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Volume Author/Editor: Frederick C. Mills

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Chapter Author: Frederick C. Mills

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lowed the end of World War II. Perhaps of greater importance than the increase in the stock of capital goods was the advance in the *quality* of capital instruments. Technological improvements as well as the innovations of scientific management were widely adopted in the early twenties; such improvements were chiefly manifest in the tools of production. These diverse factors combined with others in the complex of working conditions that determine productive effectiveness to yield a remarkable productivity gain.

III

Uses of Productive Resources

The characteristics of an economic system are defined not alone by the magnitude and sources of its productive power. The purposes for which productive resources are used are the most significant indicators of its pattern of life. These purposes reflect the collective desires and needs of the individuals who make up the system. Basic wants for food, clothing and shelter, desires for satisfactions above subsistence levels, the role of instrumental goods in the productive process, and compulsions imposed by necessities of war or defense are all manifest in the patterns of use that prevail at given times. Such uses, in the aggregate, are shown by the familiar national income and national product classifications that have been developed within recent decades for this and other countries.

Maintenance, defense, and progress

A somewhat different classification of uses has been employed in this study. Here we think of economic resources as being used for three broad purposes — maintenance, defense, and progress. The population must be supported at an established consumption level; the existing stock of capital equipment must be maintained if there is not to be retrogression through depreciation and obsolescence; means must be provided for defense against attack from abroad. Only after these needs have been met is economic progress possible.

Such progress may take the form of an advance in consumption levels (i.e., an increase in average per capita expenditures for consumption goods and services) or a net increase in the stock of capital.[6]

If the "progress" made in any period is to be determined, the requirements for maintenance must first be established. For capital stock, maintenance needs can be equated to "capital consumption" — the wearing out of plant, equipment, and residential housing — during a stated period. The criterion is definite here, although one must be content with estimates of the magnitudes involved. Less precise criteria are available when we consider population maintenance. There can be no absolute and fixed definition of consumption standards. Each generation, indeed each decade and each year, brings changes in the content of living and in the subjective scales by which people judge the adequacy or inadequacy of the real incomes provided by their monetary receipts. I here assume that the consumption level attained in a given decade (as measured, in constant dollars, by average per capita expenditures for consumption goods and services) establishes a criterion of consumption needs that carries over into the decade following. This is not to say that basic requirements for the maintenance of consumption levels are always met. Claims growing out of such needs may be relinquished in periods of national emergency; in deep depression

[6] Economic growth has elsewhere been defined as an advance in the net product of goods and services per capita of the population. (Cf. J. J. Spengler, "Theories of Socio-Economic Growth", in *Problems in the Study of Economic Growth,* Universities-National Bureau Committee on Economic Research, 1949). The present definition of economic progress is similar to this in respect of consumption gains; it differs, however, in two important ways: 1) Expenditures for defense are not considered to contribute to progress. (They are, of course, an essential form of maintenance.) 2) Any formation of net capital is considered to be a component of progress, whether there is a gain per capita of the population or not. Technological improvements contributing to major advances in *quality* of capital goods could quite conceivably make possible rising per capita consumption with no accompanying increase in total capital stock. This is not likely to be the case with a growing population — certainly we stand far short of such a condition now — but in an industrial economy marked by rapid technical advance it is not essential to progress that quantitative additions to the stock of capital grow at a faster rate than population.

Under the present definition there may, of course, be progress in a net sense if there is an advance in only one of the two forms of progress, provided that this advance exceeds the decline in the other form.

output may be inadequate to meet even fundamental needs. But the historical record provides ample justification for the view that consumption levels are persistent, that they change slowly, and that gains in such levels, once realized, are defended with tenacity.[7]

[7] I have used the term "consumption level" in the sense of J. S. Davis' illuminating discussion, in his presidential address (*American Economic Review*, March 1945). In some respects the "standard of consumption", which means the scale desired and striven for, whether realized or not, would be an appropriate criterion, but available measures are restricted to levels of consumption actually realized. There is, moreover, justification for using the *attained* level, and for viewing this as including the more vigorously defended elements of a consumption standard.

A case could be made for using as criterion not the consumption level of the year or decade immediately preceding, but the highest consumption level previously attained. Duesenberry and Modigliani have suggested that consumption propensities are influenced by previous peak incomes as well as by current income levels. Tom E. Davis of Johns Hopkins has shown that the Duesenberry-Modigliani models can be further improved by substituting previous peak consumption for previous peak income ("The Consumption Function as a Tool for Prediction", *Review of Economics and Statistics*, Vol. XXXIV, No. 3, August 1952). This procedure would be particularly appropriate in dealing with the postwar forties.

The criterion here employed, it is to be noted, gives a consumption standard which changes over time. This would be true in a secular sense, of course, in an economy marked by rising living standards. It would be true, also, with reference to periodic movements. Thus a consumption level carried over from a prolonged depression would not be the same as a consumption level carried over from a period of prosperity. These differences would have a bearing upon the choices entering into the use of disposable resources at different times. Thus in a period following prolonged depression some resources would be used to restore the consumption levels of a still earlier period.

Our procedure, in which each decade average provides a consumption standard for the following decade, implies that consumption levels advance or decline in jumps. This probably approximates the truth, for advances in such standards appear to come in uneven spurts. However, the reader should recognize that the discontinuities imposed by the use of fixed ten-year intervals are arbitrary in their timing and, to some extent, in their relative magnitudes.

With reference to consumption standards I would emphasize that this study relates to a particular historical period. The consumption levels that are taken to have been marked by strong tendencies to persist are those of the five decades 1891-1900 to 1931-40. It is possible that as durable goods and luxury elements become more important in consumer standards, persistence of consumption levels will be less marked. Thus the high postwar standards may be less tenaciously defended than were the lower standards of a decade or two ago. However, it is far from certain that even high standards, entrenched by ten years of habituation, would be lightly sacrificed if per capita output should continue to increase. (Standards of *use* will, of course, be more stable than levels of *purchase*. But the distinction between use and purchase has less significance for decade intervals than it would have for shorter periods.)

Maintenance needs are relatively stable in their changes from period to period. Expenditures for defense and for progress are far more variable. In tracing changes over the last half century it will be useful to treat maintenance expenditures as a first deduction from gross national product. The margin above maintenance requirements[8] is a quantity to which special interest attaches in a study of economic development.

The margin above maintenance needs

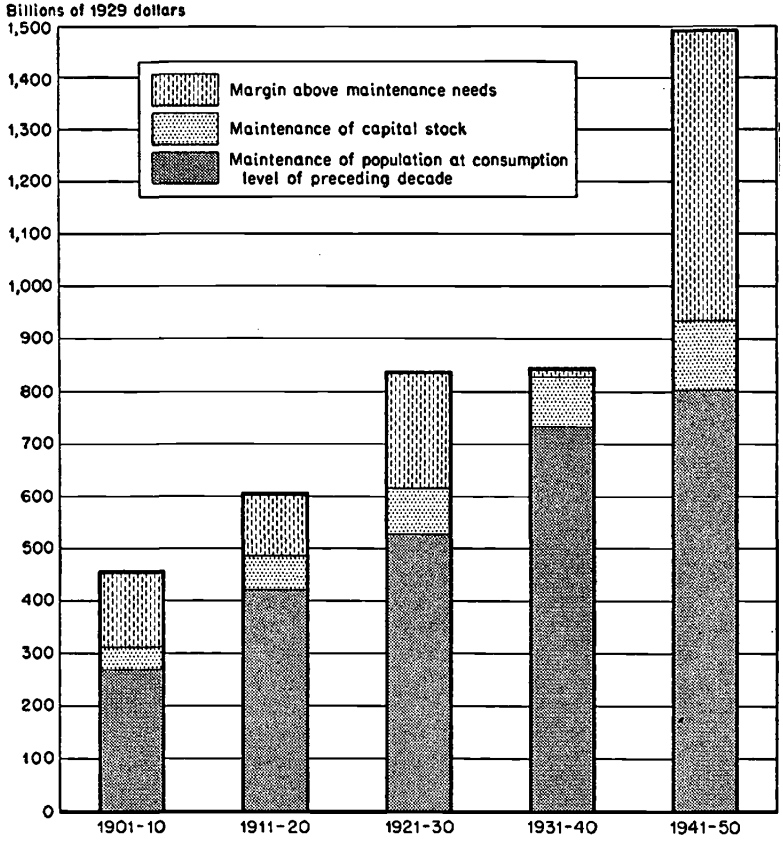
The deductions from gross national product to care for maintenance in a given decade must provide for the support of the population of that decade at per capita consumption levels equal to those prevailing during the decade preceding and for the production of capital goods sufficient to offset in full depreciation of the preceding decade's stock of capital. The procedure, using decade aggregates, is shown in the following table. A graphic representation of the division of decade totals is given in Figure 2.

		Maintenance charges			*Margin*
Decade	*Gross national product*	*Support of population*	*Capital stock*	*Total* Col. 3 + 4	*above maintenance* Col. 2 — 5
	(billions of 1929 dollars)				
(1)	(2)	(3)	(4)	(5)	(6)
1901-10	455	268	43	311	144
1911-20	603	420	65	485	118
1921-30	838	527	88	615	223
1931-40	843	734	95	829	14
1941-50	1,493	803	132	935	558

[8] I have elsewhere called a variant of this concept the "disposable margin". There is justification for this term, I think, in that there is a larger element of conscious choice, individual or collective, in the allocation of resources above those required for maintenance than there is in the disposition of resources that serve established needs for consumption or capital replacement. But the term is not altogether apt, since the margin must perforce be measured retrospectively. The resources entering into it, whether used for defense or for progress, have already been committed by the time measurement is possible. It seems advisable, therefore, to use the neutral term "margin above maintenance needs" or, in short, "output margin", in preference to "disposable margin".

Figure 2

Uses of Real Gross National Product
Decade Totals



The entries in column 6, which define amounts by which the gross national product exceeds maintenance needs, represent margins available for new uses. Without the product represented by each of these quantities we could, in any decade, maintain the existing stock of capital equipment and support the full population at the consumption levels of the preceding decade.[9] The margins above

[9] In the thirties we did not, in fact, achieve full maintenance, for actual consumption standards in that decade were slightly below those of the twenties. We devoted to population maintenance 725 billions of 1929 dollars, not the 734 billions required for full maintenance. We did, however, increase capital stock by a small amount.

maintenance requirements have ranged from a very small fraction of gross product, in the thirties, to almost 40 per cent of gross product, in the forties. Over the five decades they have averaged 25 per cent of gross product. In every decade except the depressed thirties the margin has been substantial.

Resources providing a margin above maintenance requirements may be used for defense, or to support an increase in consumption expenditures or an expansion of capital plant. Division of the total margin, by decades, among these three uses is shown in the following table and in Figure 3. The measures given are decade aggregates. For the five decades as a whole approximately 51 per cent

		Uses of margin above maintenance			
			Progress		
Decade	*Margin above maintenance*	*War and defense*	*Consumption increase*	*Net capital increase*	*Total for progress*
	(billions of 1929 dollars)				
1901-10	144	4	85	55	140
1911-20	118	28	37	53	90
1921-30	223	8	140	75	215
1931-40	14	11	—9	12	3
1941-50	558	228	285	45	330

of our output margin was used to raise consumption levels, 23 per cent was used to create net additions to our capital plant, and 26 per cent was used for defense.[10] About three-quarters of the margin was devoted to progress, one-quarter to national defense.

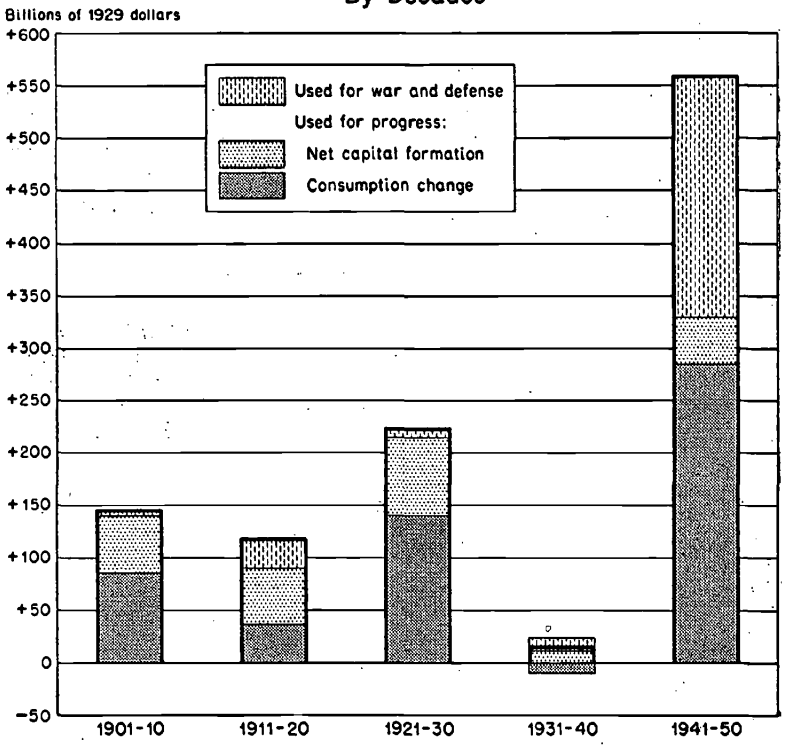
Behind these over-all proportions there have been wide decade-to-decade shifts in the uses to which the output margin has been put. Amounts spent for war and defense have varied from 4 to 228

[10] Each consumption increase in the above table is measured with reference to the preceding decade as standard, whereas the defense and capital formation figures are the total absolute amounts used for these purposes. If we use the consumption level of 1891-1900 as a fixed consumption standard for the fifty years from 1901-50, we may compare consumption changes for the whole half century with the absolute amounts used for other non-maintenance purposes. Using 1891-1900 as a base, we find that 74 per cent of the margin above maintenance needs was used to raise consumption levels, 12 per cent for net capital formation, 14 per cent for defense.

billions of 1929 dollars. Net capital formation has varied from 12 to 75 billions. Amounts devoted to consumption gains have ranged from −9 to 285 billions. Progress, as measured by the sum of the

Figure 3

Uses of National Product Margin above Maintenance Needs By Decades



amounts going to raise consumption levels and to expand capital plant, was most rapid in the first, third, and fifth decades. We have moved forward in three great surges, each taking the economy to a new peak.[11]

The entries measuring decade-to-decade changes in the resources

[11] What I have called margins above maintenance needs are, of course, not the same as increments to gross national product. Yet the two are not far apart in magnitude. Decade increments to national product, and the three major

devoted to raising per capita consumption levels are perhaps of greatest interest. These are the immediate indexes of changes in the material well-being of members of the population at large. In maintaining capital stock we are resisting the processes of erosion. In spending for war and defense we are diverting resources to necessary protection, but these uses do not represent social or individual advances. In adding to capital we are building instruments, not end products.[12] But in augmenting resources used for consumption we are adding to the goods and services that enrich living. The three decades — first, third, and fifth — for which the "progress" totals were greatest brought the sharpest gains in consumption. Depression followed by war retarded advance in the second decade of this century. In the twenties consumption levels were sharply

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uses to which each of these increments was put, are given in the following table.

Decade	*Gross national product increment*	*Uses of product increment*		
		Consumption	*Gross capital formation*	*War and defense*
	(billions of 1929 dollars)			
1901-10 (change from 1891-1900)	+161	+131	+28	+2
1911-20 (change from 1901-10)	+148	+104	+20	+24
1921-30 (change from 1911-20)	+235	+210	+45	—20
1931-40 (change from 1921-30)	+5	+58	—56	+3
1941-50 (change from 1931-40)	+650	+363	+70	+217

Two features distinguish this table from preceding text tables: 1) For all uses the figures here cited measure *changes* from decade to decade, not absolute amounts. 2) The consumption and gross capital formation entries include some requirements for maintenance as well as elements of progress.

Successive decade increments to national product have been mainly devoted to consumption. For the five decades as a whole no less than 72 per cent of the total of the increments to national product was devoted to consumer needs. Nine per cent was devoted to additions to gross capital, and 19 per cent to war and defense. There were, of course, variations from decade to decade, corresponding in general to decade shifts in margins above maintenance needs. The first, third, and fifth decades brought the greatest advances in both consumption expenditures and gross capital formation.

[12] The residential housing component of capital formation is an exception. Housing is an end product the use of which is spread over a number of years. For some purposes it would be useful to include residential housing among consumption goods. However, estimates of consumption including residential housing would not differ greatly from those given. Expenditures on residential construction during the last five decades have amounted to less than 5 per cent of all consumer expenditures.

advanced in a productivity spurt of exceptional intensity. Protracted depression brought retrogression in the thirties. The forties witnessed an extraordinary outburst of productive power. Drawing upon great additional resources of manpower and using improved equipment and new productive techniques, we provided war materials in massive proportions; in the same decade we lifted consumption levels to heights never before attained.[13]

We obtain a clearer view of the historical course of consumption levels by reducing the consumption increments to per capita terms, and showing each decade gain against the pre-existing level of per capita consumption. This is done in the following table; the expenditure figures are decade totals, per capita.

Decade	*Per capita consumer expenditures* (1929 dollars)	*Change from preceding decade* *Absolute* (1929 dollars)	*Relative* (per cent)
1891-1900	3,157		
1901-10	4,166	1,009	+32
1911-20	4,537	371	+9
1921-30	5,741	1,204	+27
1931-40	5,670	—71	—1
1941-50	7,692	2,022	+36

From an average per capita expenditure of $3,157 in the decade 1891-1900, there was an advance of over one thousand dollars to $4,166 in the decade 1901-10. (These are, of course, decade totals, in dollars of 1929 purchasing power. A figure for per capita expenditure per decade may be divided by ten to give the more familiar

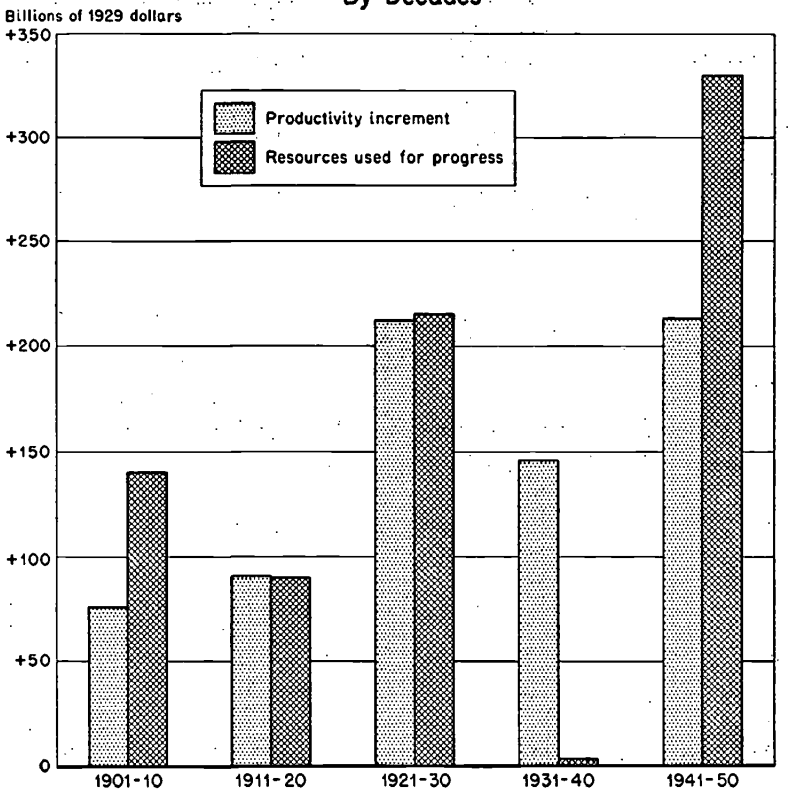
[13] The major advance in consumption levels came, of course, in the second half of the latest decade, but even during the years of fighting there was a substantial net gain in the output of consumption goods. We may, roughly, break the total consumption increase of 285 billions of 1929 dollars recorded for the decade as a whole into a 93 billion dollar gain from 1941 to 1945 and a gain of 192 billions from 1946 to 1950. The base of comparison for each of the five-year periods is the decade 1931-40.

One factor contributing to the notable consumption gain in the forties was the relatively low level of consumption in the thirties, which fell slightly below the preceding decade. The thirties provide the base of comparison for the forties.

average annual per capita expenditure on consumption goods and services.) This was a gain of 32 per cent over the ten-year period. The next great advance came in 1921-30, with a jump of 27 per cent over the preceding decade. The final decade brought a gain of 36 per cent in per capita consumption expenditures, to a level of $7,692. This amounts to $769 per capita of the population per year, a notable advance over the average of $316 prevailing fifty years before. (The yardstick is, of course, a dollar of constant purchasing power.) The thesis that industrial development is necessarily marked by increasing misery would be hard to defend in the light of this record.

Figure 4

Productivity Increments and Resources Used for Progress By Decades



On the role of the productivity increment in progress

Decade after decade the major portion of the resources making up the margin above maintenance needs has been used for progress — to elevate consumption levels and to expand our capital plant. The resources so used are not sharply defined. We do not earmark for particular uses certain additions to labor input, certain new plants, or specified productivity gains. Nevertheless, we may ask what part has been played in the economic advances of the last fifty years by the increments to product attributable to gains in productivity. We cannot trace particular gains to particular results, but it is suggestive to compare the magnitudes of productivity gains, margins above maintenance needs, and resources used for progress. The several series, in the form of decade aggregates, are repeated in the following table. The measures relating to productivity and progress are shown graphically in Figure 4.

Decade	*Productivity increment*	*Margin above maintenance*	*Resources used for progress*	*Productivity increment as percentage of margin above maintenance*	*Productivity increment as percentage of resources used for progress*
	(billions of 1929 dollars)			(per cent)	(per cent)
1901-10	76	144	140	53	54
1911-20	91	118	90	77	101
1921-30	212	223	215	95	99
1931-40	146	14	3		
1941-50	213	558	330	38	65

In the thirties substantially all the productivity increment was used for maintenance purposes. Omitting this decade, the sum of the productivity increments was equal to 57 per cent of the sum of the margins above maintenance needs, to 76 per cent of the sum of the resources used for progress over the half century. These percentages varied from decade to decade, but only in the forties did the productivity increment amount to less than one-half of the margin above maintenance needs. (A great increase in the volume of labor input was the chief factor in the expansion of this margin in that period.) The productivity increment equaled the full amount of the resources utilized for progress in the second

and third decades; in the first decade it was more than one-half, in the fifth decade almost two-thirds, of the total amounts available for progress.

In considering productivity gains as a factor in economic and social progress, we must not regard productivity as an independent first cause, nor overlook the reverse influence of progress on productivity. We may not say that there would have been no progress in the second and third decades had there been no productivity gains, or that the increment to product available for progress would have been reduced by fifty to sixty per cent in the first and fifth decades if manhour output had not increased. For if productivity had not increased, complex related processes would have been modified. Hours of work would not have been reduced as they were in the twenties and thirties if manhour output had not gone up; the size and degree of use of the labor force would have been altered somewhat; the capital plant would not have grown as it did, and capital maintenance requirements would have been less. In the interactions of the factors in economic change, productivity gains were at once cause and effect of these associated movements in capital supply, in the labor force, and in working conditions. Yet there can be no doubt, from the relative magnitudes involved, that the productivity factor, as a closely correlated variable, has played a major part in the advances in consumption levels and the expansion of capital plant that constitute economic progress.[14] The form of progress most richly and consistently aided by

[14] Additions to output attributable to the input of new labor played a major role in meeting defense needs in the forties, and contributed materially to progress in that decade. In the thirties the labor input increment was negative. It was small in the twenties — equal to less than one-ninth of the output of resources used for progress. In the decade spanning the first world war the labor input increment, while not inconsiderable, was much smaller than the productivity increment. Only in the first and fifth decades was the input of new labor large enough to play an active role in progress.

There can be no doubt that some part of the labor input increment (a part including the labor of immigrants and of new members of the labor force with young families) is utilized for population maintenance, rather than for the lifting of consumption levels or for net capital formation — the two forms of economic progress. In periods of war a major portion of the labor input increment is allocated to defense. These considerations support the evidence provided by the statistical record that the productivity increment has been a far more potent factor than the labor input increment in economic progress in the United States over the last half century.

productivity gains has been progress in living standards. Such gains have also given steady support to the expansion of capital plant. They have helped to maintain established consumption standards when other instruments failed. The steadily re-created productivity increment has been, at once, the spearhead of progress and a reserve against emergency.

IV

In the preceding pages we have discussed the pattern of economic growth of the United States over the last half century. The materials presented bear on questions central to the appraisal of an economic system. Has it produced? Has it grown in effectiveness as a producing mechanism? It was Ernest Bevin's view that the central test of an economy is "Has it delivered the goods?". But this cannot be the sole criterion of judgment. We must ask "How has productive power been used?" This question raises issues beyond the economic. Arnold Toynbee has said that the new power found through the simplification of process that generates the growth of civilizations always presents a moral challenge. Disposable resources may be used to promote welfare or illfare. In a progressive economy, marked by steadily recurring productivity increments and expanding margins above maintenance needs, each generation faces this challenge anew.

Our economy, in its performance over the first half of the twentieth century, has clearly met Bevin's test. We have used our natural resources to produce a great and growing volume of goods and services. Apart from the protracted check that came in the thirties, the advance has been virtually unbroken. By far the greatest factor in this gain has been rising productivity. Machines, plants, administrative methods, and men have improved in productive quality; equipment has grown in quantity; flexible power has been carried to assembly line and bench. These improvements, embodied in innumerable major and minor working methods, have brought an increase in output per unit of productive effort that is probably without precedent in our history.

Appraisal of the uses to which these tremendous productive