

MONTHLY *Business Review*

FEDERAL RESERVE BANK of CLEVELAND

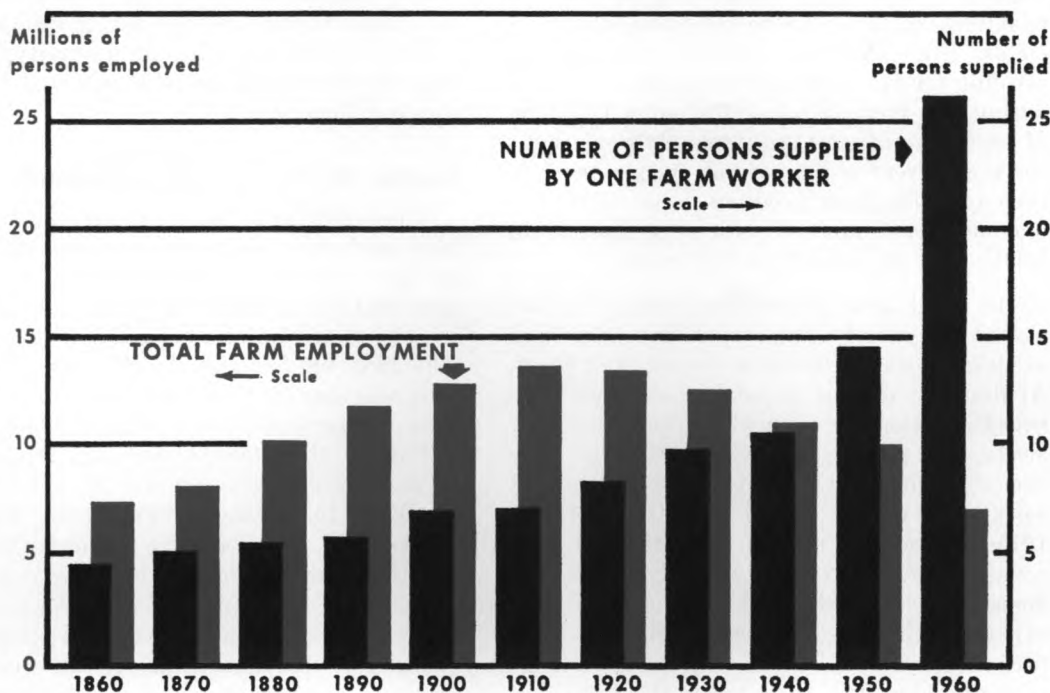
March 1962

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The number of persons supplied with farm products by one farm worker in 1960 was nearly six times as large as in 1860. Total farm employment now is smaller than it was 100 years ago.



A Century Of Advance In Farm Production

THIS SPRING, the nation's farms will be manned by fewer persons than were engaged in farming one hundred years ago. In the spring of 1862, when the nation was in the throes of the Civil War, there were about 7.3 million people involved in turning out the farm products of the nation. This year the number will barely equal 7 million. Yet, these nearly 7 million persons are expected to produce most of the farm products required by virtually six times as many people in this country and about eight times as many abroad as their forebears supplied through export shipments one hundred years ago.

How do so relatively few produce the food and fiber for so many? The climatic conditions and inherent productivity of the soil resources, certainly, have not changed appreciably over the years. How then do we account for the phenomenal increase in farm output, an increase of sixfold over the span of four generations? And, how do we account for the current ability of one farm worker to turn out the farm products required by 26 persons, as compared with less than 5 in 1860? (See the chart on the cover.)

The total area of cropland harvested has moved irregularly downward from the high of 1932, as shown in the accompanying chart. At first, the decline in total acreage was due mainly to the replacement of work stock by mechanical power; this development cut acreage of crops harvested for maintenance of work stock from a record 93 million acres in 1915 to around 5 million acres in 1961. The acreage devoted to crops to be harvested for domestic and foreign markets continued to expand until 1949, but such acreage has since turned down and is currently more than 10 percent below the 1949 level. It is obvious,

therefore, that other factors aside from the area of cropland harvested are involved in the increase in farm output.

While the use of mechanical power and equipment on farms has multiplied far beyond the mere replacement of animal power, that alone accounts for only a part of gains achieved in output of crops and livestock products. The basic explanation for the growth in farm output and in the productivity of the nation's farms appears to stem from the multitude of technical advances that occurred in agriculture during this period. Such technical innovations as improved seed stock, commercial fertilizer, hybrid seeds, pesticides, and herbicides for crops, and balanced rations, production testing, and disease control for livestock, have all contributed to the productivity of the nation's farms and thereby enlarged the output per farm worker.

Source of Technical Developments

These technical developments for the most part had their origin in or were stimulated by the work of two institutions that were provided for by the 37th Congress, which was in session one hundred years ago this spring. The first bill enacted by Congress in 1862 that was destined to have a profound influence on agriculture was the legislation providing for the establishment of a Department of Agriculture. The act was signed into law on May 15, 1862, by President Abraham Lincoln. It described the primary function of the Department of Agriculture as follows: "to acquire and diffuse among the people of United States useful information on subjects connected with agriculture in the most general and comprehensive sense of the word".

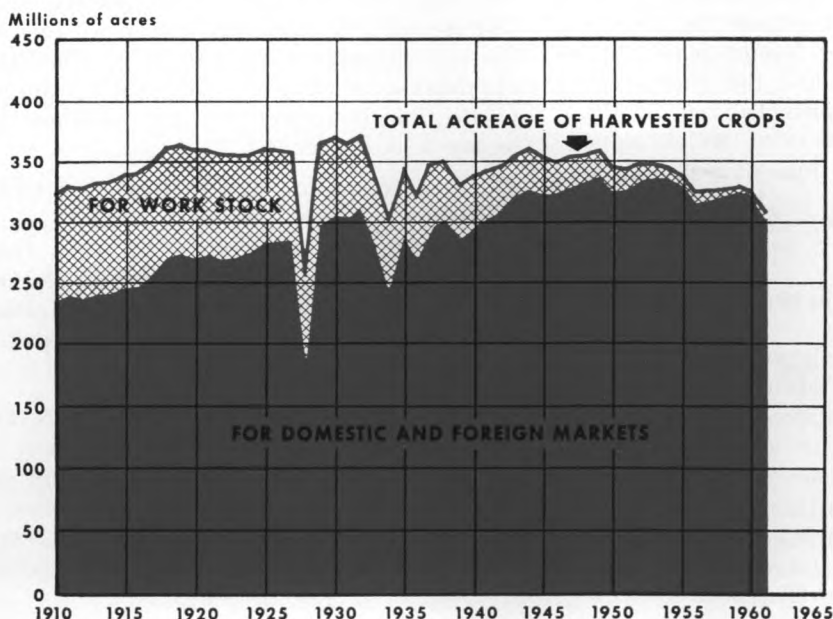
Just 48 days later, on July 5, 1862, the Morrill Act, oftentimes referred to as the Land-Grant College act, was also signed by President Lincoln. In this act the new public colleges were charged with two purposes. The first purpose was "to serve the people's needs through providing young men and women with the kind of education which would make them most useful to an ever-growing and expanding, dynamic society, and would also equip them as individuals to make more satisfactory lives for themselves". The second was "to provide the American people with equal access to educational opportunity".

The establishment of the Department of Agriculture and the Land-Grant Colleges opened opportunities for information and instruction in agriculture to every one who had the desire and determination to seek it. Moreover, the new colleges were not restricted to any one particular kind of education. They were in fact free to develop the kind of educational training and service programs which could best serve the needs of society. The kinds of programs developed by the "people's colleges", as they were commonly called, subsequently tended to reflect

the environment in which the people lived, as well as their wants and desires.

One of the immediate aims was to do something about the insufficient amount of farm output. In the 1860's, the methods of producing agricultural products, which were much the same as they had been a century earlier, were inadequate to satisfy the food and fiber needs of a population that was growing by one-fourth to one-third every ten years. The diets of many Americans were meager and monotonous. It was logical, therefore, that the Land-Grant colleges together with the Department of Agriculture developed quite quickly programs in teaching and research which would enable farmers to produce more abundantly.

Aside from sharing in the development of an agricultural science and technology that permitted the nation's farm output to expand nearly sixfold over the span of one century, the Land-Grant colleges also contributed importantly to industrial development. The body of scientific and technical knowledge amassed by these institutions of learning stimulated a variety of discoveries and inventions that added to the productivity of the



Although the total acreage of harvested crops declined following a record high in 1932, the acreage of crops for domestic and foreign markets continued to expand until 1949, before turning down.

nation's factories. Moreover, they have also contributed since the turn of the century a steadily increasing number of science graduates. Many of these graduates are now contributing importantly to the technical knowledge available to industry as well as to agriculture, through the expanding role of research in the economy.

Research and Teaching Expanded

While the Department of Agriculture and Land-Grant colleges fostered research, it became apparent after about 25 years that additional research was needed. This led to the passage of the Hatch Act by Congress in 1884. The Act provided an experiment station for each of the Land-Grant colleges where both applied and basic research could be conducted.

After a generation of time had elapsed, it became evident that research together with training at the college level was not leading to as rapid application of research findings as appeared desirable. One of the great needs during much of the latter half of the 19th century and the first two decades of the current century was to turn out more and more agricultural products to meet the need of expanding domestic and foreign markets. To this end, Congress enacted the Smith-Lever Act in 1914. The Act provided for the Federal State Extension Service, which helped to form a coordinated three-phased program of scientific training at the college level, research, and on-the-farm instruction.

Land-Grant Colleges in the Fourth District

An indication of the pervasiveness of the scientific research and training that emanated from the Land-Grant colleges and the jointly-administered experiment stations may be gained by recounting some of the noteworthy contributions to agricultural science by the staffs of the Land-Grant colleges and experiment stations in the states located in the Fourth Federal Reserve District.

In Kentucky, the breeding and introduction of disease-resistant strains of burley tobacco saved the tobacco industry in that state from the ravages of black rot about twenty-five years ago. A variety of burley tobacco has since been developed by the Kentucky Agricultural Experiment Station that is resistant to four of the common diseases of tobacco. Without such disease-resistant varieties, it is generally conceded that the burley industry would not have remained the important source of income that it has over the past twenty years. Some years earlier, a significant finding of this station was the identification of the causal organism of botulism, a form of food poisoning associated with improperly preserved foods.

Investigations leading to the commercial production of vitamin D fortified milk were pioneered by research workers in Ohio. These researchers were also among the first to develop a method and the equipment for the optimum placement of fertilizers for corn planting and legume seeding which has been universally accepted by manufacturers of farm equipment.

In Pennsylvania, extensive work in developing adapted hybrids and securing their widespread use added one-fifth more corn to the annual outturn in that state. Similarly, applications of nitrate fertilizer at the appropriate time increased the yield of wheat by as much as 50 percent.

The development of effective insecticidal sprays by research workers in West Virginia saved the apple industry of that state from severe damage by the apple curculio. Marked progress has also been achieved in controlling some of the respiratory diseases of poultry through the use of antibiotics.

The foregoing technical innovations are only a small segment of those developed at the four Land-Grant institutions serving the Fourth Federal Reserve District. They should serve to illustrate, however, the broad scope of scientific developments that have enabled

(Continued on Page 10)

Unemployment Insurance As An Economic Stabilizer — A Further Look

IN AN EARLIER issue of this *Review*, we discussed the role played by the unemployment insurance system in stabilizing economic activity in the United States in the postwar period.⁽¹⁾ So far as could be determined on the basis of annual data, the conclusion was reached that the unemployment insurance programs had operated generally in a counter-cyclical manner during the four cyclical movements experienced in the postwar period.

A measure of the difference between the total of benefit payments to the unemployed and the total of taxes paid by employers under the state and railroad programs was used in that analysis.⁽²⁾ Benefit payments under the several federal programs were discussed individually because these programs are financed from general government revenues, and not from separately identified taxes paid by employers, as is the case with the state and railroad programs. Nevertheless, the federal programs were judged, again on the basis of annual data, to have operated also in a counter-cyclical fashion.

A limitation of the analysis in the earlier article is that turning points in business cycles seldom coincide with the beginning or end of the calendar year, so that the use of annual data only necessarily involves making somewhat approximate conclusions. Of the four recessions since 1946, only the first one, which extended from November 1948 to October 1949, could be said to have coincided even approximately with the calendar year. (The months used as cyclical turning points in this article are the reference cycle turning points selected by the National Bureau of Economic Research.)

(1) See "Unemployment Insurance as an Economic Stabilizer," this *Review*, December 1961.

(2) The small amount of taxes paid by employees in the three states in which such taxes are still collected was excluded.

What are needed, therefore, for a more conclusive test of the effectiveness of unemployment insurance (or UI, as referred to hereinafter) as an economic stabilizer are data on a less-than-annual basis, i.e., monthly or quarterly. Other things being equal, monthly data would in most cases be preferred over quarterly data. However, because of the very large irregular month-to-month fluctuations in tax collections, it is not feasible to reproduce on a monthly basis the measure of the impact of unemployment insurance on the economy that was used in the earlier article, i.e., benefits less taxes. Accordingly, quarterly data for this measure have been developed, with adjustments being made for seasonal variation.

It is possible, however, to relate the timing of changes in benefit payments alone to the business cycle on a monthly basis because benefits are not affected by the same irregular factors as taxes. Monthly data on benefit payments also have been seasonally adjusted.

Both of the measures described here — quarterly data on benefit payments less taxes and monthly data on changes in benefit payments — relate only to the "economy-wide" effects of UI, i.e., its role as a stabilizer of economic activity. Attention is focussed in this article on the "dynamic" aspect of UI, i.e., the relationship of its operations to changes in economic activity, with special emphasis devoted to the timing of UI operations in relation to the business cycle. Where possible, consideration is given to measuring the quantitative impact of UI operations. It has been assumed that a surplus of benefit payments over taxes collected during the time period specified indicates a net addition to purchasing power during that period; and, conversely, that a larger total of taxes col-

lected than benefits paid represents a subtraction from the income stream. As explained earlier, this calculation excludes the federal programs.⁽³⁾

UI Reacts Quickly to Downturn, but Slowly to Upturn

Before turning to cyclical changes in the impact of UI operations, it would be well to consider briefly the relation of UI benefit payments, taken alone, to cyclical changes, on a monthly basis. Several conclusions are suggested by an examination of the data plotted in the accompanying chart.

First, the pattern of change in UI benefits corresponds closely with changes in the number of persons totally unemployed — those not employed at all and seeking work. Such a relationship may appear to be obvious, but it is worth restating as a reminder that UI

was set up to cushion the effects of unemployment on the individual as well as on the economy.

Another conclusion is that, although the peaks in both UI benefits and unemployment coincide quite closely with the upper turning points for the economy as a whole, both series lag considerably during periods of economic recovery. Furthermore, the lags in the downturn of unemployment and UI benefits during the two most recent periods of recovery were considerably longer than in the two earlier recovery periods. Various reasons for the lagging behavior of unemployment in cyclical upturns are suggested later, in the discussion of the changes in the impact of UI.

Still another conclusion which emerges from the analysis of the monthly data is that part of the lag in the downturn in UI benefit payments following the troughs of the 1957-58 and 1960-61 recessions was due to the effects of the temporary unemployment compensation programs, which in both cases did

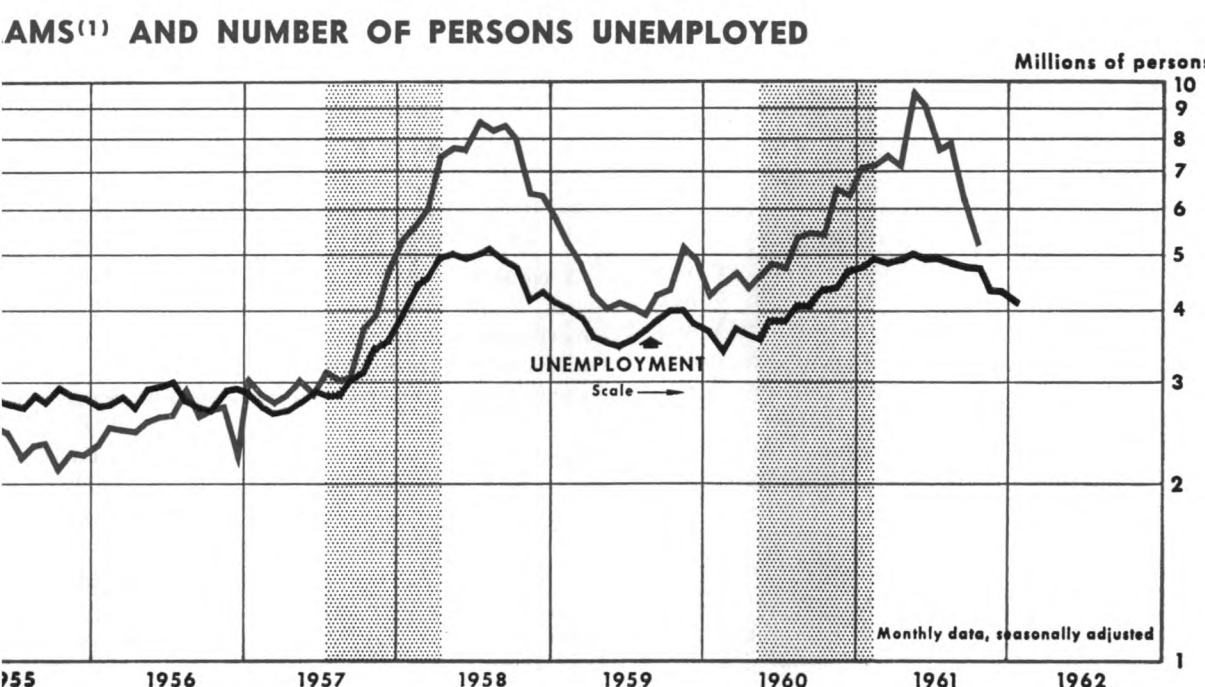
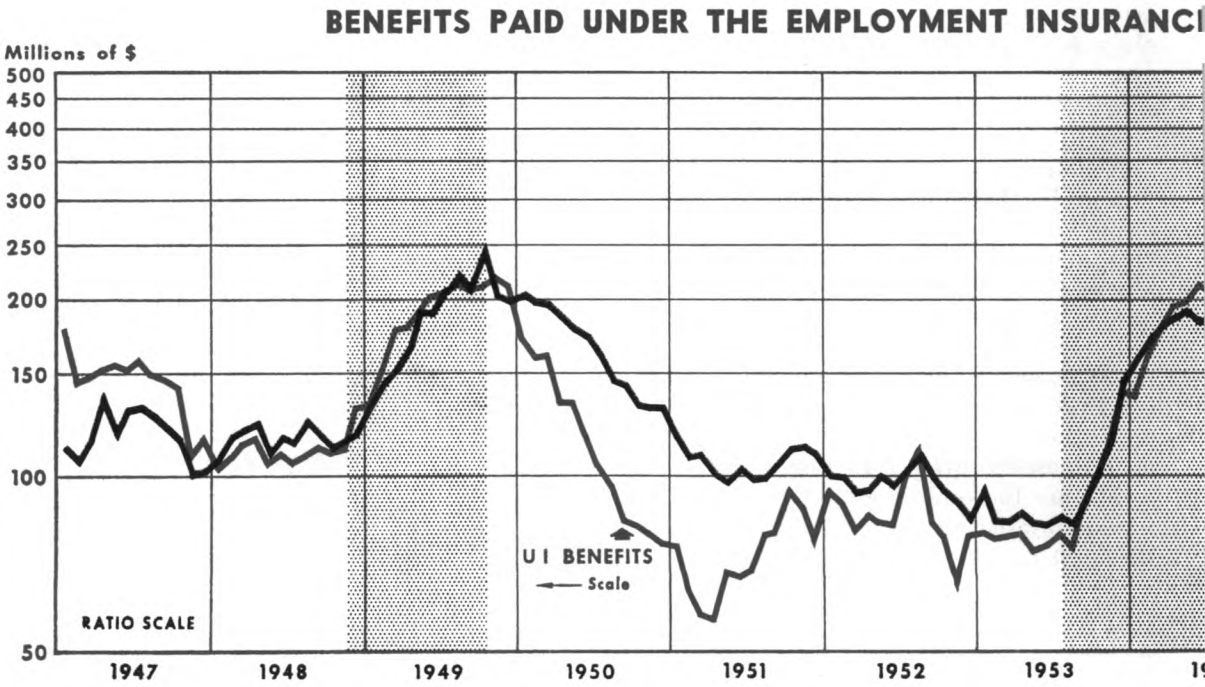
not become operational until after the trough of the recession was reached. At the same time the existence of the temporary programs meant that UI benefits remained at high levels throughout the time that unemployment was high. If these programs had not existed, UI benefits would have declined more rapidly than total unemployment, as benefit rights under regular programs were exhausted.

Turning to the quarterly data on benefit payments and taxes, it is found that in the postwar period the response of UI to the onset of recession has been to swing into deficit fairly soon after the beginning of recession, and thus to stimulate purchasing power during the business downturn. In three of the four postwar recessions — those of 1948-49, 1957-58, and 1960-61 — UI operations moved from surplus to deficit in the quarter following the quarter in which the recession began. In the 1953-54 episode, the swing into deficit occurred two quarters following the peak quarter, but the excess of tax receipts over

benefit payments had declined sharply in the first quarter following the cyclical peak, as benefit payments had moved up.

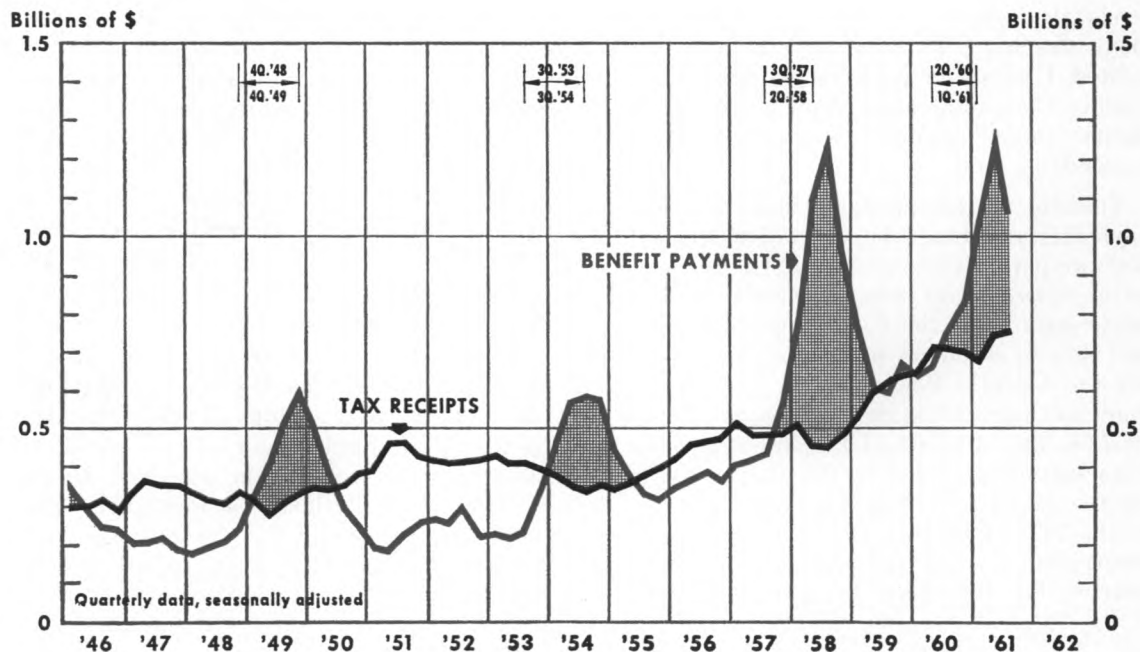
The sharp upturn in benefit payments in recessions has accounted for the largest part of the swing from surplus to deficit in UI operations. In addition, however, taxes have generally declined as employment and payrolls have fallen off. In the first of the postwar recessions—1948-49—tax receipts started to move up before the trough of the recession was reached; in the succeeding recessions, however, tax collections continued to decline until the trough of the cycle was reached, beginning to move up thereafter.

It is apparent from an inspection of the chart on the next page that the turnaround from a deficit to a surplus in UI operations during the recovery stages of postwar business cycles has been much slower than the swing into deficit during a downturn. The stimulative effect of UI operations has thus been prolonged well into the phase of the cycle when economic activity is rising.



⁽¹⁾ Data include State, Federal, and Railroad Programs

Benefits paid under the unemployment insurance system have moved up sharply during each of the four postwar recessions. When account is taken of the concurrent stability or decline in tax payments, it is apparent that the UI system has added to purchasing power in cyclical downswings.



Data include State and Railroad Programs

The behavior of UI operations in this respect is explained by the lag in the response of unemployment to cyclical upswings. Unemployment has tended to move down slowly during the initial months of cyclical recovery, in part because of the slower recovery of the manufacturing sector of the economy (where most cyclical fluctuations occur). This slower recovery is produced by several factors. When they wish to increase production, manufacturers will usually lengthen working hours (which have probably been reduced during the downswing) before increasing their work force. Added to that factor is the rapid gain in output per man-hour (the usual expression of productivity) during the recovery; this gain produces additional increments of output without the need for corresponding increases in man-hours. Also contributing to the lagging behavior of unemployment, a

phenomenon which has been increasingly evident in the last three recessions (along with successively higher levels of unemployment) is the fact that in each cycle since 1953, manufacturing employment has failed to recover fully its losses during the recession.

A consequence of the continuation of high levels of unemployment during economic recoveries is that benefits have remained high while tax receipts have moved up slowly, as employment and payrolls have been slow to increase. In the three postwar cycles for which data are available on a complete cycle of UI operations—from surplus to deficit and back to surplus—the earliest return to surplus status occurred in 1948-49. (As of the third quarter of 1961, the latest calendar quarter for which data are available, UI operations were still in deficit status.) Following the 1953-54 and 1957-58 recessions, UI operations

did not result in a surplus until the fifth quarter following the trough quarter; in the earlier of these two experiences, however, taxes equalled benefits in the quarter prior to the quarter in which a surplus was eventually attained.

The aftermath of the 1957-58 recession also differed from earlier recovery periods in that the surplus in UI operations, once achieved, was not maintained, as operations swung back into deficit the following quarter. The return to a deficit in UI operations in 1959 was one of the consequences of the steel strike in that year, in that the shutdown in steel mill operations resulted in layoffs among workers in related or steel-consuming industries; coal miners and railroad workers, for example, were especially hard hit by such "secondary" unemployment.

UI Impact Largest in 1957 Downturn

The degree of correspondence between UI operations and the business cycle is only one criterion by which to judge the counter-cyclical effectiveness of UI. It is also of interest to attempt to measure the quantitative importance of UI as a stabilizer. The earlier article on this subject attempted to measure the contribution of UI to cyclical stabilization in terms of year-to-year changes, and reached the conclusion that UI operations were "fairly significant in relation to the changes in economic activity in the first three postwar recessions, but not in the latest and mildest of the postwar recessions, that of 1960-61." Quarterly data permit a more precise measurement of the impact of UI; such data actually reinforce the conclusion that the impact was much larger in the earlier than the later recession.

On the downside of postwar business cycles, the impact of UI operations was most stimulative in 1957, as measured by the magnitude of the shift from surplus to deficit. The impact of UI operations (defined as benefits less taxes) changed from a \$45-million surplus in the third quarter of 1957 to a

deficit of \$93 million in the fourth quarter of that year; the net change amounted to \$138 million and was, by a small margin, the largest such change in the four postwar downturns. Since the downturn in economic activity in 1957 was also the sharpest in the postwar period, the larger swing in UI operations may be deemed appropriate in economic terms, even though it was small in relation to the decline of \$1.5 billion in the actual quarterly total of Gross National Product, on a seasonally adjusted basis.

As mentioned earlier, the change in the impact of UI operations from surplus to deficit was delayed in the downswing of the 1953-54 cycle by one quarter, but the net change of \$129 million, when it did take place, was almost as large as in 1957. In partial extenuation of the lagging performance of UI during the 1953-54 downturn, that recession was somewhat milder than the 1957-58 experience.

Although it was not maintained at the same rate, the magnitude of the initial decline in GNP in the 1948-49 recession was as large as in 1957, but the turnaround in UI operations, at \$101 million, was considerably smaller.

In a comparison of UI operations during the downswings of the four postwar business cycles, the 1960-61 experience must be considered the least stimulative, with the net change from the peak quarter to the next quarter amounting to \$80 million. The 1960 downturn was the mildest of the postwar period, however, so that the behavior of UI was appropriate for that experience.

* * *

The delay in the return of UI operations to a condition of surplus following troughs in economic activity has already been described and an explanation of the lag given in terms of the tendency of unemployment to remain at high levels for some time following the recession trough. The lagging behavior of UI in cyclical upturns has meant that the contractive effect of the change from deficit to surplus in UI operations has not been felt until well on into the expansion

stage of the cycle, when the effect was dwarfed by the forces of cumulative expansion then under way.

Strictly speaking, this observation is true only for the aftermath of the first two post-war recessions, since the most that could be attained during the period between the end of the 1957-58 recession and the beginning of the 1960-61 recession was a small surplus; as of the third quarter of 1961, UI operations were still in deficit status, on a seasonally adjusted basis. The result has been, of course, that UI reserves have declined steadily since 1958.

It is also true that UI is valued mainly for its effect in cushioning downturns, and not for whatever effects it may have in curbing booms. A surplus in UI operations in periods of high economic activity is necessary to ensure the adequacy of reserves for recessionary periods when they are likely to be drawn down. The buildup of reserves will also make

a small contribution to restraining the boom, although that effect is incidental. UI operations during periods of high business activity should therefore be examined from the standpoint of whether or not reserves are being built up to satisfactory levels.

It has been shown that UI operations have responded promptly to the onset of recession, but have lagged in reacting to economic recovery. As one of the "automatic stabilizers", UI would therefore rank high from the standpoint of the timing of changes in its operations in relation to economic downturns. Its quantitative contribution in stemming the decline, however, has actually been small. In economic upturns UI operations lag in turning from deficit to surplus because the reduction in unemployment during recoveries proceeds at a much slower rate than the buildup in the number of jobless during the downswing of the cycle; such a lag has been particularly evident following the 1957-58 and 1960-61 recessions.

Farm Production

(Continued from Page 4)

producers to expand and improve the output of agricultural products.

An indication of the contribution to education generally, and to agriculture in particular, may be provided by a listing of the Land-Grant colleges serving the Fourth District. These are the only institutions in the area which offer degrees in agriculture.

LAND-GRANT COLLEGES Serving Fourth Federal Reserve District

	Year Established	Enrollment, Fall 1961	
		Total	College of Agriculture
University of Kentucky Lexington, Kentucky	1865	10,309	340
Ohio State University Columbus, Ohio	1870	27,565	1,503
Pennsylvania State University University Park, Pennsylvania	1863	22,855	1,246
West Virginia University Morgantown, West Virginia	1867	8,282	520

As can be noted from the dates of establishment, all of these institutions are approaching a centennial of service to the citizens of the states in which they are located, as well as to many others from elsewhere in the nation and from foreign lands who have received instruction from members of their staffs.

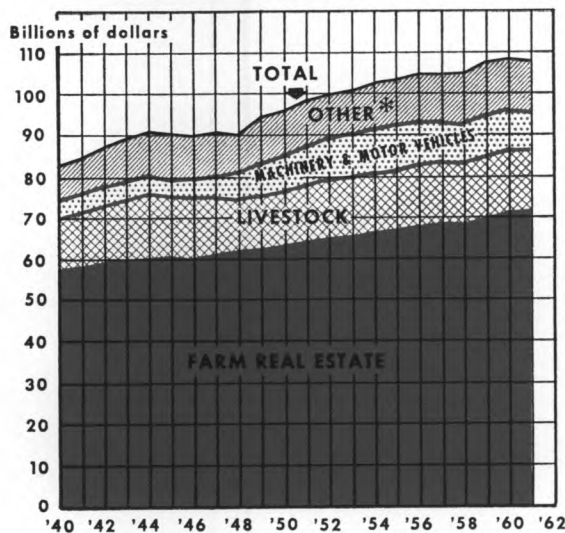
Production Assets Expand

The increased tempo with which scientific innovations have been applied in agriculture as a result of scientific training and research has led to a decline in the amount of labor and, to a lesser degree, to a decline in the area of land used in agriculture. The production assets used in agriculture, meanwhile, have expanded. The extent of the increase since 1940 is shown in an accompanying chart, in which production assets have been valued at constant prices to remove the influence of price changes over the years.

Of the four principal types of production assets, machinery and motor vehicle assets have registered the sharpest gain. The 141-percent gain in this category of assets over the twenty-year period undoubtedly reflected the marked expansion in advanced types of field equipment and barn equipment that have come into widespread use during the post-war period. Machinery and motor vehicles now constitute about 10 percent of the total production assets used in agriculture, as compared with 5 percent in 1940.

Other production assets, which include crop inventories held for livestock feed and that portion of the demand deposits owned by farmers being held to meet production expenses, increased by 47 percent during the period. This increase emphasizes the growth of operating capital requirements of the farm business that has occurred in recent years.

PRODUCTION ASSETS USED IN AGRICULTURE (1947 - '49 prices)



* Includes value of crop inventories held for livestock feed and that portion of total demand deposits owned by farmers that was estimated to be held to meet farm production costs.

Production assets used in agriculture have registered significant gains since 1948, reflecting a marked expansion in machinery and motor vehicles used in farming.

The 23-percent gain in the real-estate category of production assets during this period presumably reflected the vast amount of soil conservation measures introduced, including drainage, as well as all other improvements to land and buildings on farms.

Within the livestock category of production assets, an 11-percent gain was registered. The gains in livestock and in real estate, however, were not sufficient to maintain their relative proportions of the total. As a consequence, real estate and livestock, taken together, represents a somewhat smaller portion of total production assets than in 1940.



FOURTH FEDERAL RESERVE DISTRICT