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Recent Changes in Production

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THE real income of a nation is the physical volume of economic goods which it annually produces. The present survey of recent production changes in the United States is concerned with this aggregate. The amount by which the flow of commodities has been curtailed during the depression; the increase during 1933; the new directions that the expenditure of our productive energies has taken; the effect of the depression on standards of living, on our productive equipment; the degree of decline in the productive efficiency of the economy; the change in the productivity of employed labor—these are all matters within the scope of the present inquiry.

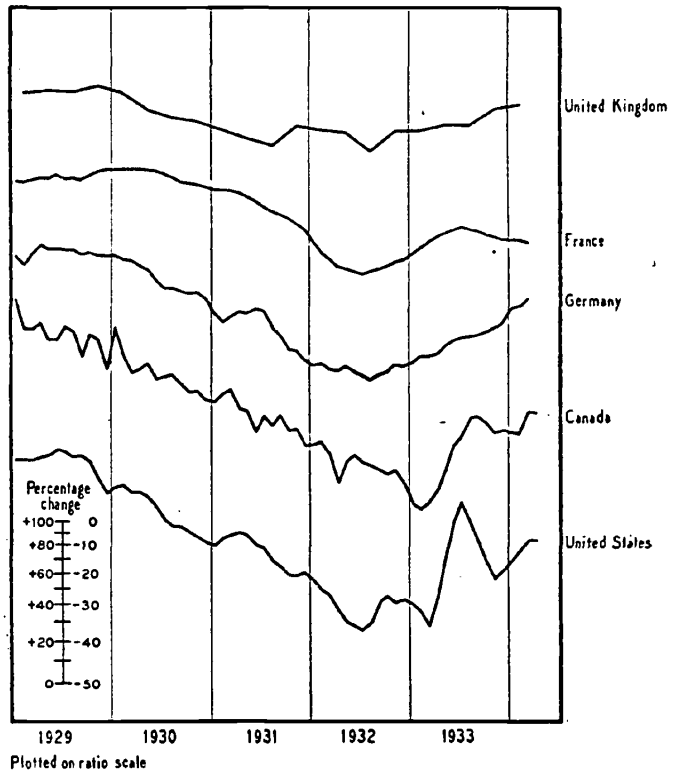
WORLD RECOVERY

The recovery from depression lows of industrial output in the United States is one phase of a world movement that began in the summer of 1932. Suggestions of improvement appeared earlier, but in mid-1932 declines in production ceased in the more important industrial countries. The widespread character of the subsequent recovery, which came as a ground-swell of increased productive activity, is revealed in the comparison of index numbers for five countries in Figure 1.

In France and in Germany the trough occurring in midsummer of 1932 is clearly marked, and while the use of quarterly statistics places the low point for the United Kingdom in the third quarter, supplementary information locates it, more exactly, in August. In the United States the 1932 recovery was short lived. Production rose for three months from a low in July, then leveled off and ultimately dropped to a second low in March 1933. In both the United States and Canada (which is the least industrialized of the countries here represented) the depression decline had started early; it also turned out to be more severe than in Europe.[1] But if decline was more precipitous in this country and recovery longer delayed, the increase in

Figure 1

CHANGES IN THE VOLUME OF INDUSTRIAL PRODUCTION IN FIVE COUNTRIES SINCE JANUARY 1929



[1] Technical differences in the averages and variations in the character of the several economies affect all international comparisons of production changes. The index numbers here presented are described in the *Note* at the end of this article. Adequate measurements for all countries are not available, and there has been no attempt to make the present list all-inclusive. The use of quarterly averages for the United Kingdom tends to dampen the fluctuation of the given series, in comparison with monthly figures such as are available for the other countries represented.

the rate of production was more striking when it did come. However, the subsequent reaction in the latter part of 1933 was a movement shared only by France and Canada.

The accompanying table summarizes the movements of these index numbers during decline and recovery. The components of the index numbers (with the exception of the quarterly index for the United Kingdom) are corrected in most items for usual seasonal variations.

Country	Decline from peak activity to low point of index (*per cent*)	Increase from low point to level at latest month[2] (*per cent*)	Percentage below peak activity at latest month
United Kingdom*	—22	+19	— 7
France	—36	+14	—27
Germany	—43	+42	—20
Canada	—59	+50	—38
United States	—53	+42	—33

*The measurements for the United Kingdom relate to quarterly rather than to monthly figures.

The recent increases in production in the United States and in Canada seem large at first glance, but the picture is somewhat different when viewed in the light of the preceding declines. In such a comparison, recovery seems most advanced in the United Kingdom where the rate of productive activity, as measured by the quarterly index, had declined but 22 per cent during the depression. Recovery in the United States has still about two-thirds of the previous loss to regain in order to attain the peak levels of 1929. On the other hand, the pre-recession advance was greater in this country. The average rate of growth of industrial production for the period 1922-29 was but 1.8 per cent per year in the United Kingdom, less than half of the 3.7 per cent rate of growth in the United States.

The extent of recovery is revealed when we compare present levels with those of the preceding highs as is done in the last column of the above table. The index of industrial output in the United Kingdom is within 7 per cent of the highest quarter of 1929; the index for the United States is still 33 per cent below its 1929 high. In Germany the current rate of production is 20 per cent below that of peak activity, in France it is 27 per cent below the pre-recession high. In all these countries an increased production is beginning to restore to former levels the flow of economic goods. But even these levels must be exceeded if allowance for additions to population since 1929 is to be made.

[2] For the United States and Canada the measurements relate to movements up to April 1934. For France and Germany the latest month for which figures are available is March; for the United Kingdom the latest figure is for the first quarter of 1934.

March 1933 is taken as the depression low for the United States although the level of July 1932 was one point lower in the index used (Federal Reserve Board). Other indexes of industrial production indicate the low to be March 1933.

The difference in bases makes a given percentage rise from the low point much less considerable, in absolute terms, than the preceding fall.

CHANGES IN THE TOTAL VOLUME OF PRODUCTION IN THE UNITED STATES

The current measurements pictured in Figure 1 reveal the remarkable spurt in production that occurred in the United States in the spring and summer of 1933, the subsequent decline and the recovery in the spring of 1934. But such measurements of monthly changes are restricted to industrial production, that is, to the products of manufacturing and mining. In measuring production as a whole, and in covering each field as completely as possible, the year must be the unit. Moreover, when the results of our productive efforts are assessed in terms of consumer benefits, annual totals are of greater significance than are rates of activity over short periods. It is in these broad changes in total production during recent years that our present interest lies.

Comprehensive measurements of the course of production in the United States from 1927 to 1933 are presented in Table I, together with figures showing the growth of population. The activities represented, agriculture, mining, manufacture and construction, are those which result in a physical product. The index numbers are relative to a 1927 base, so that some notion may be had of the changes prior to the 1929 break.

In the last column of Table I is a striking picture of the losses brought by the depression. It is a picture painted not in the changing colors of price and money, but in terms of constant units of physical quantities. It is a record of a real loss to the country, amounting, in the past year, to well over 25 per cent of the 1927 output and to roughly 35 per cent of the peak production of 1929. Such a decrease has seriously impaired the well-being of the country. Reductions in the wheat crop, in petroleum output, in iron and steel, in automobiles, and in building—these are all losses which are suffered, in the final analysis, by consumers in the aggregate. The loss is not entirely direct, of course, for there is always some portion of current production going to the replacement or increase of productive equipment. But direct or indirect, immediate or postponed, the reduction in output of economic goods since 1929 has left the real income of a more numerous population greatly below what it was in pre-recession years.

The recovery in total production during the last year was not inconsiderable. The average output of agriculture, mining, manufacturing and construction in 1933 was 4 per cent greater than in 1932. Yet this increase offset roughly less than 3 of the 36 per cent decline suffered since

Table I

CHANGES IN POPULATION AND IN THE PHYSICAL VOLUME OF PRODUCTION IN THE UNITED STATES, 1927-1933[1]
(1927: 100)

Year	Population	Agriculture	Mining	Manufacturing	Construction	Total Production
1927	100.0	100	100	100	100	100
1928	101.2	105	100	109	103	106
1929	102.2	103	109	116	97	110
1930	103.1	101	97	98	87	97
1931	103.9	106	82	83	74	86
1932	104.5	98	67	66	47	70
1933	105.2	94	72	74	34	73
Percentage change						
1929-32	+2.3	—5	—38	—43	—51	—36
1929-33	+3.0	—8	—34	—36	—65	—34

[1] These index numbers are described in the *Note* at the end of this article.

1929. Among raw materials, agricultural output was 8 per cent, and mineral production 34 per cent, below the level of 1929. Manufacturing production had increased 12 per cent from 1932 but still remained 36 per cent below the output of 1929; construction in 1933 dropped to still lower levels, some 65 per cent below 1929. The economic system was providing the consumer with the basic products of agriculture (chiefly foodstuffs) but the satisfaction of other wants and investment in equipment were being seriously restricted.

Although these group measurements suggest the character of the nation's loss, the precise relationships indicated do not reflect the varying fortunes of the different producing groups. Changes in the prices at which goods are bought or sold as well as in the quantities produced affect the aggregate purchasing power of every group. Differences in the degree of control over supply and variations in the cyclical stability of demand must be considered. Relative purchasing power depends also upon the changes in the income of every other element in the economic community. As a result, index numbers of the physical volume of production alone tell but part of the story of the changing well-being of particular groups of producers.[2]

When any one producing group maintains its output in the face of a disadvantageous exchange relationship, it continually offers more, in physical quantities, for those goods which it seeks to purchase. This, of course, was the position of the farmer during the greater portion of this period. The developments of the past year, which have brought diminished output from the farms and relatively higher prices of agricultural staples, have tended to correct this situation.[4]

[2] Variations in the aggregate purchasing power of the different income groups of the population were described in National Income, 1929-1932, *Bulletin No. 49* of this series.

The recent course of agricultural production is marked by diverse movements. The index numbers of farm production presented in Table I are the estimates of net agricultural production of the United States Department of Agriculture; they cover all products from which farmers derive income. The production of grains, which make up about 15 per cent of the total, declined slowly during the first part of the depression but fell sharply during 1933, owing to crop restriction and bad weather. Cotton farmers, on the other hand, had a most favorable 1933 season with unusually high yields. In spite of a smaller acreage there was little or no reduction in output. Production of dairy and poultry products, of vegetables and fruits and nuts remained high. Governmental action led to an increased slaughter of meat animals in 1933. The net result of these various changes is summarized in the average given in Table I.

The high level at which agricultural production was maintained during this period does not indicate any superior position on the part of the farmer. Rather, the large output helped to depress the prices for which the products were sold. The recently-compiled estimates of national income reveal that agricultural income fell proportionately more than did total national income between 1929 and 1932, and was distributed to a group of workers scarcely diminished in size. The decline in per capita income was considerably more than that for any other industrial group represented in Table I. On the other hand, the burden of many of those counted as detached from other industries

[4] A similar situation develops when there are changes in the relationships among the monetary units of the nations entering into world trade. The action of the United States in leaving the gold standard and the resulting cheapening of the dollar in world markets made it necessary to increase the physical amount of exports required for the purchase of a fixed quantity of foreign goods.

in the computation of per capita income was assumed by relatives and others more fortunate in retaining employment.[5]

In contrast to the active part it played in the recovery of 1921-22, the construction industry contributed but little to the general improvement in 1933. In spite of the inclusion in the averages presented in Table I of expenditures on public works, total construction declined.[6] This is true even when the dollar totals, which are the only complete measures of construction volume, are corrected for changing prices, as has been done here.[7]

In mining and manufacturing the changes in physical output have been quite similar. In both, the peak of activity occurred in 1929 (a year later than the date of the maximum output in agriculture and in construction) and, in the declines that followed, each dropped steadily and by about the same amount. Recovery in 1933 left them still at approximately the same levels, about 35 per cent below those of 1929.[8]

Recent changes in production in the United States are thus characterized by a wide variety of movements. Agricultural output fell but slightly, construction volume fell by two-thirds, and industrial production (manufacture and minerals) fell by more than a third. These are wide differences in the incidence of the depression on the activity of different producing groups. Taken together, and considered in relation to a steadily increasing population, these measurements tell the story of a sharp drop in the real income of the nation.

[5] The increase of more than two million in farm population between 1929 and 1933 indicates that a portion of this burden was carried by farmers. But the number is small compared with the total of the industrial unemployed and their dependents.

[6] The estimates of public works included in the compilations underlying these index numbers would be much larger if we were to include expenditures the first purpose of which was relief rather than public improvement.

[7] See the *Note* at the end of this article for a description of these measurements. The index here given is substantially confirmed by estimates of the volume of shipments of thirty construction materials compiled by the Federal Employment Stabilization Board. Recomputed on 1927 as base these index numbers are as follows:

1927 — 100	*1930* — 77
1928 — 102	*1931* — 61
1929 — 94	*1932* — 41

On a monthly basis available data for construction contracts indicate a low point in the spring of 1933. The average for the year, however, is below that of 1932.

[8] It is perhaps surprising that the production of basic mineral products should have declined no more than did the volume of manufacture. The reason lies in the presence in the mineral group of certain products subject to a rather stable consumption demand, chiefly crude petroleum and natural gas. The movements of these and other individual series are summarized in Table V.

CHANGES IN THE PHYSICAL VOLUME OF FOREIGN TRADE

Two factors qualify the use of changes in physical output as a measure of a country's well-being. One is foreign trade; the other is inventories. The amount of current production going to consumers is reduced by a physical volume of exports greater than that of imports or by general addition to inventories. Likewise, a reduction in stocks or relatively heavier imports increases this flow. The index numbers of changes in the physical volume of our foreign commerce given in Table II are therefore pertinent to the present inquiry.

Table II

CHANGES IN THE PHYSICAL VOLUME OF FOREIGN TRADE OF THE UNITED STATES, 1927-1933

(1927: 100)

Year	*Exports*	*Imports*
1927	100	100
1928	103	102
1929	106	116
1930	88	98
1931	72	87
1932	56	70
1933	56	76
Percentage change		
1929-32	—47	—40
1929-33	—47	—34

Between 1929 and 1932 the physical volume of exports dropped 47 per cent. For the same period the drop in the output of domestic production (excluding construction) was considerably less: 36 per cent. This difference means that the foreign market absorbed less and less of domestic output, the proportion of domestic production shipped out of the country having declined from about 10 per cent in the period before 1929 to about 7 per cent in 1932.[9]

In 1933 there was a further decline, for although domestic production increased, there was no rise in the volume of exports. Because of the different magnitudes involved, this relation of the volume of foreign trade to the total volume of domestic production must be kept in mind when comparing the index numbers of exports and imports with the averages of total production in Table I.

During the period since 1929, the flow of physical commodities favored the United States. Since the average unit-value of imports declined more than the unit-value of exports, there was a tendency for a relatively greater volume of goods to be imported than exported.[10] Whereas in 1929 a physical unit of exports would have bought only one unit

[9] Estimated by the United States Department of Commerce.

[10] This was partly due to a greater decline in the prices of raw materials than of manufactured goods, since the former have bulked larger in our imports than in our exports. But most important was the rising value of the dollar in terms of other national currencies prior to 1933.

of imports, in 1932 one and one-fifth units of imports were purchased. In terms of potential consumer satisfactions, this shift was highly desirable. Yet the advantage was unreal for those consumers who were at the same time producers deprived of foreign markets or harassed by a greater foreign competition at home. The departure of the United States from the gold standard in 1933 and subsequent events have tended to reverse the situation. As yet, however, the full effects of the change in monetary policy have not been felt. Partly because of general uncertainty and partly because of a possibility of devaluation, foreign purchases of American goods in 1933 were delayed until late in the year. But if present exchange relationships continue, we should expect a more rapidly increasing physical volume of exports than of imports.[11]

CHANGES IN THE VOLUME OF INVENTORIES

Much of the sharp increase in production that marked the second and third quarters of 1933 was in anticipation both of expected monetary inflation and of higher production costs under the proposed industrial codes. The immediate result was probably an increase in the physical amount of goods held in stock. Yet it is difficult to measure the extent of these inventories and to determine their location in the hands of the various producing agents—manufacturers, wholesalers, retailers. Utilizing such quantity statistics as are available (chiefly relating to raw and semi-finished goods) the Department of Commerce currently compiles a series of measurements of stocks of selected commodities held in various industries. Separate totals are given for raw and manufactured products. The index numbers of stocks at the end of each year since 1927 are shown below.

	Raw materials	*Manufactured goods*
December 1927	100	100
1928	104	108
1929	124	105
1930	130	106
1931	139	96
1932	129	85
1933	142	96
Percentage increase, December 1932 to December 1933	+10	+13

These measurements indicate that the stocks of manufactured goods in recent years were never large in relation to the holdings at the end of 1927. However, stocks of raw materials (chiefly agricultural staples) rose with the drop in demand, though they were reduced in 1932. The 1933 increase in stocks was greater for manufactured goods although the significance of the figures is limited by the paucity of available information on stocks at this stage in production. The index of stocks of raw materials rose 10 per cent between December 1932 and December 1933, stocks of manufactured and semi-processed goods rose by 13 per cent.[12]

A study of the balance sheets of over 150 industrial companies gives us additional evidence on changes in stocks of goods during 1933. For these corporations the reported inventories aggregated 2,441 millions of dollars on December 31, 1932. A year later inventories for these same corporations totaled 2,830 millions, an increase of 16 per cent.[13]

In view of an increased rate of business activity over that of the previous year, these figures do not indicate any excessive increase of stocks in the hands of producers. Increased turnover of itself demands an increased inventory. Moreover, these inventory figures are in dollars and therefore reflect the pleasantly buoyant effect of a rise in prices. If we correct for changes in the level of wholesale prices during 1933, this 16 per cent increase in dollar inventory is reduced to 4 per cent.[14] To the extent that the goods

[11] Adjustment of tariff barriers would, of course, have its effect on these relationships. So also would a resumption of international capital movements, since these and other 'invisible' items of foreign exchange also enter into the balance of international payments.

[12] These index numbers are currently published in the *Survey of Current Business*. Items are weighted by the value of total production in the base years 1923-25, lumber being the most heavily weighted commodity in the manufacturing group. The index numbers have been shifted to a December 1927 base for the purpose of this *Bulletin*.

Normal seasonal variation prevents a direct comparison of stock holdings between December and the mid-year. But a rough adjustment may be made in the Department of Commerce figures for this seasonal factor. The following figures are for manufacturing only.

	1932 December	*1933 March*	*1933 June*	*1933 September*	*1933 December*
Seasonally adjusted (December, 1927: 100)	88	86	90	104	99

[13] The companies selected were those for which published balance sheets are available; consequently the sample is dominated by large concerns.

To avoid excessive weighting of particular industrial groups, efforts were made to approximate the distribution of inventories of all manufacturing corporations as reported in *Statistics of Income for 1931*. The present sample represents approximately 30 per cent of total inventories of manufacturing corporations. Companies specializing in wholesale or retail trade have not been included.

The change in inventories for the various industrial groups ranged from —8 per cent (paper) to +68 per cent (textiles and textile products). A compilation of the Standard Statistics Company from reports of 400 companies shows a 13.3 per cent increase in the value of inventories during the year.

[14] Wholesale prices of manufactured goods (as measured by the index numbers of the National Bureau of Economic Research) rose 11 per cent between the level of December 1932 and the average for the last six months of 1933.

Table III

ESTIMATES OF CHANGES IN LABOR PRODUCTIVITY
MANUFACTURING INDUSTRIES OF THE UNITED STATES, 1929-1933[1]

(1) Year	(2) Index of physical output of manufactures	(3) Factory employment	(4) Output per wage earner employed (2) ÷ (3)	(5) Index of hours per week actually worked	(6) Man-hours (3) × (4)	(7) Output per man-hour (2) ÷ (6)
1929	100	100	100	100	100	100
1930	85	87	97	93	81	104
1931	72	74	97	87	64	112
1932	57	61	93	77	47	121
1933	64	66	97	76	50	127

[1] See the *Note* at end of this article for a description of these index numbers.

held in inventory at the end of 1933 had been produced prior to the price rise this may be an over-correction. But the margin of error cannot be large, and the conclusion remains that inventories in the hands of manufacturers were little, if any, larger at the end of 1933 than they were at the beginning.[15]

CHANGES IN PRODUCTIVE EFFICIENCY, 1929-1933

That the efficiency of the economic system has declined since 1929 is evidenced by the curtailed volume of employment and the reduced output of goods. In terms of 1929 output, 1933 operations were but 65 per cent of normal. There can be no talk of general productive efficiency with men idle and factories half empty. Yet in a special sense increases in efficiency may occur in the output which continues to be produced. While efficiency may be considered relatively to any of the various factors of production, it is efficiency in the use of labor effort which is here in mind. Changes in such efficiency are measured by the ratio of changes in output to changes in number of workers or man-hours.

A period of depression is conducive to improvement in labor productivity. Faced with narrowing profit margins, business men strive for cheaper, more direct, more efficient methods of production. With overhead costs per unit increasing, special effort is made to reduce direct costs per unit, largely by laying off the less efficient workers and by improving management. When aggregate man-hours are reduced by more than the decline in output, there is evidence that the productivity of the employed labor has increased. In some respects the gains are potential, for the necessity of curtailing production schedules prevents the full enjoyment of the improvement. On the other hand, this reduction in output is itself a source of increased efficiency, for it makes possible the concentration of the more skilled workmen on the better machines and leads to the shutting down of the least efficient plants.

The record of economic progress has been characterized by repeated increases in labor productivity. Particularly was this so during the post-War decade. Since there was no great alteration, prior to 1929, in the length of the work-week, changes in output per worker are acceptable measures of this pre-recession advance. Such measurements indicate an increase of some 22 per cent in the output per employed factory worker between 1923 and 1929. During the full decade, 1919-29, the increase in productivity was over 40 per cent.[16]

An attempt to estimate the extent of the increase in the productivity of employed factory labor since 1929 is made in the successive columns of Table III. Unlike the pre-recession advance in productivity, which coincided with increases in total output, the recent gain is the net resultant of factors shrinking at varying rates. Employment in manufacturing industries has dropped 34 per cent since 1929. A work-week averaging just short of 50 hours in 1929 has been reduced to about 38 hours in 1932 and 1933[17]—a drop of almost 25 per cent. Total man-hours have thus

[15] Little information is available on stocks in the hands of wholesalers and retailers. The compilations of the Federal Reserve Board for department stores indicate an 8 per cent increase in stocks between December 31, 1932 and December 31, 1933; a 14 per cent increase from June 30, 1933, after adjustment had been made for normal seasonal movements. Sales in December 1933 were 15 per cent larger than in the preceding year; but were approximately the same, after correction for the seasonal factor, as in the previous June.

Stocks held by wholesale grocery firms reporting to the New York Federal Reserve Bank increased 57 per cent during 1933 (net sales for the one month of December were 43 per cent greater than December 1932). Wholesale hardware stocks were reported 12 per cent higher.

Since these various measurements relate to dollar inventories, they reflect the effect of higher prices.

[16] Cf. *Economic Tendencies in the United States*, by F. C. Mills (National Bureau of Economic Research, 1932), pp. 289-99.

These increases in productivity, as well as those for recent years described in the present survey, relate to manufacturing only. Similar gains were not experienced in all fields of employment.

[17] The average of hours per week for 1933 is but fractionally below that of 1932 because in many industries the depressed rate of activity has kept the weekly hours well below the maximum imposed by the N.R.A. codes.

declined 50 per cent since 1929. Physical output has declined 36 per cent. Taken together, these estimates indicate an increase in output per man-hour of approximately 25 per cent in four years, an amazing advance indeed.

Striking as is this change in productivity, we must realize that it is not directly comparable with the increases recorded for the post-War years. As has been suggested, the recent improvement may be in large part the result of temporary organizational changes, of greater labor effort on the part of the more skilled workers remaining in employment, and the use of the best of the existing equipment—all changes contingent in large degree upon a reduced rate of production. These are factors probably far more important than the introduction of revolutionary mechanical innovations. To the extent that this explanation is true, it indicates that in the heyday of 1929 our productive system was inefficiently organized, that much labor effort was wasted or that much of our productive equipment was of second order. The interruption to the improvement in output per man-hour caused by the effort to increase production in 1929 accords with this suggestion (there was an 8 per cent advance in 1928, none in 1929). So does the notable inactivity in the capital goods industries during the depression. Little of the increased productivity since 1929 can be credited to the introduction of new machinery. Such improvements still lie before us.[18]

Although much of the increase in productivity during the depression would appear to be dependent on a rate of productive activity considerably less than that of 1929, it is by no means correct to assume that the improvement will entirely disappear with the resumption of more normal production schedules. The depression years have taught many lessons not likely to be soon forgotten, and have forced plant reorganizations that will result in permanent gain. The general adoption of a shorter work-week will bring, of itself, a sustained improvement in efficiency. In addition, a considerable amount of new machinery will probably be installed in order to avoid placing workmen receiving higher hourly wages at long-idle and probably obsolete machinery. Consequently there is strong likelihood that much of the recent gain in labor productivity will be retained.

An increase of more than 25 per cent in the physical product resulting from a given amount of labor effort is a remarkable advance for such a short period. But in terms of national well-being, full enjoyment of this increased productivity will not be had until the rate of manufacturing operations is again on a level commensurate with normal needs. If, under such circumstances, the ratio of output to labor hours remains high, the gain will be positive and the benefits real. The shorter working week under the codes may in part be continued, and the desired increase in the volume of output brought about at the same time; the new leisure and the increased output should both contribute to an improved standard of living. Yet with the constantly changing direction of productive activity the task of adjustment for an enlarged working population is not easy. Increases in labor productivity do not simplify the problem.[19]

THE CHANGING DIRECTION OF PRODUCTIVE ACTIVITY IN DEPRESSION AND RECOVERY

One of the striking features of the period of pre-recession expansion was the increasingly larger portion of our productive efforts being devoted to the output of durable goods, particularly those for use in further production. Doubtless a similar emphasis upon such goods characterizes most periods of industrial growth but the extent to which this was true in the post-War decade was remarkable. Consumers were turning to the more durable of consumption goods and producers were taking advantage of circumstances favorable to the increase of equipment.[20] With the break in 1929 this tendency was reversed, and as the depression continued the output of such goods decreased even more sharply. The extent of these declines is indicated by the index numbers given in Table IV, and is shown graphically in Figure 2.

It is evident that the full force of the depression has exerted itself on those products for which demand may be postponed. The output of foods, the most imperatively needed of all consumption goods, declined least; they likewise gained least in 1933. Similar in behavior was the output of perishable goods, of which about seventy per cent are foods. Durable goods, on the other hand, bore the full

[18] Little information is available on the physical output of machinery industries. Employment in foundry and machine shops is estimated to have declined 55 per cent from 1929 to 1932; in the machine tool industry, employment dropped over 75 per cent, orders by 88 per cent.

The wide margin between the poorest and the best of existing equipment is indicated by the replies to the series of questions addressed to prominent engineers and business executives by a special sub-committee of the Columbia University Commission on Economic Reconstruction. As recorded in the report of this investigation (*Economic Reconstruction,* Columbia University Press, 1934, p. 91) replies indicated a possible improvement of about 75 per cent in physical output if existing equipment and management were brought up to the level of the most efficient.

[19] The figures in Table III provoke speculation on the capacity of industry to reabsorb those workers displaced since 1929. Assuming that the volume of output be returned to the level of 1929, that output per man-hour remain at the present selective rate, and that hours per week rise to the maximum permitted under the codes (an average but slightly below 40 hours per week, 18 per cent below 1929) we have an estimate of employment increased to 97 per cent of the 1929 total. Because of population growth the volume of employment should be larger than in 1929, though a physical output greater than the 1929 average used in the above calculation is also necessary if we are to return to the former per capita rate.

[20] See *Economic Tendencies in the United States* for a description of the period.

Table IV

CHANGES IN THE PHYSICAL VOLUME OF MANUFACTURING PRODUCTION ANALYZED ACCORDING TO THREE CLASSIFICATIONS OF COMMODITIES

(1927: 100)

	1927	1928	1929	1930	1931	1932*	1933*	Percentage Change[1] 1929-32	1929-33
All Industries	100	109	116	98	83	66	74	—43	—36
Foods	100	104	110	108	101	95	96	—13	—12
Non-foods	100	110	117	96	79	59	69	—49	—41
Perishable commodities	100	105	112	109	101	94	97	—16	—13
Semi-durable goods	100	102	107	91	90	80	91	—25	—15
Durable goods	100	115	122	96	67	38	48	—69	—61
Goods for human consumption	100	107	114	101	92	79	86	—31	—24
Goods for use in capital equipment	100	117	126	98	69	42	52	—66	—59
Construction materials	100	106	107	82	60	36	43	—66	—60

*Preliminary.
[1] Shown graphically in Figure 2.

brunt of the depression. In 1932 the output of all durable goods was only one-third that of 1929. Curiously, the production of goods for use in capital equipment and the output of construction materials were reduced by the same amount, although the latter did not rise to as great a peak as the former in 1929. The percentage increases in 1933 over 1932 in these durable goods industries were considerable, but being percentages they reflect in part the extremely low levels to which output had fallen the preceding year. Production in 1933 was still about 60 per cent below 1929 levels.

Since all production is for the ultimate purpose of human consumption, the measurements discussed above may be interpreted in the light of general consumer interest. The output of consumption goods is directly to the benefit of all consumers collectively, the output of goods for use as capital equipment only indirectly so. The sharpest drop, as we have seen, occurred in investment goods—in productive equipment and construction. Here the loss to the consuming public is indirect and the need postponable. Indeed, if during the period prior to 1929 the production of these types of goods had utilized a greater portion of our productive energies than was proper to the maintenance of economic balance, the extent of the loss is more apparent than real.

Consumers, in general, also suffered directly through the reduced output of consumption goods. Between 1929 and 1932 the production of such goods, both durable and non-durable, was reduced approximately 30 per cent. In view of an increase in population of about two and one-half per cent during the same interval, this means an average decrease in actual standards of living of roughly 33 per cent. Per capita of population, the flow of consumers' goods had been reduced by one-third.[21]

[21] Total national income paid out declined from 1929 to 1932 by roughly 40 per cent. The cost of living of industrial workers as measured by the Bureau of Labor Statistics fell 20 per cent. The indicated drop in real income of the nation, estimated in this fashion, is about 25 per cent.

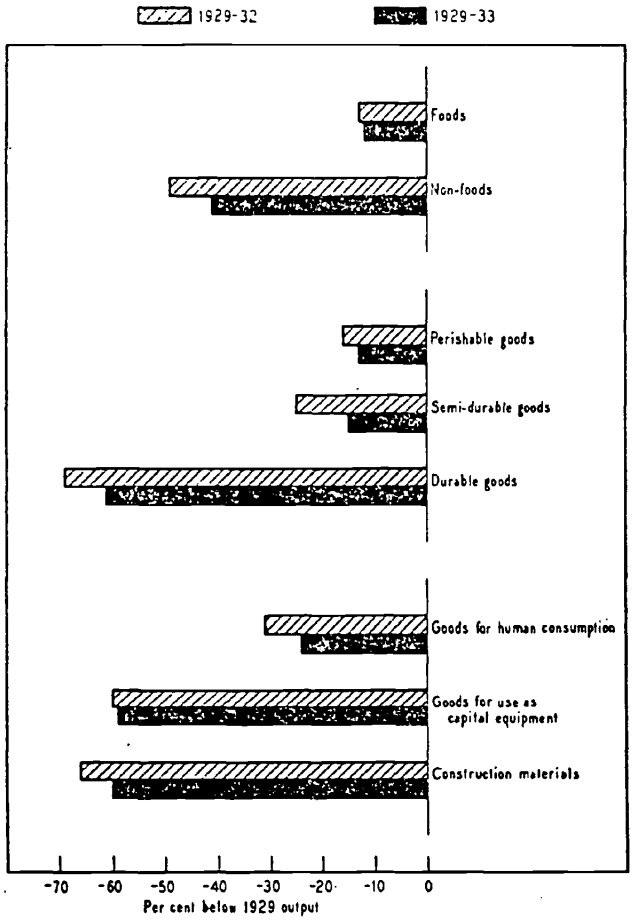
As a result of variations in the impact of the depression upon different types of goods, the direction in which the productive energies of the country are expended has been considerably altered in the past four years. A greatly-lessened share of our productive effort has been devoted to the production of investment goods. On the other hand the pressure of consumer demand has maintained, to a fair degree, those processes leading to the output of the necessities of life. The greatest recovery in 1933 for the groups given in Table IV was that of semi-durable goods, which is composed chiefly of textiles and textile products. During a period of reduced output one would expect a relatively greater emphasis on the production of consumption goods. Deliberate efforts to foster increased consumer purchasing power have had the same immediate result, though the secondary effect of such changes is ordinarily to create a demand for investment goods. The restrictive influence of relatively rigid prices for equipment goods and the existence of a limited capital market have kept activity in these industries low.

The present apportionment of total productive energies, distorted by the depression, will undoubtedly revert in due course to something closer to the pre-recession relationships. The extent of this reversion will, however, depend on many factors. Among these will be the extent to which consumer purchasing power is spent for present goods or for future

The index numbers presented in Table IV relate only to manufactured goods, and to these products in all stages of fabrication. Weights are based on value added by manufacture. Consequently, the present averages are measures of the volume of fabrication only; they do not relate to total production as do the index numbers in Table I.

Account should be taken of those products which go directly to the ultimate consumers with little or no fabrication. Among these are fresh fruits and vegetables, and certain dairy and poultry products, which, being foodstuffs, showed scarcely any decline in production during the depression. Coal and natural gas, and such building materials as sand and gravel which are processed directly at the quarry are also not included in the measurements of manufacturing output.

Figure 2
ILLUSTRATING THE EXTENT OF DECLINE IN MANUFACTURING OUTPUT SINCE 1929



incomes, as well as the extent to which investment funds are diminished by the drain of the depression years and higher tax levies. The flow of such funds may be restricted by new circumstances. On the other hand, relatively higher wages for industrial labor will encourage a demand for new capital equipment. There is also a probable reservoir of an as-yet-ineffective demand for durable goods accumulated during the years of reduced consumption.[22] Perhaps the greatest possible improvement in living standards would be through the provision of better housing, which would entail, both directly and indirectly, a larger production of durable goods. Whether or not the pre-depression share in total productive energies will again be devoted to the output of equipment goods is uncertain. But it is certain there will again be an increase in the production of durable goods in general, if the upward march in the standard of living is to be resumed.[23]

[22] The deficit in all consumption goods over the depression years must be considered in large measure to have been written off with the passage of time. There is no accumulated need for food which might have been eaten or for fuel which ordinarily would have been burned. Even in the case of semi-durable goods, the depression may have lasted longer than the ordinary life of these products, but for most durable goods this is not so likely to be true.

SUMMARY

The almost universal halt to world decline in productive activity that occurred in the summer of 1932 was experienced also in the United States. But here the subsequent recovery, as indicated by measures of the output of mining and manufacture, followed a distinctive pattern. Delayed by a collapse to a second low in early 1933, recovery came with a rush during the spring and summer months, was temporarily halted in the last quarter of the year and then resumed its advance in 1934. The present rate of industrial activity finds us, however, still one-third below the highest levels in 1929.

A broader view of production movements may be had through the average of annual changes in agriculture, mining, manufacturing and construction. A wide diversity of movement is involved, but the aggregate indicates a loss of 35 per cent in the output of the commodities that contribute to the nation's well-being. The net improvement during 1933 brought an increase of 4 per cent over 1932. Examination of statistics of foreign trade and of inventories shows that the flow of commodities was not diminished by a net diversion to stocks or to consumers in other countries, but rather was increased by such changes.

During the depression the increase in labor productivity that had characterized the pre-recession years continued. An hour of labor effort in 1933 yielded an output over 25 per cent greater than in 1929. While this increased productivity probably resulted in large part from the concentration of the best workers on the best equipment, there is reason to expect that much of the improvement will be retained when the labor force is again increased and a more normal rate of productive activity resumed. For part of the gain is due to improvements in organization that will be maintained, and further improvements may be expected when business enterprises are ready to buy new equipment again on a considerable scale.

Meanwhile, an increase in population of three per cent since 1929 requires that aggregate production surpass the level of that year if former standards are to be restored. Even greater efforts are necessary if the real income of the nation is to be materially advanced.

[23] The effect of a rise in income upon any standard of living is to decrease the relative expenditure on foods and other necessities. Applied to the national standard of living this would suggest the very tendencies observed in the pre-recession decade: an increased output of durable goods and an increased importance of the service industries. Such changes go hand in hand with the attainment of a higher standard of living.

It is unfortunate that the necessary accompaniment of this advance is an increased susceptibility to extreme fluctuations in demand as the area of essential needs diminishes in relative importance in the consumer budget.

APPENDIX

A. CHANGES IN THE OUTPUT OF INDIVIDUAL COMMODITIES

In all the general measurements presented in the foregoing discussion recourse has been had to averages of what are, in many instances, divergent movements. The following table presents data relating to changes in 80 production series during the three periods 1922-29, 1929-32 and 1932-33.

Table V

CHANGES IN 80 PRODUCTION SERIES, 1922-1929, 1929-1932 AND 1932-1933

(1) Commodity	(2) Average annual rate of change 1922-29[1] (per cent)	(3) Percentage change 1929-32	(4) Change, 1932-33, as percentage of 1929[2]
Agricultural products			
Barley	+11.7	+7.8	−52.1
Wool	+5.6	+7.7	−27.8
Cotton	+5.1	−12.3	+1.2
Cottonseed	+5.1	−12.3	+1.2
Truck crops	+4.8	−2.8	−2.1
Milk	+3.2	+2.5	+0.8
Sugar, domestic	+2.9	+29.7	+20.6
Rice	+2.8	−0.5	−11.8
Poultry products	+2.3	0	+1.7
Wheat	+1.3	−8.5	−26.7
Tobacco	+0.9	−33.4	+24.3
Meat animals	+0.4	−1.0	+4.8
Fruits and vegetables	+0.4	+3.9	0
Corn	−0.4	+14.7	−22.8
Hay	−0.6	−7.8	−5.7
Oats	−1.0	+11.5	−47.0
Potatoes	−1.2	+8.8	−12.4
Minerals			
Natural gas	+11.8	−18.9	+1.4
Crushed stone	+8.6	−49.7	+3.7
Copper	+7.3	−72.8	+7.2
Petroleum	+7.1	−22.0	+11.3
Zinc, slab	+5.4	−66.7	+18.4
Cement	+5.2	−55.3	−7.9
Lead	+4.5	−60.2	+3.5
Iron ore	+3.4	−86.5	+68.3
Gypsum	+2.7	−72.8	−2.3
Bituminous coal	+1.7	−42.2	+3.9
Anthracite coal	+0.9	−31.9	−1.1
Silver	−1.1	−60.9	−2.7
Gold	−1.8	+10.9	−0.6
Series relating to manufacture			
Aircraft[3]	+73.1	−77.5	−1.2
Mechanical refrigerators[3]	+34.9	+22.2	+44.4
Rayon	+25.2	+11.2	+60.0
Gasoline	+15.9	−10.0	+2.5
Cigarettes	+11.2	−13.3	+7.2
Trucks	+11.2	−69.5	+15.2
Electricity	+10.3	−14.6	+2.2
Tires	+9.0	−41.7	+7.9
Plate glass	+8.9	−65.4	+22.6
Silk deliveries	+8.8	−11.2	−13.2
Cottonseed oil	+8.5	−4.6	−10.4
Fuel oil	+7.8	−34.1	+4.3
Copper consumption	+7.1	−70.8	+8.2
Newsprint consumption	+6.8	−23.4	−3.6
Series relating to manufacture (cont.)			
Book paper	+6.4	−33.3	+6.7
Passenger cars	+5.7	−75.2	+10.2
Lubricating oil	+5.4	−35.2	+4.1
Steel ingots	+5.3	−75.6	+17.6
Cement	+5.2	−55.3	−7.9
Tin deliveries	+4.9	−59.1	+23.6
Canned milk	+4.5	−18.2	+3.1
Cheese	+4.4	+1.5	−17.0
Inner tubes	+4.3	−46.6	+8.7
Butter	+4.2	+6.1	+2.6
Woodpulp, chemical	+4.0	−28.4	+26.7
Sulphuric acid	+4.0	−49.0	+8.8
Fertilizers	+4.0	−40.6	+2.4
Coke	+3.9	−63.6	+9.6
Pig iron	+3.8	−79.7	+11.0
Sheep, inspected slaughter	+3.4	+28.0	−3.4
Flooring	+2.5	−73.3	+1.5
Cotton consumption	+2.5	−29.6	+18.3
Explosives	+2.4	−53.0	+4.5
Lime	+2.1	−54.1	+6.2
Boots and shoes	+1.2	−13.6	+10.0
Calves, inspected slaughter	+0.7	0	+9.9
Kerosene	+0.5	−21.9	+9.4
Woodpulp, mechanical	+0.4	−29.2	−4.2
Sugar meltings	+0.4	−22.1	−1.9
Flour, wheat	0	−15.8	+1.0
Hogs, inspected slaughter	−0.3	−6.2	+7.2
Newsprint production	−0.5	−26.9	−5.4
Cattle, inspected slaughter	−0.7	−8.0	+12.6
Cigars	−1.2	−33.0	−2.1
Wool consumption	−2.0	−34.0	+22.3
Lumber	−2.2	−72.1	+11.2
Wool carpet and rug loom activity	−2.9	−62.2	+17.8
Leather	−3.4	−23.2	+12.2
Railroad cars	−9.2	−95.3	−1.6
Locomotives	−14.6	−87.8	−9.8

[1] Most of the measurements in column 2 are from *Economic Tendencies*, pp. 253-6. The method used in calculating average annual rates of change is described in that volume.

[2] The use of the same base (1929) for the entries in columns 3 and 4 makes possible their direct comparison. The extent of the decline (or rise) through 1933 may be determined by adding, algebraically, each pair of entries.

[3] The rates of growth in column 2 for aircraft and mechanical refrigerators are for the period 1926-29.

B. NOTES ON SOURCES OF DATA AND CONSTRUCTION OF INDEXES

Figure 1. The index numbers of industrial production for the United States are those of the Federal Reserve Board. For the United Kingdom the quarterly index of the Board of Trade has been used; for France the index of the Statistique Général; for Germany that of the Institut für Konjunkturforschung; for Canada that of the Dominion Bureau of Statistics. The following tabulation, which is based upon materials from the Statistical Yearbooks of the League of Nations and original sources, summarizes the general character of the averages.

	United States	Canada	United Kingdom	France	Germany
Base year	*1923-25*	*1926*	*1924*	*1913*	*1928*
Distribution of weights					
Total	100	100	100	100	100
Mining	14	11	20	8	11
'Investment' goods[1]	39	34	29	57	40
Foodstuffs (including tobacco)	10	26	14	0	15
Textiles and textile products	18	2	19	24	18
Leather and leather products	4	3	3	8	3
Paper and printing	10	9	[2]	2	7
Other	5	15	15	1	6
Estimated percentage of industrial activity represented in index	80	80	65+	50	60
Percentage of total gainfully employed[3] engaged in					
Manufacturing	28.9	26.9	39.7	31.2	38.1
Mining	2.0	1.6	7.5	2.0	3.2

[1] Iron and steel, engineering, motor vehicles, building, building materials.
[2] Included in 'other'.
[3] The figures are from censuses taken in different years: United States, 1930; Canada and United Kingdom, 1921; France, 1926; Germany, 1925.

Table I. The population index is for continental United States. Prior to 1930, it is based on estimates of P. K. Whelpton of Miami University; since then on official estimates of the Bureau of the Census. Account is taken in the construction of these estimates of changes in births, deaths and migration. The series in column 2 is the index of net volume of agricultural production of the United States Department of Agriculture. The index numbers of mineral output in column 3 have been computed from statistics for 18 minerals compiled by the Bureau of Mines.

The index of manufacturing production in column 4 has been constructed by the National Bureau of Economic Research. The figures for 1927, 1929 and 1931 are based upon data for 145 industries reported in the *Census of Manufactures* and are similar in character to indexes of manufacturing output described in *Economic Tendencies*. Imputed weights have not been used. However, imputed weights based on arbitrary groupings of the Bureau of the Census give an index not substantially different: 1927, 100; 1929, 113; 1931, 80. (An index secured by deflating total value of product of census groups by derived index numbers of selling price is also close to those presented in Table I: 100, 115 and 84.) The figures for other than census years have been estimated on the basis of available materials. The index numbers for 1932 and 1933 are subject to revision.

The index of construction volume in column 5 covers private (residential, industrial, farm), public utility, and public (city, county, state and federal) construction. The series has been secured by roughly correcting the estimates of total value of construction for changes in construction costs. An average of the indexes of construction costs of the *Engineering News-Record* and of the Federal Reserve Bank of New York has been used for this purpose.

The index of total production is the average of the four series described above. Weights are based on gross farm income, on total value of mineral production and on total value added by manufacture and construction (the latter estimated at 50 per cent of total dollar volume) in the two years 1927 and 1931.

Table II. The index numbers of the physical volume of exports and imports in Table II are the recently revised averages of the United States Department of Commerce.

Table III. The measurements of physical volume of manufacturing used in the computation of output per man-hour are those presented in Table I and described in a previous section of this *Note*. The series on manufacturing employment is the revised index of the Bureau of Labor Statistics, which is adjusted to the total number of wage earners reported in the biennial *Census of Manufactures*. The index of hours per week shown in column 5 has been prepared as follows: (1) a weighted average of hours worked in 1932 and 1933 was calculated from the monthly reports of the Bureau of Labor Statistics. Employment figures were used as weights in securing annual averages for these two years; (2) an estimate of 49.4 hours per week actually worked in 1929 was secured by applying the relation in 1929 between actual and nominal hours for the industries in the sample of the National Industrial Conference Board to the average nominal week for all manufacturing as computed from the frequency distributions published in the *Census of Manufactures* for that year; (3) the National Industrial Conference Board sample was used to interpolate between the 1929 and 1932-33 estimates and to carry the series back to 1927.

Results obtained from the use of the Conference Board sample alone agree substantially with these more or less independently derived estimates of output per man-hour. So also does an average of a series of estimates prepared for those industries for which the necessary data are available.

Charles A. Bliss is secretary of the National Bureau and is associated with Frederick C. Mills in the National Bureau's studies of production and prices. Most of the measurements presented in this BULLETIN *are results derived in the course of this major project and extend certain of the figures given in* ECONOMIC TENDENCIES IN THE UNITED STATES, *published by the National Bureau in* 1932.

PLANNING CONFERENCE, MAY 30, 1934

To assist the National Bureau in formulating its future program, several Directors and staff members conferred with a few representatives of other research agencies, economists and business men on May 30. Those present were: Wesley C. Mitchell, presiding; James W. Angell, Henry S. Dennison, David Friday, Meredith B. Givens, Alvin H. Hansen, Charles O. Hardy, Robert M. MacIver, Sydnor Walker, David L. Wickens, Oswald W. Knauth, Shepard Morgan, M. C. Rorty, N. I. Stone, Joseph H. Willits, Martha Anderson, Charles A. Bliss, Arthur F. Burns, Simon Kuznets, Frederick C. Mills.

Dr. Mitchell opened the meeting by saying that because of the limited character of the National Bureau's dealings with monetary economics he had invited Professor Angell of Columbia University, one of the most active workers in this field, to discuss the problems encountered.

Dr. Angell contrasted purely theoretical studies and descriptive studies, primarily statistical, and asserted that in the combination of the two—skilled statistical work with the formulation of intelligent working hypotheses—lies the way of progress and the contribution of an organization like the National Bureau of Economic Research. He then described in some detail projects for the determination of the exchange velocity of money, banking adjustments between districts and the money volumes of new savings and new investment.

Dr. Mitchell then called upon Mr. Henry S. Dennison of the Dennison Manufacturing Company, a member of the advisory Council on Economic Planning appointed by the Department of Commerce. Mr. Dennison emphasized the need for planning alike in private business and in public administration. He heartily endorsed any research work that would help to make practical planning possible. In particular, methods of control must be developed to promote economic stability. As specific studies he suggested the relation of taxation to cyclical fluctuations in economic activity, the distribution of income, migration and decentralization of industries, economic nationalism and the tariff, public works, the debt structure, differences between large and small businesses as revealed by statistics being collected under the N. R. A. codes.

Dr. Friday, one of the Directors of the National Bureau, outlined the inception and purpose of the Committee on Credit and Banking of the Social Science Research Council. As elements of a study of the relation of banking policy and credit control to economic stability the Committee has set itself to investigate:

I The Growth of Capital during the Post-War Period

II The Financing of Capital Expansion and Contraction in Relation to Economic Stability

III The Role of Credit and Banking Policy in Social Control

At the request of Dr. Friday's committee, a study of the volume of durable goods produced in the United States, 1919-33, as a measure of capital formation, was undertaken by the National Bureau of Economic Research under the direction of Simon Kuznets and supported by a grant from the Social Science Research Council. An interim report of this investigation of capital formation in its physical aspects has already been circulated privately, and the next National Bureau *Bulletin* will contain a resumé of some of the preliminary estimates.

Now that the project under the first part of their program, the Measurement of the Growth of Capital during the Post-War Period, is nearing completion, the Committee has requested the National Bureau to undertake a study of Real Estate Finance and Economic Stability. Real estate mortgage financing, both agricultural and urban, will be included in the survey.

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