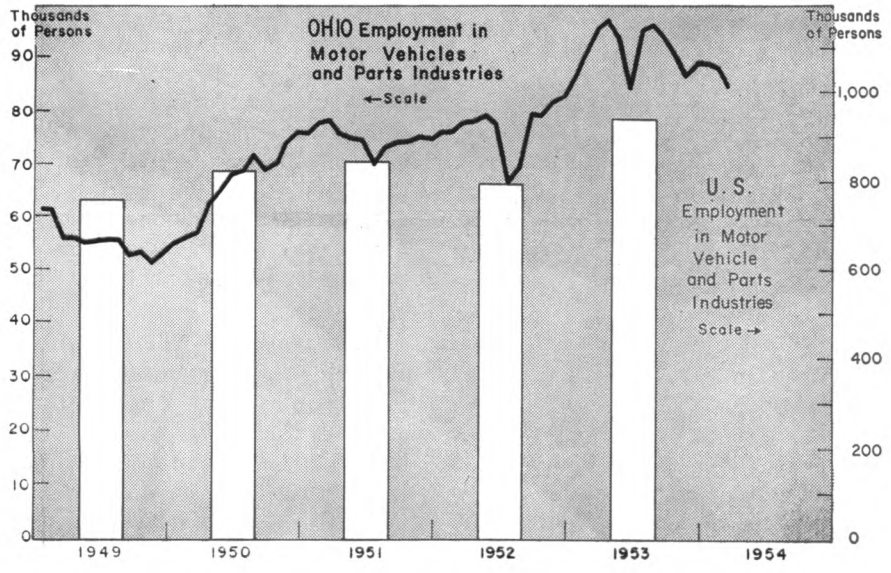
IN THIS ISSUE

Employment in Ohio's automotive industry, although down from its peak, is nearly 50 percent higher than in March 1950. The four-year rate of growth substantially exceeds the corresponding national increase.



(See page 5)

Industrial Scoreboard, Early '54

THE INDUSTRIES which are especially important to the Fourth Federal Reserve District — especially those clustering about steel — have been clearly affected by the moderate recession from previous high levels of activity. The following information on most recent trends for which data are available apply in the main to industrial developments in Ohio, western Pennsylvania, or other parts of the Fourth District. Totals for the United States, however, are included at various points for background purposes.

Employment and Unemployment in Ohio

Total nonfarm employment in Ohio continued to decline during the first quarter of 1954, with nearly every industry sharing in the reduction. From mid-December to mid-March, the reduction amounted to 140,000, of which about 90,000 could be accounted for by seasonal contractions in trade, construction and certain governmental activities. The remaining 50,000-reduction reflected widespread layoffs in manufacturing.

Almost every major industry in Ohio had fewer employees in March than in December. But the dip was centered chiefly in durable goods and rubber products, as has been the case since the current slump in manufacturing employment began last October. Primary metals and fabricated metal products have been particularly hard hit, with March employment standing a full 13 percent below year-ago levels. Machinery, motor vehicles, lumber and stone, clay, and glass have undergone smaller, but still substantial, employment losses ranging from 7 to 9 percent of their March 1953 totals.

With the exception of the rubber industry, employment in the soft goods sector remained relatively stable. Very small declines were the general rule, and chemicals and leather, aided by seasonal factors, actually managed small increases. Manufacturers of rubber products, being highly dependent upon the unsteady automotive industry, had to carry out extensive cutbacks in production. Work forces were trimmed about 4 percent from December to March, making a total year-to-year reduction of 11 percent, or 10,000 jobs.

In the nonmanufacturing field, seasonal movements largely dominated the employment scene. There were some railroad layoffs due to the drop in steel and coal traffic, but by March these were being offset by the usual expansion of freight movement on the Great Lakes. A moderate easing in Federal government payrolls was being balanced by hiring at the state and local levels.

Although construction employment faltered in March because of adverse weather conditions, 1954 is expected to be a banner year. Work on Ohio's two giant public projects will sharply increase in tempo this summer. Ohio Turnpike contractors will add between ten and twelve thousand workers directly to their construction forces, while many other persons will find employment with suppliers. Further expansion of both construction and permanent work forces at the Pike County atomic energy plant will also create several thousand new jobs.

Altogether, nonagricultural employment in Ohio during March was about 4 percent below the level of a year ago. But in order to maintain the proper perspective, it should be remembered that last year was the greatest boom year in our nation's history. Actually, recent employment totals have been higher than in the corresponding months of any previous year excepting 1953.

Unemployment. The downturn in manufacturing has generated an appreciable rise in unemployment. During the first quarter of 1954 the spotty cutbacks and layoffs of last fall became quite general throughout the District's major production centers. In Ohio, claims for unemployment compensation climbed from a 1953 low of less than 1 percent of total insured employment to 4.7

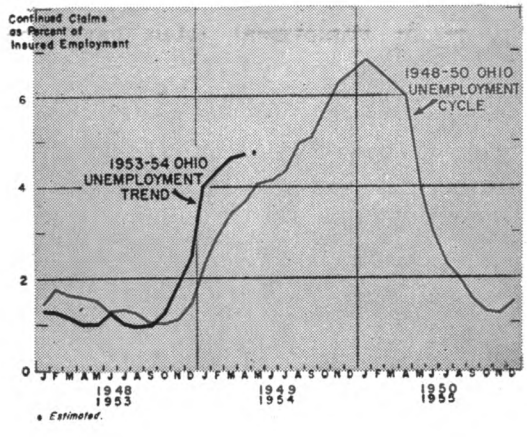
percent in March 1954. Yet this was still well below a national average that had been boosted to 6 percent from 3 percent last year.

Unemployment in Ohio had begun increasing sharply early last fall, as indicated by an accompanying chart. Because recent industrial developments have in many ways paralleled those of the moderate 1949 recession period, the current rise in claims for state unemployment compensation has been plotted so that the 1953-54 trend can be compared with that of 1948-49. Claims have been expressed as a percentage of insured employment during a base period just preceding each recession, so as to eliminate any distortion arising from the increase in covered employment.

Through July 1949, the plotted claims figures tend to understate the total number of unemployed since a substantial number of veterans received compensation under the provisions of the Servicemen's Readjustment Act. The inclusion of all or part of the unemployed veterans would tend to steepen the upswing in claims evident in early 1949. With this in mind, the abruptness of the 1953-54 rise in unemploymennt becomes somewhat less striking than it first appears.

By the middle of March a number of industries began to display faint signs of a seasonal spring upturn, and weekly unemployment data showed some tendency toward leveling off. It is yet too early to ascertain the full significance of this development.

The unemployment trend in Ohio has so far roughly paralleled that of the 1949 recession.



Steel

The decline in steel-making activity, which began in the second half of last year, continued through the first quarter of 1954. Production in April eased a little further and averaged 68 percent of capacity, down one point from the previous month. There was little evidence at press time to indicate that a strong upturn in the operating rate was imminent.

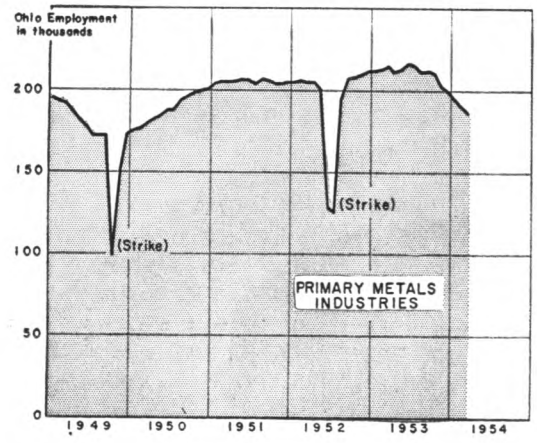
Steel mills in the United States poured 22.3 million tons of steel ingots and steel for castings in the first three months of this year. This output represented a 15-percent drop in tonnage from the fourth quarter and a 23-percent decline from the comparable 1953 period. On a capacity basis, the operating rate in the first quarter averaged 73 percent as against 100 percent in the year-ago quarter. The 27-percent drop in the operating rate, as compared with a 23-percent decline in tonnage, is due to the 6.8-million-ton increase in this year's steel producing capacity.

Peak employment in Ohio's primary metal working industries was reached in June 1953 when 215,000 workers were on the payrolls. In March of this year, employment totaled 185,500, or a drop of 29,500. Slightly more than half of this decline was due to layoffs at blast furnaces, steel works and rolling mills, and the remainder represented reduced job opportunities at iron and steel foundries and non-ferrous metal works.

The drop in employment from last March amounted to 13 percent, as compared with a cutback of about 28 percent in steel tonnage produced. Work at the mills has been spread out by reducing the average number of hours worked from 41.6 hours in March 1953 to 36.7 hours this year. Man-hours worked, as a consequence, were 23 percent lower than in the year-ago month.

In the Fourth Federal Reserve District, the Pittsburgh, Wheeling, and Ohio River steel-making areas were able to hold their

Employment in Ohio's primary metals industries has been reduced about 14 percent from last June's peak.



operating rates above the national average during the first quarter. The Youngstown district has been consistently below the national average since early December. The Cleveland-Lorain district dropped behind in late February.

The decline in steel-making activity has been due in considerable part to the efforts of steel consumers to reduce their inventories of raw steel. This drive to liquidate steel stocks has been compounded of two factors: a drop in sales of most finished products containing steel, and the ability of rolling mills to make faster deliveries on new orders, which further reduces inventory requirements. Consequently, actual steel consumption has probably been larger than steel production.

The recent weakness in steel ingot production is also due in part to inventory liquidation of semi-finished steel stocks in the hands of steel mills, themselves. Many steel mills, in the latter part of the fourth quarter and early this year, continued making steel ingots and semi-finished products at rates above outgoing shipments in the belief that an upturn in orders was at hand. These mills, for competitive reasons, wanted to be in a position to make fast deliveries on incoming orders. Semi-finished stocks are now being cut back, so that mill shipments of finished steel are somewhat higher than indicated by ingot production.

Thus, eventual balancing of steel inventories — in the hands of fabricators and steel mills — should be accompanied by an upturn in steel ingot production even though no rise takes place in the rate of final steel consumption.

Pig iron production in the United States totaled only 15.3 million tons in the first quarter, a loss of 20 percent as compared with a year ago. On April 1, out of a total of 191 blast furnaces that operate chiefly on Lake Superior iron ore, 58 were idle. On the same date in 1953 only 27 furnaces were idle.

Iron Ore. As a result of sharply reduced iron ore consumption, stocks of Lake Superior iron ore at furnaces and docks have remained high. On April 1, they totaled 29.3 million gross tons, the largest since 1938. This represented a 5-month ore supply at the March rate of consumption.

The easy ore supply delayed opening of the general Lake shipping season until the first week of May, the latest opening since 1950. One leading company, however, put its fleet in service on April 19. (In 1953, some ore was moved in the latter part of March.) The trade expects Lake Superior iron ore shipments to approximate 75-80 million gross tons this year, as compared with the record-breaking total of 95.8 million tons moved over the Lakes in 1953. Two hundred seventy six carriers will see service this year, or four less than last year.

Steel Fabricating. Employment in the District's metal fabricating industries has shown a drop about equal to that experienced by primary metal producers. In Ohio, for example, employment by metal fabricators totaled 124,900 persons in March as compared with 144,300 in the record year-ago month, or a loss of 13.5 percent. The number at work now is about the same as in mid-1950 and substantially higher than during the recession of 1949.

Motor Vehicles

Automobile manufacturers sold an estimated national total of 1.4 million passenger cars in the first quarter of 1954, or 5.5 percent fewer than last year. Nevertheless, sales in the initial three months were the third best on record for an opening quarter.

Preliminary estimates indicate that car producers expect to hold to about the March rate of production throughout the second quarter. This would yield a total volume of about 1.5 million vehicles or a 6-month total of 2.9 million cars. Retail inventories on April 1, however, were the highest on record in the postwar years, and it is altogether likely that factory output will be geared very closely to final consumer demand in the second quarter. This became apparent during April as individual producers changed schedules, both up and down, to meet their own particular situations.

The most marked development in the automobile industry so far this year has been the loss of market position experienced by the "independent" producers. Ward's estimates that the independents' share of the market has dropped from 11.4 percent of the total in the first quarter of 1953 to a little less than 5 percent this year.

January-March truck production fell 17 percent under the year-ago months and was the lowest opening quarter since 1946. Field stocks are ample and current production is geared to dealer sales in most instances.

Employment in Ohio's motor vehicle and equipment factories sagged 2 percent further in the initial quarter from the final quarter of 1953. In March, 84,400 workers were employed as compared with 95,300 in the year-ago month, a drop of more than 11 percent. This recent decline should not obscure the very large growth that has taken place in the industry in Ohio in the postwar period. In March 1950, the year of record automobile production, Ohio vehicle and parts factories employed only 57,300 workers. This year's employment thus represents a gain of 47 percent from 1950, and, with the exception of 1953, has never before been equalled or exceeded. (See chart on cover.)

Machinery

Output of both electrical and nonelectrical machinery, as measured by factory employment, continued to sag in Ohio during the first quarter. Employment in all the machinery industries dropped 3 percent in this period to a total of 352,800 workers. A year ago, employment in the machinery industries was at an all-time high of 382,600, or 8 percent above the current level.

As compared with a year ago, producers of household machinery have cut their employment rolls the sharpest, with a drop of nearly 11 percent. Electrical machinery manufacturers follow with a drop of 7 percent while producers of industrial and metalworking machinery have trimmed payrolls only 3 percent.

The machine tool industry was the only durable-goods industry in the state averaging more than 40 hours a week in March. Average weekly hours worked were 43.9. A year ago, the industry was virtually on a 6-day-week basis, or 47.8 hours. This continued high rate of employment and long work week, however, has cut sharply into unfilled order backlogs. The National Machine Tool Builders Association reports an average order backlog of only 4.6 months as compared with 8.5 months in March 1953.

After a brief upturn in January, machine

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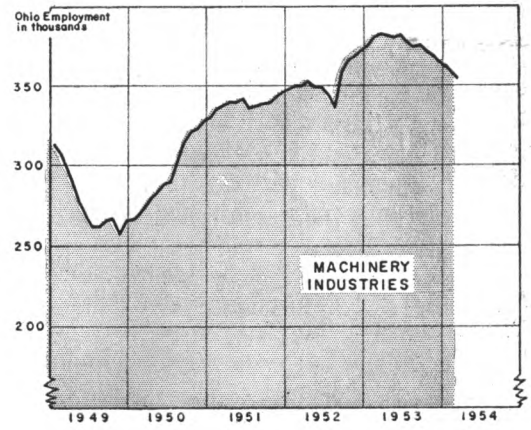
Ohio's machinery industries employ 8% fewer workers than at the peak in early 1953.



Outlays by Municipal Governments

THE VALUE of all the goods and services consumed by municipal governments in the performance of their services represents a sizable portion of the total national product. During 1952, the latest year for which detailed summaries are available, the municipal governments of the 481 cities in the United States with populations of 25,000 or more reported outlays totaling more than seven billion dollars. Last year, the payrolls of all local governments combined — cities, towns, counties and their subdivisions — exceeded the total Federal government payroll by an appreciable margin.

Outlays by state and local governments have risen continuously since before the end of World War II. Even in more recent calendar quarters, when expenditures by certain other sectors of the economy have slackened somewhat, state and local government expenditures have continued to increase. In view of the importance of state and local government expenditures to the economy as a whole, some attention may well be given to outlays in at least one of the important areas of state and local administration — the municipal governments.

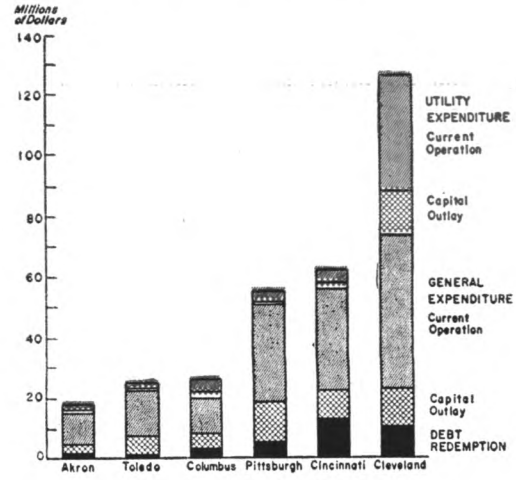
A recently published study provides comparative data on financial outlays, debt, etc. for 481 city governments in the United States, drawn from the year 1952.(1) Although data for that year may not be in all respects representative of present-day city government activities, they provide at least a starting point for visualizing the magnitudes involved. Cities of the Fourth Federal Reserve District have been singled out for special attention in the selected materials below.

Outlays by Fourth District Cities

The municipal governments of the ten largest Fourth District cities, *Cleveland, Pittsburgh, Cincinnati, Columbus, Toledo, Akron, Dayton, Youngstown, Erie,* and *Canton,* had total outlays of more than 350 million dollars in 1952. An accompanying bar chart shows total outlays during 1952 by each of the six largest cities in the District. The solid portion of each bar represents the volume of debt retired during the year (both general debt and utility debt) while the portion of the bar shaded in black indicates *general* municipal expenditures, which is further divided to show expenditures for current operation and for capital outlay. The red portion of each bar represents expenditures for operation of *public utilities,* also segregated as to current operation and capital outlay.

It is immediately apparent from the chart that expenditures by Cleveland during 1952 were larger by far than for any of the other Fourth District cities shown. Although a part of the larger total for Cleveland can be attributed to the greater population of the city as compared with the others, it is easily seen that utility expenditures account for a much larger share of the total in Cleveland than is the case for any of the other cities shown.

Cleveland's municipal outlays, including utility expenditures, were about twice as large in 1952 as those of Cincinnati or Pittsburgh.



(1) *Compendium of City Government Finances in 1952,* Bureau of the Census, U. S. Department of Commerce.

Cleveland is unique among other Fourth District cities in that the municipal government operates a public transit monopoly and an electric power system, as well as a water utility. Outlays by the transit system alone account for a considerable portion of all utility expenditures by the city. If utilities are disregarded, the larger expenditures by Cleveland as compared with the other cities do not appear out of line with differences in population. (In fact, on a per-capita basis, general expenditures in Cleveland were lower than in Cincinnati, as shown in the second chart.)

Debt redemption (both general and utility) accounted for a significant share of total outlays by each of the cities shown on the chart. However, the ratio of debt redemption to total expenditures was somewhat greater for Cincinnati than for any of the other cities.

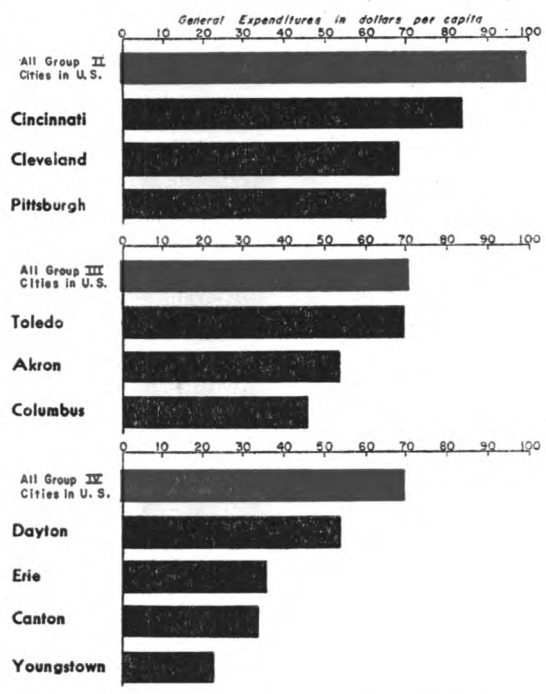
General Expenditures

A second chart shows per capita *general* expenditures for each of the ten largest Fourth District cities as well as the average of per capita expenditures for all U.S. cities in each of the three size groups represented.[2]

Even when reduced to a per capita basis, general expenditures tend to be greater for the larger cities than for the less populous communities. Per capita general expenditures for all 13 cities in the United States with populations between 500,000 and 1,000,000 were almost $100 as compared with about $70 for the 65 cities with populations between 100,000 and 250,000.

On the whole, per capita expenditures by individual Fourth District cities were less than was the case for the aggregate of all U. S. cities in the corresponding size groups. Of the ten cities shown on the chart, Cincinnati, the third largest, had the highest per capita expenditures, while Youngstown, ranking eighth in population, had the lowest per capita expenditures.

Per-capita general expenses in 1952 were larger in Cincinnati than in Cleveland or Pittsburgh.



In any comparison of expenditures between cities, whether measured by total dollars or a per capita basis, due regard must be given to certain fundamental differences among the cities. Not all cities perform identical services for their residents. Services which are provided by some cities are regarded as functions of the county government in other communities. Or, as often happens in the field of public education, special districts are created to handle particular responsibilities. In either case, expenditures for services furnished by offices other than the city government are not reflected in the cities' finances.

None of the ten Fourth District cities shown on the chart, for example, operate public elementary and secondary schools as part of the city government. Three of the cities, Cincinnati, Toledo, and Akron, operate municipal universities, however. A number of other U. S. cities in each of the three

(2) The Fourth District cities discussed here fall within three size-group classifications described in the *Compendium*. Group II cities (such as Cleveland) are those with 500,000 to 1,000,000 population; Group III cities (such as Columbus) are those with 250,000 to 500,000 population; and Group IV cities (such as Dayton) are those with 100,000 to 250,000 population.

size groups represented do operate public schools as part of their municipal functions. Other functions which may be handled by some but not all city governments would include public welfare, public libraries, and hospitals.

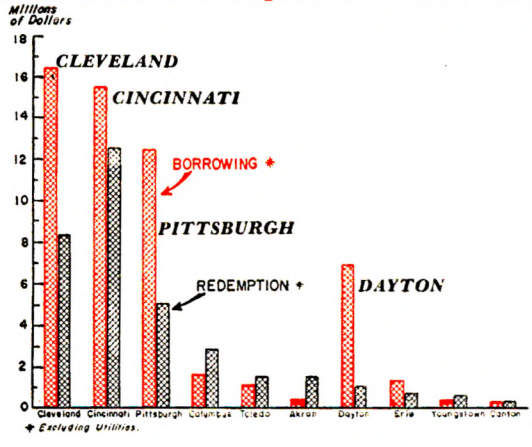
Furthermore, larger cities such as Cleveland which are surrounded by smaller outlying communities often accept the responsibility for providing water and sewage disposal services to the neighboring municipalities. Although these services are ultimately paid for by the recipient areas, expenditures in this connection increase the total for the central city.

Other factors to be taken into consideration in interpreting the differences in outlays among municipal governments would include differences in quality of services offered and the different stages of development between the cities. Obviously the municipal government of a city which is experiencing a huge population growth would encounter financial problems considerably different from those of a city where population had remained constant or increased only moderately over a number of years.

Municipal Debt

As with almost all economic units, municipal governments find it necessary to borrow funds from time to time to meet certain expenses. Such borrowing usually occurs in connection with needs for capital improvements. During 1952, the 481 United States cities with populations of 25,000 or over borrowed more than one billion dollars. At the same time, however, these cities retired about 500 million dollars of old debt. Total outstandings at the end of the year for the 481 cities amounted to over 10 billion dollars.

New borrowing exceeded debt redemption during 1952 in five of the ten largest Fourth District cities.



An accompanying chart shows the volume of new borrowing and debt redemption for the ten largest Fourth District cities during 1952. New borrowing is indicated by the red bars on the chart, while the black bars pertain to debt redemption. During the year, new borrowing exceeded retirement of old obligations in five of the ten cities.

Of the cities shown, Cleveland, Cincinnati, and Pittsburgh, the three largest, borrowed the largest amounts during the year. Cincinnati, however, retired the largest volume of debt of any of the cities shown and, as previously mentioned, debt redemption there accounted for a considerable proportion of total outlays.

Borrowing by Dayton during 1952 exceeded that of any Fourth District city in either its own or the next larger size group. This was apparently due to a large bond issue for grade-crossing elimination.

One measure of the relationship of municipal indebtedness to the underlying resources of a city may, perhaps, be found in a comparison of per-capita debt outstanding to median family income for the city. Such a comparison is shown on the accompanying table. The table shows per capita debt for each city at the end of 1952 and median family income for each city during 1949 (the latest year for which data on family income are available by cities). The table shows that of the ten largest Fourth District cities, Cincinnati had the highest per capita debt, with outstandings of $141.52 per capita. Toledo, on the other hand, had the lowest debt with $5.99 outstanding per capita. On the family income side, however, it is seen that Toledo, with the smallest per capita

Municipal Debt and Family Income

(Selected Fourth District Cities)

City	Debt Per Capita[1] (1952)	RANK	Median Family Income (1949)	RANK
Cincinnati	$141.52	1	$3,186	10
Pittsburgh	86.66	2	3,314	8
Cleveland	85.66	3	3,531	5
Dayton	68.94	4	3,744	2
Columbus	47.26	5	3,660	3
Erie	35.96	6	3,542	4
Akron	29.76	7	3,490	7
Canton	25.53	8	3,301	9
Youngstown	23.31	9	3,493	6
Toledo	5.99	10	3,968	1

[1] Debt is exclusive of utility debt; it refers to total debt less reserves or offsets at end of fiscal year.

debt, ranked first in median family income.

So far as it goes, the table suggests that the outstanding debt of cities is frequently at variance with the relative position in respect to family income. Thus, insofar as the income of city residents represents a measure of the financial strength of the city, considerable capacity for further borrowing may be available in certain Fourth District cities, assuming it to be permissible under statutory debt limits.

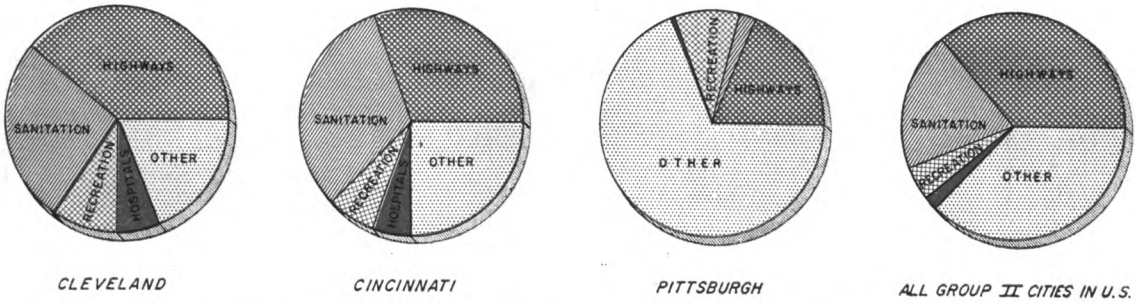
Capital Outlays

While the largest share of general expenditures by each municipal government represents expenditures for current operation, a significant part of the total is allocated to capital outlays. Capital outlays include expenditures for roads and highways within the city, sanitation equipment, playgrounds and parks, civic buildings, and other enterprises.

An accompanying chart shows the distribution of capital outlay funds as to the purpose of the expenditure for each of the three largest Fourth District cities and for the aggregate of all Group II cities in the U. S. As seen from the chart, cities of 500,000 to 1,000,000 population allocated more than one-fourth of all capital outlays for highways. Somewhat less than one-fourth of such outlays went for sanitation purposes, while capital expenditures for hospitals and recreation represented somewhat smaller amounts. "Other" capital outlays, which made up over one-fourth the total, include outlays for education, airports, inspection, conduct of elections, etc.

Both Cleveland and Cincinnati apportioned their capital outlay funds in much the same ratios as the aggregate for all Group II cities. In each of these two cities, however, unclassified expenditures accounted for a smaller proportion of the total than was the case for all Group II cities. This may be at least partially explained by the fact that none of the Fourth District cities operate public school systems while several other

Highway and sanitation developments accounted for the largest shares of capital outlays by most municipal governments in 1952.



Each circle shows percentage distribution of capital outlays, excluding utility outlays.

cities in the country do operate their school systems.

Pittsburgh was quite unlike the other cities of its size group in respect to the distribution of capital outlays during the year averaged. Capital outlays by this city for highways, sanitation, recreation, and hospitals made up only about one-third of the total in 1952. However, a considerable volume of spending by the Municipal Parking Authority there in 1951 is included in the "other" category as a carryover figure in 1952, and has the effect of swelling the ratio of unclassified capital outlays.

Summary

Demand for the services provided by municipal governments has increased considerably during the postwar period. Increases in population, both from in-migration and from births, have added to such everyday requirements as police and fire protection, and sanitary facilities. New industrial plants in almost every city have also added to requirements for these same services.

In addition to the demand for ordinary municipal services, recent city growth has resulted in other problems which will have considerable effect on municipal outlays. Traffic congestion, urban redevelopment, and provision of educational facilities for the large numbers of children born since World War II will require considerable municipal expenditures for some time to come.

Thus, it would not seem unrealistic to anticipate continued growth in municipal outlays if the needs of the communities are to be met successfully, provided the required funds are forthcoming, either through current revenue or through borrowing. Such an event would have a definite bolstering effect on the nation's pace of business activity.

INDUSTRIAL SCOREBOARD

(Continued from Page 5)

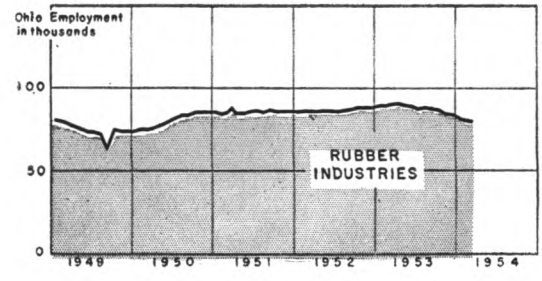
tool orders resumed their long-term downtrend in February. The new order index for the first quarter averaged 168 (1945-47 = 100) as compared with 288 in the year-ago period. Machine tool shipments likewise have slipped, with deliveries in March off 13 percent from the same 1953 month.

Rubber

Passenger-car tire sales got off to a slow start in the first two months of the year. Factory shipments were down 9 percent from the same year-ago months. Producers had anticipated the 9-percent drop in demand for tires by motor car manufacturers, but at the same time they had expected some increase in sales in the important replacement market. Replacement demand in January and February, however, was off 10 percent. Part of the decline was apparently due to the reluctance of dealers to build up stocks in the usual manner in anticipation of the spring selling season.

The truck and bus casing situation was even more disappointing to manufacturers. Sales in January and February to the original equipment market were down 30 percent from 1953, and replacement sales were off 27 percent. Truck and bus casing production totaled only 2.1 million units for this two-month period, a loss of 24 percent from last

Moderately declining employment in Ohio's rubber factories has reflected the lower rate of auto output and inventory caution.



year. This was the lowest rate of output for these two months since 1943. Factory inventories on March 1 amounted to 2.9 million casings, and were 4 percent below the year-ago level.

Employment in Ohio's rubber factories has dropped steadily from the all-time peak of 91,000 reached in April 1953. In March, 79,700 persons were employed, or nearly 12 percent fewer than in March 1953. In addition, the average weekly hours worked dropped from 39.9 to 35.1 hours so that total man-hours were off 22 percent from the year-ago level. As shown in the chart, employment was still considerably above the 1949 and early 1950 average.

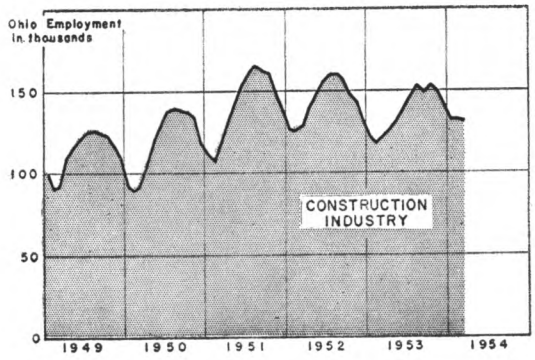
Construction

The construction industry is one of the brightest spots in the Fourth District picture. Contract award activity was exceptionally heavy in the first quarter, and much work remains to be done on large projects that passed through the contract award stage last year.

Construction contracts awarded in the Fourth District during the January-March period totaled nearly $470 million, or 13 percent above the previous 1953 first-quarter high. Awards for all major types of activity except public works set new first-quarter records. Gains in contract award activity were not spread evenly throughout the District, however, and several metropolitan areas showed marked declines from year-ago levels.

Residential building awards were 7 percent above the initial three months of 1953, as an exceptionally large volume of speculatively-built one-family homes was placed under contract. The physical volume of units placed under contract also reached a new first-quarter high in the District. The floor

Employment in construction work has held high in Ohio, although reflecting the usual seasonal swings.



area of units contained in residential awards was nearly one-eighth above the year-ago quarter.

Contract awards for nonresidential buildings were running 15 percent ahead of the same year-ago months during the first quarter. These gains were mainly due to a record volume of manufacturing (including A.E.C.) and school building awards, coupled with a gain in commercial building contracts.

Public works awards were off slightly from a year ago when Ohio turnpike contracts were beginning to appear in the totals. Utilities awards were at first-quarter peaks, about one-fourth above the old 1947 high.

Activity at Ohio's cement mills reflects the generally optimistic outlook of industries closely allied with construction activity in the state. Shipments of finished portland cement from Ohio mills during January and February were up 8 percent from the same 1953 months, while they were down 5 percent nationally.

Note on Sources: Data for all charts in this article are from the Division of Research and Statistics, Ohio Bureau of Unemployment Compensation. National data for chart on front cover are from the Bureau of Labor Statistics, U. S. Department of Labor.

The Outlook for Natural Gas

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

NATURAL GAS serves the nation as a domestic fuel for home heating, cooking, water heating, refrigeration, and air-conditioning. Important fuel applications are also found in such field uses as drilling and pumping; in petroleum refining; in electric power generation; and in heat-treating furnaces of metal, ceramic, and other industries. Methane and other derivatives of natural gas are valuable raw materials in making synthetic rubber, plastics, fertilizers, anti-freeze, and many other products of the chemical-processing industries.

To fulfill such needs, the natural gas industry is now supplying about 20 per cent of the country's total energy requirements, as compared to 3 per cent of a much smaller total in 1900. Investment in plant and facilities has been calculated at $11 billion. Annual sales to 21 million customers are well over $2 billion.

As striking as past growth has been, huge reserves of natural gas, its cost advantages in many sections of the country, and its versatility for domestic and industrial use assure continued very healthy growth. The cleanliness and convenience of gas for residential use render the outlook in this field particularly promising. During each of the next three years, for example, gas utility companies estimate that they will add 1.2 million house-heating customers to the 1953 total of 11.8 million. By 1975, it is conservatively estimated that the total number of house-heating customers may be at least double those in 1953.

In common with the country's other energy-producing industries, the natural gas industry is faced with a future of growing competition. Usually, all fuels are interchangeable and the choice of any one fuel for a particular purpose is determined by its cost and availability. The ultimate growth in natural gas usage, therefore, will be largely governed by the industry's approach to problems affecting cost and availability. These center primarily around the supply, transportation, and storage of the product.

The need for new discoveries to meet demands of the immediate future is not great, although continued exploration is necessary. The country's proved reserves of natural gas are about twenty-five times the 1953 consumption. Experts have estimated that minimum total proved and unproved reserves may be fifty times as great as consumption was in 1953. However, new discoveries of reserves, extensive enough to supply a market for at least 20 years, are vital to long-range expansion of the industry. Large-scale research is under way to improve drilling methods in the natural gas and petroleum industries. This effort gives promise of aiding new discoveries through reducing drilling costs and hence making possible an increased amount of drilling.

The development of a system of pipelines for transporting natural gas over long distances has been one of the major technological advances of the industry. The nation's total pipeline network of gathering, transmission, storage, and distribution lines totals an estimated 394,000 miles, or enough to encircle the world 16 times. Washington, Oregon, Idaho, Maine, and Vermont are the only states not yet included in the network, but proposals are being considered for extending pipeline service to all of these except Vermont. Plans of the industry call for an expenditure, within the next three years, of $2.5 billion on new pipelines and on improvements to the existing network. Studies are being made to increase the flow of gas by increasing the diameter and operating pressure of pipelines. By enabling greater load-carrying capacity, these studies may play an important part in improving the over-all economics of the gas industry.

Although the natural gas industry already has extensive underground storage facilities with an estimated total capacity of 1290 billion cubic feet, attention is being focused on increasing them. The industry expects to spend $134 million for this purpose over the period of 1953 through 1956. During periods of slack residential use, there is a large economic advantage in storing natural gas near the point of use where it can be quickly recovered for distribution in times of peak demand. This is true because the terminal cost of gas from pipelines is made up predominantly of fixed charges on the pipeline investment. Thus, the pipeline must operate at or near capacity if unit costs are to be kept low. For capacity operation during the slack summer months, much gas has been sold at low prices as fuel to industrial consumers. The provision of increased storage capacity would permit the reduction of such sales and make more natural gas available for more profitable markets.

In the face of intense competition over the past half-century, the natural gas industry has risen from humble beginnings to become one of our fastest growing industries. Conceivably then, competition, as in the past, could greatly accelerate future progress.

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.