Uses of National Income

in Peace and War

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As a background for understanding the factors that have controlled real investment and consumers' outlay and their bearing upon the present situation, this paper surveys briefly the proportions that have gone into these two components of national income in this country during the last six decades. The analysis must be tentative, not only because the estimates are crude and preliminary but also because our knowledge of what determines the division of the national product between ultimate consumption and real investment is so incomplete. Yet from the little we know we must try to come to some conclusions.

The Past Course of Capital Formation and Consumers' Outlay

Real investment or capital formation as measured here comprises (1) the value of producers' durable equipment (machinery, trucks, etc.) reaching the business and public enterprises that use it, at cost to them; (2) the value, at cost, of all new construction including major repairs and alterations (residential, commercial, industrial, public utility, semipublic, public); (3) net additions to stocks of commodities held as inventories by business enterprises; (4) changes in net claims by individuals, firms, and public units in this country against individuals, firms, and public units in other countries. The sum of these four components is the part of the current national product that is diverted from immediate consumption into additions to the capital of business and public enterprises. While it accounts for the major portion of the current increment to the country's total wealth, it omits some items.[1]

1 These omissions comprise some additions to tangible wealth, such as increases in commodity stocks of nonbusiness enterprises and of households; all investment in the productive capacity of the individuals who make up the nation; all additions to values of intangible assets (such as goodwill), even though attained by actual outlay; all purely pecuniary appreciation of assets; and all additions that result not from current production but from the bounty of incalculable providence (e.g., discovery of oil in excess of the

Capital formation so defined can be estimated gross or net of the current consumption of durable capital, i.e., of producers' durable machinery and equipment and of structures. For many purposes, especially consideration of short term problems, gross capital formation may be more relevant and useful than net.

Net capital formation is one component of the net national product or national income; the other is consumers' outlay, i.e., the value, at cost to ultimate consumers, of the finished commodities and services that flow to them. Gross capital formation can be treated as a component of gross national product, i.e., of national income taken gross of the durable capital consumed in production. Gross national product is the sum of gross capital formation and consumers' outlay.

Capital formation as estimated here includes residential construction, but omits consumers' durable goods (such as passenger cars, furniture, heavy household equipment). However, from the totals we can estimate the value of consumers' durable commodities as well as of three other components of consumers' outlay: perishable commodities, semidurable commodities, and services not embodied in new commodities. We therefore have a fourfold breakdown of both consumers' outlay (perishable, semidurable, consumers' durable, services not embodied in new commodities) and capital formation (all construction, producers' durable, inventories, claims against foreign countries), or a breakdown of the national product into eight categories. Approximate as the estimates are, they give a rough picture of the constitution of our national product from 1879 to

(note 1 concl.)

cost of discovery). Under all these categories there may be not only additions to wealth, but also drafts upon it. Since we exclude additions under these categories from capital formation (gross), we exclude drafts upon capital under these categories in estimating capital consumption.

1938, viewed in terms of its utilization either for direct ultimate consumption or for capital formation.[2]

After these estimates were published, we calculated totals also for overlapping decades (i.e., not only for 1879–88, 1889–98, etc., but also for 1884–93, 1894–1903, etc.), so that for the sixty years we have eleven overlapping decades, the midpoints of each pair separated by five years. The estimates are in both current and constant prices (as of 1929), but our main interest is in the apportionment of the real product rather than of monetary values expressed in a changing monetary unit. As all these shares are for decades, they are not affected by short term fluctuations.

1) In 1929 prices the share of gross capital formation in gross national product ranged prior to 1919–28 from 22 to 25 per cent (Table 1). The secular stability that characterized the share of gross capital formation until the 'twenties gave place to a decline. During 1919–28 the share shrank to one-fifth; during the next decade, which included the severe depression, it shrank to 14 per cent.

In current prices (prices actually prevailing in successive years of the record) the share of gross capital formation in gross national product is even more stable. The percentages fluctuate between 20 and 21 during the decades from 1879–88 to 1919–28, then decline to 15 in 1929–38.

2) The decade shares of net capital formation in net national product fluctuate somewhat more (Table 2). Yet for the first 40 or 50 years no long term trend is evident. In 1929 prices the share ranges from 12 to 15 per cent through the 1914–23 decade, then drops to 2 per cent in 1929–38. In current prices, it remains through 1919–28 at a level of about 11 per cent, then drops to 3 per cent in the last decade.

3) If we add consumers' durable commodities to capital

[2] They were first presented for six decades in a paper read in the autumn of 1940 at the Bicentennial Conference, University of Pennsylvania (published in *Studies in Economics and Industrial Relations*, University of Pennsylvania Press, 1941, pp. 53-78).

formation, the share of gross capital formation in gross national product in 1929 prices is raised to a level of 27-30 per cent; and the share of net capital formation in national income, to a level of 17-21 per cent through the 1920's (Table 3).[3] They decline only during the last two overlapping decades which include the depression years after 1929.

4) The share of consumers' outlay in the national product and its behavior are, of course, determined by the size of the other component, capital formation, its stability during the first eight decades, and its decline during the last three. Consumers' outlay (including consumers' durable commodities) accounted for 75-78 per cent of gross national product and for 85-88 per cent of national income. Fairly stable until the 1920's, it increased somewhat during that decade largely because of the increase in the share of consumers' durable goods; and increased even more with the oncoming of the depression and the contraction in the national product. During 1929–38 it accounted for 85-86 per cent of gross national product and for 97-98 per cent of national income.

5) Of the four components of capital formation, construction is by far the largest, followed by producers' durable goods, net additions to inventories, and net changes in claims against foreign countries (Tables 4 and 5). But there are marked shifts in their relative shares. In 1929 prices the share of construction definitely declines, especially in gross capital formation (from about two-thirds in the earlier decades to somewhat over one-half in the later); that of producers' durable more than doubles (rising from about one-sixth in gross capital formation to over one-third). The share of net additions to inventories, accounting for about one-tenth of gross capital formation and about one-fifth of net, does not show a marked trend; the share of net changes

[3] However, the consumption of consumers' durable commodities is not allowed for. It is production net of such consumption that should be included in net capital formation.

in claims against foreign countries, negative and minor before the first World War, became positive and substantial thereafter, especially in net capital formation.

6) In consumers' outlay the largest component of the four is the flow of perishable commodities, which accounts for 40-50 per cent; the next largest is the value of services not embodied in new commodities (rent, direct personal and professional services, direct payments by individuals to governments, repairs and servicing of consumers' durable and of residential housing, etc.), which accounts for 30-35 per cent (Table 6). Semidurable commodities constitute about 15 per cent, and consumers' durable, somewhat less than one-tenth, on the average. But here again we find marked changes in the composition of consumers' outlay. In 1929 prices the share of perishable commodities declines from about 50 to about 40 per cent. That of consumers' durable almost doubles (from about 6 per cent in the early decades it rises to well over 10 in the later). The share of services not embodied in new commodities seems to increase slightly, but the samples of expenditures on which our assumptions are based are scattered and rather inadequate. The share of semidurable commodities remains about the same.

This summary necessarily omits several observations that scrutiny of the estimates suggests. It does not mention the rate of growth in national product, capital formation, and consumers' outlay in the past—in the totals, per capita, or in measures per some other population unit; or the rather interesting suggestion that changes in the rate at which consumers' outlay and capital formation grew are inversely related during most of the period, especially in the early decades preceding the first World War. But all we need say here is that in 1929 prices national product, capital formation, and consumers' outlay increase from one decade to another; that national product declines only during the last

decade, 1929–38; that consumers' outlay does not decline at all, even in the last decade; and that capital formation declines beginning with the decade 1924–33.

Some of the long term trends are in line with expectations and can be explained easily. The decline in the share of construction and the rise in the share of producers' durable goods reflect the building up of our basic housing and industrial systems and the shift of emphasis to machinery and equipment. The reversal of the sign and the increase in net changes in claims against foreign countries reflect the shift in this country's position from an international debtor to a creditor, in the past a usual corollary of a country's attainment of industrial maturity. The shift in consumers' outlay toward consumers' durable commodities and services not embodied in new commodities is a natural concomitant of a rising standard of living. Not only did the share of consumers' durable commodities increase but the more dispensable goods came to dominate: outlay on passenger cars and radios grew faster than outlay on furniture. There is no need to discuss these trends; we merely note them for future reference.

But two observations are relevant at the moment. First, in no past decade has net capital formation exceeded 15 per cent of national income (in 1929 prices); and in only one (1889–98) did it exceed 14 per cent. Of course, for single years or pairs of years during the period before 1919 this share may have been higher than the average (12 per cent). But since 1919, the one period for which we have annual estimates, in only two years was it slightly over 15 per cent; and in no period of more than two years did it average over 11 or 12 per cent (Table 8). The smallness of the share of capital formation in national income has obvious implications in an emergency such as the present. We should therefore try to explain why the share is not larger.

Second, the ratio of capital formation to the national

product has been stable. Except during the periods affected by the severe depression of 1929–32, when the decade averages even of the national product declined, the share of capital formation in national income fluctuates from decade to decade, largely because of the prevalence of long cycles in construction, but shows no definite trend either upward or downward. The decade shares of gross capital formation in gross national product are similarly devoid of a long term movement. Why, in view of the consistent and large increase in real product per capita, should there be such secular stability in the division of the national product between consumers' outlay and capital formation? Why, with a gain in income per capita, did not the propensity to consume weaken and that to save become stronger, increasing the share of capital formation in the national product? What mechanism served to enlarge consumption *pari passu* with the growth in the national product, thereby maintaining the relative shares of consumption and investment?

Let us consider this mechanism in studying today's problems. Apparently, the factors that explain the secular stability explain also the limits upon the absolute size of the share of capital formation in national income. We therefore deal first with the factors that tended to produce secular stability in the division of national income between consumers' outlay and capital formation; then indicate their bearing upon why such a small fraction was left for capital formation.

THE FACTORS IN SECULAR STABILITY

We list some of the more important factors that make for larger consumers' outlay per capita, indicate those that contribute to a rise in capital formation *pari passu* with the rise in national product, and describe the mechanism that serves to align these groups of factors so that neither consumers' outlay nor capital formation grows faster than total national

product. But the explanation is tentative and is offered chiefly in the way of suggestions.

1) The factors that made for larger consumers' outlay per capita concurrent with a mounting national product per capita seem to be as follows.

First, some of the conditions inducing or accompanying the growth in national product per capita depended upon and called for larger outlays by ultimate consumers. For example, the close connection between scientific progress, personal skill, and a sustained rate of economic progress meant a demand for more extensive and intensive education. But money spent on education is part of consumers' outlay. The large growth in the proportion of urban dwellers, a corollary of the increasing industrialization that gave the basis for a sustained increase in national product per capita, imposed upon more and more people living conditions whose discomfort could be lessened only by additional expenditures on items included under consumers' outlay. The increasing division of labor and complexity of the economic system, with the need for more regulation, were consequences of the very factors that made for the rapid growth of national income; and they called for a larger consumers' outlay, specifically those parts that were in compensation for the services of regulating public and other agencies.

Second, technical progress influences the production not only of capital goods but also of finished consumers' goods and the demand patterns of ultimate consumers. Thus, technological innovation, which contributed to the increase in output per capita, served, by stimulating demand for new products or for improved old ones, to enlarge consumers' outlay; or more precisely, contributed to a greater potential demand for consumer goods. Even a hasty glance at the make-up of consumers' outlay in recent decades will indicate how large a portion of it is commodities and services that are distinctly results of modern technology and of rela-

tively recent technological innovations.[4] Among the perishable are certain drugs and toilet preparations and gasoline; among the semidurable, tires and tubes and certain types of housefurnishings; among consumers' durable, electrical household appliances and supplies, radios, passenger cars, etc.; among services not embodied in new commodities, services of professional practitioners vastly superior to those in the past, repair services in connection with the new types of consumers' durable goods, and the like. In short, technological progress has stimulated individual and household demand for more and different consumer goods as well as brought pressure for more roundabout methods of production and hence for more capital formation.

Urbanization and changes in the economic status and age structure of the population suggest other factors contributory to a greater average consumption per capita. As population moved from the country to the city, and especially as the proportion of independent proprietors of unincorporated businesses declined and that of wage and salary employees rose, there was more exposure to the attractions of a high-level consumption pattern and less drive to save in order to accumulate capital for the expansion of one's own business. These factors may have gone a long way toward offsetting any potentially depressive effects of a larger income per capita upon the propensity to consume or its expansive effects on the propensity to save. In addition, the relative gain in the number of younger adults meant that the secular increase in the number of both producing and consuming units was greater than in the total population, inducing larger consumers' outlay *per capita;* and that the secular increase in national product per consuming unit was, therefore, smaller than in product per capita.

2) There are also obvious factors that tended to sustain

[4] See the analysis of the output of manufactured products in 1879 and 1889 and in 1929 and 1939 by W. H. Shaw in Finished Commodities since 1879 (*Occasional Paper 3*, Aug. 1941), pp. 12-3.

capital formation, preventing a secular decline in its share, at least up to the 1920's. First, since two large components of capital formation, residential construction and the construction of associated utilities serving consumers directly, are part and parcel of the pattern of ultimate consumption, an increase in the latter would necessarily mean an increase in the former. Second, other components of capital formation consist of capital invested directly in the production of finished consumer goods. Any increase in the latter would tend to keep up the production of such capital, even were there no technological changes that would require a larger capital investment per unit of finished product. Third, technological innovations may create a demand for new capital, even beyond the increase called for by greater consumers' outlay.

3) We do not know enough about the factors that make for larger consumers' outlay as against those that make for increased capital formation to demonstrate how and why their combined influence kept their shares in the national product stable from 1880 to 1920 (or 1930). But we point out the close interrelation of the factors that swell the per capita amounts of both components and the close interdependence of these components in the sense that an increase in one tends to cause an increase in the other. These bonds of common factors making for expansion and for interdependence at least suggest why the relative shares of consumers' outlay and capital formation tend toward secular stability, unless a major technical change temporarily emphasizes the expansion of consumption, as it did in the 1920's via demand for passenger cars; or unless an extraordinarily severe depression cuts the growth of the national product sharply and thus serves to augment the share of the component more resistant to contraction, viz., consumers' outlay.

Moreover, certain features of the distribution of national income made for stability in the relative shares of consump-

tion and real investment or savings, at least during the period with which we are concerned. In general, almost all the monetary equivalent of national income is distributed in the form of payments to ultimate consumers. The share of national income retained by enterprises during 1919–28 was quite small (about 5 per cent); during 1929–38 it was negative.[5] In the earlier decades it was probably not much, if at all, larger.

In the total flow of current means of payment to ultimate consumers the relative shares of service income payments (the sum of employee compensation and withdrawals of entrepreneurs' incomes) and of property income payments (dividends, interest, and rent, including or excluding savings of enterprises) in national income also show over the same long period marked secular stability (Table 9). As the net income originating in an industry grows, the continuous pressure of the employed and gainfully attached to get their share causes a tendency toward stability in the share of service income payments within the industry. While in some industries this share may shrink because proportionately more money is invested in fixed capital and property (as rapid technical progress requires greater investment in fixed capital than in direct costs), in other industries the reverse may occur; and there may be a compensating increase in the relative weight in the national economy of industries with a higher than average ratio of service income payments to net income originating. Secular stability in the shares of service and property income payments, in turn, suggests secular persistence in the degree of inequality in the distribution of income by size among recipient units, such as individuals and families; and such persistence is at least not belied by what little historical evidence we have.[6]

5 See *National Income and Its Composition*, Table 22, I, 216-8 (National Bureau of Economic Research, 1941).

6 Stability in the relative shares of service and property income in national income removes only one factor that might have made for changes in the

This, in turn, suggests temporal stability in the shares of consumption and savings in income; and thus suggests, in terms of the disposal of means of payment, the secular stability that was observed in the division of the real product between consumers' outlay and capital formation.

To repeat, the explanation submitted above is highly tentative and can hardly claim to have even mentioned all the factors involved. It is rather a list of suggestions why, for the period studied, there seems to be secular persistence in the share of capital formation in the national product, suggestions that need corroboration by more specific evidence. Especially should we resist the temptation to infer that such secular stability will necessarily continue. On the contrary, it is more probable that, as in some more fully industrialized countries, the share of capital formation may decline, a tendency especially probable if we consider *domestic* capital formation alone and exclude investments abroad.

If these arguments explain to some extent why the relative shares of capital formation and consumers' outlay were stable secularly, they contribute also to an understanding, if not to an adequate explanation, of why the share of net capital formation is so moderate. First, the account above of the factors that make for a concurrent rise over time in consumers' outlay and capital formation indicates also that at any given moment the division of national income between the two components is the end product of a variety of forces, some of which tend to make for a large share of consumers' outlay and others for a large share of capital formation. That the end product is a relatively moderate share of capi-

(*note 6 concl.*)

inequality in the distribution of income by size. It does not preclude the possibility that other factors, such as differences between average income from service and property, the degree of inequality in the size distributions of service or of property income, each group taken separately, may have changed so as to affect the size distribution of income among ultimate recipients.

tal formation must obviously be traceable to the expansibility of consumers' wants; to a decisive preference of human beings endowed with a limited life span for present satisfactions over future in an uncertain world; and to the necessarily limited stream of investment opportunities whose prospective net returns would be sufficiently great to outweigh the preference on the part of income recipients for present satisfactions.

Second, if, as our estimates show. the division of national income between consumers' outlay and capital formation remained secularly stable during the four decades that preceded the 1920's (and some preliminary estimates suggest that it was about the same during a fifth decade, that of the 1870's), the reason that the share of capital formation was not more than about 15 per cent lies in the economic situation prevailing four or five decades before the 1920's. Since we are not in a position to analyze that situation we cannot demonstrate why this share should have been 15 rather than 20 or 30 per cent. Possibly with the level of national product per capita that prevailed in the 1870's and 1880's and with the free competitive system existing then, it was not feasible to devote more than one-seventh of national income to purposes other than direct ultimate consumption. At any rate, the relatively small share of capital formation in national income seems more plausible when it is traced back to the earlier decades in this country's growth, decades marked by per capita income much lower than at present, than when one attempts to see the reason for it during recent years, marked as they were by such high levels of per capita income.

Both arguments are merely suggestions that indicate in what directions one must seek an adequate explanation of the relatively small share of capital formation in national income. The explanation itself could be attained only by dint of elaborate further study, beyond the scope of this paper.

The record of the past indicates that with a rapid growth in national product per capita, the interdependence of consumers' outlay and capital formation meant a continuous growth in both; that the share of capital formation in national product did not grow with the product per capita; and that net capital formation constituted not more than 15 per cent of national income. In contrast, the various plans for war outlay now envisage diverting 40 or 50 per cent of national income from immediate consumption by individuals and families.

The estimates quoted for the past relate to decades and, of course, to the performance of the economy under more or less normal economic conditions, while the plans for war outlay are predicated for a period much shorter than a decade and are for a situation in which significant departures from the ordinary functioning of economic and social institutions can and will be made. But obvious as this comment is, let us consider what these peculiar circumstances of the emergency may mean if a greater proportion of a mounting national income is diverted from immediate consumption.

First, there is the divorce between net capital formation and consumers' outlay. The connection between the two, so close in the secular development of the economy and so instrumental in giving secular stability to their relative shares, is broken by an entirely new stimulus to diversion from ultimate consumption. To what extent this entails a complete shift of net capital formation to war purposes and away from servicing industries concerned with consumers' outlay depends partly upon mobility of resources, partly upon how long the war lasts. If we provisionally make the most extreme assumption, namely, that for the duration no new capital formation will take place except that directly relevant to and part of the war outlay, about 15 per cent of national income can be turned to war production.

But should we not consider gross rather than net capital formation? It is gross capital formation that measures the value of all finished machinery, equipment, new construction, net additions to inventories, net changes in claims against foreign countries, the sum of which is the value of finished products diverted from ultimate consumption. The charge for depreciation and obsolescence, the difference between gross and net capital formation, does not measure actual retirement or destruction of existing capital goods: a substantial part measures the opportunity cost of keeping machinery, etc. instead of replacing it with technically more advanced and newer equipment. In times of emergency such opportunity cost may be, temporarily, quite low, and we may claim that the full value of all capital formation, gross of depreciation and obsolescence, can be diverted to war outlay. If the emergency is relatively short, such a view is tenable since failure to replace does not necessarily entail reduction in the productive capacity even of that peacetime part of the industrial system whose current additions to replacement funds have been absorbed into war production. Therefore, gross rather than net capital formation should be considered in estimating how much can be diverted from direct or indirect use for ultimate consumption. In the past, it constituted, at best, about one-fourth of gross national product. But it is a higher percentage of national income, since gross national product has recently averaged some 112 per cent of national income (for the prosperous decade 1919–28; the ratio would be higher for the 1930's). Gross capital formation is about 28 per cent of national income under conditions approximating the prosperous past; and this is the percentage that can be diverted, again assuming full mobility of resources and a brief emergency.[7]

[7] War outlays are usually calculated gross, and when compared with national income the comparison is essentially of gross quantities with net. Hence gross capital formation can be considered the proper component in war outlays. When we compare it with national income (rather than with

But the assumptions under which this percentage was derived are manifestly unrealistic. The basic qualification is that productive resources used to turn out peacetime capital goods may, when diverted to the production of war instruments, yield a significantly higher or lower gross value product. The complex of raw materials, machinery, and labor used to produce a truck, a locomotive, or a typewriter, may when used (with some adjustments) to turn out a tank or a set of torpedo parts, yield a higher or lower gross value of finished products: the raw materials may be used more or less economically; the machinery may find, upon conversion, a more or less productive use; labor may be applied more or less efficiently. These changes in productivity are not clearly taken into account in the usual assumption of constant price levels: the changes are not in prices of identical goods, but in the technical conditions of production that make labor, machinery, and sometimes even raw materials not quite comparable as between civilian and war use. Similar considerations apply to the discussion below, when we treat of the possible diversion from the output of con-

(*note 7 concl.*)

gross national product) we are following the procedure usual in discussions of war outlays, although it may lead to absurd results, since under it war outlays may exceed national income.

Gross capital formation as measured here is net of repairs and maintenance: and it may be argued that during short periods of emergency, outlays on repair and maintenance may also be reduced and the real resources involved diverted to war uses. The estimates, for public utilities and governmental capital (highways and sewers), indicate an outlay in these areas alone of roughly $3 billion in 1929 (see Solomon Fabricant, *Capital Consumption and Adjustment*, National Bureau of Economic Research, 1938, Table 31, pp. 170-1). And it is reasonable to assume that the total maintenance and repair bill, as distinct from depreciation and depletion charges, might amount in prosperous years to between 5 and 7 per cent of the national income. No allowance has been made in the discussion below for diversion from this source, since it seemed doubtful that, with the strain imposed upon durable commodities and structures by a higher rate of utilization during the emergency, much reduction in the repairs and maintenance outlay could be expected.

sumer goods to war production: this diversion again means a marked break in the technical coefficients of production. And while the possible differences in the yield of complexes of productive factors as between peace and war uses tend to be kept within limits (under assumption of constant prices) by the continuity of identity of these factors in the process of transition, there may nevertheless be sizable differences. Unfortunately, we cannot take account of them quantitatively; and for the diversion from both gross capital formation and consumers' outlay we are forced to assume that the productive resources that yielded, in peacetime use, a billion dollars' worth of final products (in 1941 prices) will yield, when turned to war production, a value product not too far from $1 billion (in 1941 prices).

But the assumptions are also unrealistic in the sense that complete diversion of gross capital formation to war uses is predicated. Two factors make such a complete transfer unlikely. First, diversion of capital formation, which has been so closely tied to the production of peacetime goods, into essentially different channels within a short time assumes mobility of resources; yet resources are mobile only over relatively long periods. If the period is long, however, failure to replace capital goods or to add to their stock may seriously curtail the capacity of the system devoted to the production of the consumer goods we cannot do without. Hence, in thinking of a brief emergency, we must assume that some of the resources ordinarily devoted to private capital formation would continue so. And in considering a long emergency, we must allow for some private capital replacement and additions to assure the production of whatever consumer goods seem essential.

Second, the very increase in production for war purposes assumes bigger demand for some nonwar capital formation, unless we include under war production not only commodities and services directly utilized in war but also all goods involved at second, third, fourth, etc., remove. If more tanks

are produced and a bigger supply of steel is called for; and this bigger supply of steel calls for new steel capacity, which in turn calls for more construction and therefore for more bricks, do we consider the manufacture of bricks war production and include its full value under war outlay? Obviously, if we carry our classification of goods as war goods too far, war outlay encompasses almost all economic production. And if we confine war outlay to the cost of final war goods and perhaps the capital goods immediately involved, nonwar capital formation (gross or even net) may be the prerequisite for the development of the war effort on the scale assumed.

What share of national income will be claimed by nonwar capital formation, i.e., cannot be transferred to war effort or cannot be dispensed with during the emergency, we can only conjecture. Perhaps some idea of the rock-bottom levels to which this ratio can descend can be formed from the experience of the severe depression of the 1930's. During its worst years, 1932 and 1933, the ratio of gross capital formation to national income was between 7 and 8 per cent; and its ratio to estimated depreciation and depletion charges during these years was between 42 and 48 per cent (Table 8). Neither is an adequate base on which to judge the irreducible minimum of nonwar capital formation that must be allowed for. Eight per cent of the large national income of today and tomorrow means much more in terms of the relative replacement of capital goods than 8 per cent of the small national income produced in 1932 and 1933; and it may therefore be argued that such an allowance for the minimum ratio of nonwar capital formation to national income is too generous. On the other hand, total depreciation charges do not measure either retirement or incentives for nonwar capital formation: such incentives are better reflected in the size of the national income and, even for nonwar capital formation, are likely to be stronger during a war economy than during the trough years of a severe de-

pression. First, we assume that the indispensable minimum of nonwar capital formation is 8 per cent of national income; then, we make the more moderate assumption that it is 40 per cent of the depreciation and depletion charges.[8]

These crude calculations suggest that if war outlays are to exceed one-fifth of national income, we must, even on the assumption that all except an irreducible minimum of capital formation is transferred to war purposes, think of paring down the share of consumers' outlay in national income. But how much the reduction will be and what it will mean in the way of scrimping consumption can be clearly visualized only if consumers' outlay is measured absolutely (rather than as a percentage of national income) and related to the number of consuming units. We must, therefore, posit some level of national income and some number of consuming units during the emergency.

Let us take as a reasonable guess an annual national income for the war years of about $105 billion in 1941 prices. The latest estimate of national income for 1941 suggests a level of about $95 billion; and the assumption would thus mean a substantial relative increase in 1942 over 1941. Yet the guess may be on the low side even for 1942, if we take into account the recent rate of expansion of the national product and include under national income, in the calculation of governmental net savings, the accumulation of all assets including planes, tanks, ammunition, etc. (a proce-

8 On the basis of the national income total assumed below, nonwar capital formation estimated at 8 per cent of the former amounts to $9.8 billion (in 1929 prices) while depreciation and depletion charges are $10.5 billion. If such irreducible nonwar capital formation is assumed to be 40 per cent of depreciation and depletion charges, its annual amount is $4.2 billion. In prosperous times in the past, gross capital formation (preponderantly and overwhelmingly nonwar in character) amounted to 28 per cent of national income, and for a national income of $122.1 billion (in 1929 prices) would be $34 billion. The 'high' assumption for nonwar capital formation during war years, therefore, means a reduction to between one-third and one-quarter of a presumptive peacetime amount; the 'low' assumption, a reduction to about one-eighth of the latter.

dure refused by the logic of the analysis at hand). For 1943 and 1944 a level of national income of $105 billion in 1941 prices may be even more of an under-estimate. Yet we preferred to proceed on the more conservative assumption, and based our illustrative calculations on this level. Since the average cost of living index in 1941 was 86 per cent of that in 1929, the assumed national income is, in 1929 prices, roughly $122.1 billion.

Our discussion has been based upon a ratio of net capital formation to national income of 15 per cent; this leaves about $103.8 billion (in 1929 prices) for consumers' outlay. Consuming units for these two or three war years may be roughly estimated to be 100 million.[9] If the share of consumers' outlay in national income remained the same, outlay per consuming unit during the war years (say 1942–44) would average some $1,038 in 1929 prices, a consumption level much higher than that prevailing during 1929–38 ($757 in 1929 prices, see Table 10); and even higher than those for 1938 and 1929 ($791 and $880 respectively in 1929 prices).[10] This conclusion is obvious, based as it is upon calculations that transfer to consumers' outlay the full relative increase in national income caused by an extraordinary expansion of war production.

What percentage of national income could be diverted to war purposes if, instead of allowing consumers' outlay to grow with national income, we kept outlay per consuming unit at prewar levels? If we assume that outlay per consuming unit remains at the average level of 1929–38 (i.e., $757 in 1929 prices), consumers' outlay during the war years would amount to $75.7 billion. This would mean a ratio of

[9] From 95.8 million in 1938 they have been assumed to increase at a rate of about 0.9 million per year, the rate for the years preceding 1938 (see *National Income and Its Composition*, Table 8, I. 151). In translating population to consuming units we weight age and sex groups by their consumption needs. For the scales used see W. S. Thompson and P. K. Whelpton, *Population Trends in the United States*, Table 45. p. 169 (McGraw-Hill, 1933).

[10] *National Income and Its Composition*, Table 10. I, 156.

war outlay to national income of 39 per cent estimated as follows: consumers' outlay and an 8 per cent (of national income) allowance for nonwar capital formation will be $\$75.7 + \$9.8 = \$85.5$ billion; allowance for capital consumption, roughly $10.5 billion in 1929 prices,[11] added to the national income we assume, yields a gross national product of $132.6 billion; the diversion for war purposes is then the difference between $132.6 and $85.5 billion, or $47.1 billion. If we assume that outlay per consuming unit remains at the 1938 level, consumers' outlay during the war years would amount to $79.1 billion, and the ratio of war outlay to national income would be 36 per cent.[12]

It would seem then that in order to attain a war outlay equal to 40 per cent of the national income we assume, consumers' outlay per unit can be maintained or pruned moderately. But if the desideratum is a 50 per cent ratio the picture changes: annual consumers' outlay would be reduced to $61.7 billion, or $617 per consuming unit.[13] A glance at Table 10 indicates that $617 per consuming unit is substantially higher than the level for any pre-1919 decade, but it is 19 per cent lower than in 1919–28 or 1929–38, and 22 per cent lower than in 1938. On the 'low' assumption for nonwar capital formation, a diversion of 50 per cent of national income to war outlay would admit of a consumers'

11 Based upon a rough extrapolation of the estimate of capital consumption in the National Bureau's study of capital formation. For 1939 this estimate puts capital consumption at $9.6 billion (in 1929 prices).

12 On the 'low' assumption for nonwar capital formation, a maintenance of consumers' outlay at the 1938 level would admit of a ratio of war outlay to national income of 40 per cent; and the maintenance of the consumers' outlay level of 1929–38, a ratio of war outlay to national income of 43 per cent.

13 The President's budget message to Congress on January 7, 1942 mentions national defense outlays for the fiscal year 1943 of $52.8 billion (presumably in 1941 prices), or about one-half of the national income we assume will prevail during the war years. Of course, it might be contended that given such an outlay, national income could exceed the level assumed here, in which case the implications for consumers' outlay would of course be modified.

outlay per unit of $673 (in 1929 prices), and thus call for a reduction of 11 per cent from the consumers' outlay level of 1929–38, of 15 per cent from the 1938 level.

This reduction from the level of 1929–38 (or 1938) does not mean that consumers' expenditures would be reduced by the same amount; for consumers' outlay per unit, as usually estimated, includes payments to governments, some of which are for military purposes and others are for functions that can be shifted to war production without affecting the supply of goods and services to ultimate consumers. For example, if x per cent of consumers' expenditures are for taxes of various types included in the cost of the goods to ultimate consumers, and if in normal times one-tenth of these tax receipts are spent for military purposes and another tenth for functions that can be shifted to war production without depriving ultimate consumers of important governmental services, then 0.2x per cent of consumers' outlay can be added for potential war uses without perceptibly reducing consumers' outlay per capita.

The item is not large. Military expenditures by governments in this country have not constituted a high percentage of national income (on the average not much more than 1 or 2 per cent, if we exclude such transfer outlays as veterans' pensions). The substantive functions of governmental agencies, so far as they do not contribute to capital formation, cannot easily be abridged without curbing the flow of goods and services to ultimate consumers; and those functions that give rise to capital formation have already been assumed to be diverted to war purposes. Thus, even though, according to recent estimates, taxes included in the cost of consumers' expenditures amounted to as much as 18 per cent of the latter, it is doubtful that more than 2 per cent of national income can be added on this account to what can potentially be diverted to national defense. With this addition, per unit outlay by consumers, on the assumptions made, would have to be pruned to some $641 to assure a

diversion of one-half of national income to war purposes.[14]

The meaning of paring consumers' outlay per unit down to an average about 16 per cent lower than during 1919–28 and roughly 19 per cent lower than in 1938 can be grasped only by analyzing differential effects upon groups of consumers and types of goods, which we are not in a position to do here. Yet three considerations are obvious.

First, groups that, in more normal times, live close to the subsistence level, cannot spend much less. In 1935–36, of all American families 41.6 per cent received incomes of $1,000 or less and averaged considerably less than $1,000 of consumers' outlay per family.[15] Even if we assume that only one-third of American families had such small incomes, the bulk of the reduction in consumers' outlay would still have to be borne by two-thirds of the consumers in the country. Furthermore, the chief expenditures (on food, clothing, and housing) of those consuming units that join the armed forces cannot be cut. And while some will come from the one-third of families near the subsistence level, the rest will come from families that would not suffer if they spent less on consumer goods. If we assume an armed force of 5 million, about 3.3 million of whom are from such families, no reduction in consumers' outlay can be expected for about 2 million units (3.3 million weighted by the 62 per cent allowance for food, clothing, and housing).[16] The 16 to 19 per

14 Two per cent of national income would amount to $2.4 billion (in 1929 prices), or $24.4 per consuming unit; which, added to the $617 derived above, would raise outlay per consuming unit to $641. On the 'low' assumption for nonwar capital formation, outlay per consuming unit under conditions indicated in the text would be $697, a reduction of 12 per cent from the 1938 level.

15 See *Consumer Expenditures in the United States* (National Resources Committee, Washington, 1939), Table 1, p. 20.

16 It might be argued, as we were inclined to do in an earlier version of this paper, that expenditures for consumer goods by the armed forces is a part of war outlay; then we could merely include this part of consumption under war outlay, thereby increasing the share of national income devoted to war purposes without reducing the per capita outlay of civilian consumers. The

cent of over-all reduction in consumers' outlay per unit would mean a reduction of some 20 to 22 per cent per unit for the consumer groups able to bear the burden of contraction in nonwar production.[17]

Second, because of the stickiness of resources and because some goods are more essential than others in war produc-

(*note 16 concl.*)

logical fallacy of such treatment is revealed if we apply the same reasoning to workers employed in a factory producing munitions: would we include their expenditures on consumer goods under war outlay? The latter buy consumer goods with money received from the government: the former receive consumer goods that have been purchased by the government.

The crux of the matter is that war outlay includes the value of the *services* of the armed forces as well as the value of capital goods produced for waging war (the latter embodying the services of workers employed in munitions factories). We may and do estimate the value of the services of the armed forces at the value of their subsistence and salary. But defense outlay excludes both the value of the services of the armed forces and their subsistence consumption, just as it excludes both the value of the services of workers in munitions factories and their consumers' outlay. Greater war outlay means consumption of the services of more armed forces (not embodied in commodities) and of other employees (some embodied in commodities, others not); and consumers' outlay, not a part of war outlay, must be calculated on the assumption that it sustains all consumers in the country, whether in the armed forces or elsewhere.

[17] Based on the relationship of the consumption expenditures of the upper two-thirds to those of the lowest third of consumer units (*Consumer Expenditures in the United States*, Table 6, p. 40). For 1935–36 expenditures on consumption items were $550, $1,056, and $2,212 for the lowest, middle, and upper third, respectively; the average was $1,273. For 1919–28 outlay per consuming unit was $765. If, for the war years, we assume that the relation of the average for the middle and upper thirds to that for the lowest third is at the 1935–36 level $\left(\frac{1056 + 2212}{2} \div 550 \text{ or } 2.97\right)$, we get $\frac{x + 2(2.97x)}{3} = 765$. The outlay of the lowest third is $331, and of the upper two-thirds, $983. Assuming no reduction for the lowest third, the upper two-thirds must bear a reduction of one-fifth in order to bring the average down to $641.

On the 'low' assumption for nonwar capital formation, the reduction in per unit outlay by the consuming groups that are able to bear the contraction would amount to 10 per cent of their outlay in 1919–28 and 14 per cent of their outlay in 1938.

tion, an over-all reduction in consumers' outlay cannot be divided either proportionately or at the discretion of the ultimate consumers themselves among the various types of finished goods. It would be much easier for ultimate consumers if they were told that the over-all reduction in their outlay should be such and such, and then were left free to choose which items they would forego or use less freely. Instead, expenditures on certain types of finished goods must be curtailed drastically, whereas others may remain the same; i.e., the whole structure of consumers' budgets is affected.

Yet in this specific emergency there is an important mitigating circumstance. The demands of war production seem to be concentrated on goods from industries that produce chiefly durable commodities for ultimate consumption (airplanes, automotive equipment, electrical appliances, radios, etc.). Consequently, war demands for productive capacity and materials fall most heavily upon industries that produce goods in which consumers' inventories tend to be large, in which a short term shortage is likely to mean little privation, and in which even a long term restriction of supply is not likely to impair seriously the well-being of ultimate consumers.[18]

Finally it is altogether too easy to say, as we did, that with the steady growth in ultimate consumption per unit, levels prevailing during the years immediately preceding the emergency were much higher than only a decade or two before; and that even cutting ultimate consumption one-

18 This concentration of war production in the technologically younger industries, which may still have a relatively large backlog of technical changes and are therefore subject to the law of increasing returns, may counteract any tendencies in productivity to decline because of hasty changes in plant operations from peace to war needs, shortages in materials and services, dilution of labor skill, and other corollaries of a rapidly expanding war effort. It may influence the postwar development of the economy tremendously, because the technological improvements in these younger industries during the war may provide a base for wide postwar expansion of demand for their products.

fourth (from the levels of 1929–38) will bring us to levels that characterized 1909–18, a decade during which people felt they were enjoying a high standard of living. Such purely arithmetic calculations are deceptive; for, as already pointed out, ultimate consumption has grown in response to fundamental changes caused by technical and other factors in the pattern of everyday life; and this means that any attempt to bring it back to earlier levels will be resisted. We pointed out also that stability in the division of the national product between ultimate consumption and diversion into other uses (such as capital formation) rested upon stability in the functional distribution of income payments, in the inequality of the distribution of income by size, and upon the persistence of the consumption-savings habits among the different strata of income recipients. Yet conditions of wartime expansion may help to distribute income more equally and to strengthen the propensity to consume, as a result partly of fuller employment, partly of the fear that there will not be enough consumer goods to go around. Thus to the forces that resist lowering of consumption levels once attained may be added the peculiar circumstances of war expansion that are conducive to a greater rather than smaller share of consumers' outlay in national income.

We by no means intend to imply that the contraction in consumers' outlay involved, under the assumptions made, in devoting one-half of the country's net product to war uses is too costly; nor that 50 per cent measures the maximum potential that can be diverted, since we have not even considered what share of national income is needed to insure consumers' outlay at the minimum levels compatible with the health and maximum efficiency of the population as a body of producers. It seems quite likely that were we to apply this criterion, outlay per consuming unit would be substantially less than $617 or $641 (in 1929 prices). Nor have we considered several other factors that determine the country's potential capacity in the war effort.

But we have suggested that in an emergency such as the present, diversion of national income to war production must be predicated upon substantial contraction of both private capital formation and consumers' outlay; and that both mean drastic changes in the social institutions and customs that have governed the growth of national income and its division between consumers' outlay and capital formation. Our task today is radically different from those solved by this country's economic system from 1880 through 1930. We cannot attain the diversion thought desirable without disrupting the customary pattern of economic activity. Prompt and decisive action is imperative to ease the pain of the dislocations inevitable in any attempt to direct capital formation into new channels, breaking the long established connection between capital investment and consumption needs of ultimate consumers; to overcome resistance to any extraordinary increase in the share of national income to be diverted from immediate consumption. It is also clear that the war will leave a huge heritage of departures from the secular pattern of development; and that the satisfaction of neglected needs and unfulfilled wants will dominate the processes of consumption and capital formation in the early phases of the postwar period.

The Estimates and Their Derivation [19]

SOURCES OF TABLES 1-7

ANNUAL ESTIMATES of gross and net capital formation and of their components, as well as the sources and methods, for years beginning with 1919 were published in *Commodity*

[19] The derivation of the decade estimates of commodity flow, capital formation, and national product will be published in more detail, probably in *Technical Paper 3*. Mr. Shaw's basic and detailed estimates of finished commodities are being assembled, and will, we hope, be published in a monograph this year.

Flow and Capital Formation, Vol. One (National Bureau of Economic Research, 1938), and in *Bulletin 74*, Commodity Flow and Capital Formation in the Recent Recovery and Decline, 1932–1938 (June 25, 1939). These estimates have been revised in merely minor respects. The estimates of national income for the last two decades are described in detail in *National Income and Its Composition, 1919–1938* (National Bureau of Economic Research, 1941). They are a series that was revised slightly for publication in that report but since the changes were minor the original series was retained here.

For convenience, we discuss the estimates for the earlier decades (used in Tables 1-7) under seven headings.

a) Finished commodities

The flow, by groups, was derived from estimates of the value, at producers' prices, of finished commodities destined for domestic consumption, prepared by William H. Shaw

TABLE 1

Gross National Product and Gross Capital Formation Per Year, by Decades, 1879–1938
(columns 1, 2, 4, and 5 in millions of dollars)

	CURRENT PRICES			1929 PRICES		
DECADE	Gross national product	Gross capital formation	% (2) is of (1)	Gross national product	Gross capital formation	% (5) is of (4)
	(1)	(2)	(3)	(4)	(5)	(6)
1879–1888	11,542	2,305	20.0	17,308	3,897	22.5
1884–1893	12,916	2,737	21.2	20,688	5,125	24.8
1889–1898	13,875	2,939	21.2	24,151	6,106	25.3
1894–1903	16,868	3,531	20.9	29,636	7,019	23.7
1899–1908	22,966	4,680	20.4	36,499	8,207	22.5
1904–1913	29,710	5,988	20.2	43,721	9,785	22.4
1909–1918	41,257	8,481	20.6	50,786	11,569	22.8
1914–1923	62,748	13,288	21.2	60,795	13,219	21.8
1919–1928	80,276	16,181	20.2	76,705	15,011	19.6
1924–1933	78,475	13,063	16.6	82,269	13,199	16.1
1929–1938	69,495	10,151	14.6	80,328	10,827	13.5

at the National Bureau. The estimates are based upon a study of the successive censuses of manufactures, mines, and agriculture, supplemented by state and other data for intercensal years; of statistics of exports and imports; and of various data on wholesale prices in order to express values in both current and constant prices. The procedures are fairly similar to those used for recent years and described in *Commodity Flow and Capital Formation,* Vol. One. Mr. Shaw's estimates, published in *Occasional Paper 3* (Aug. 1941), are, however, for producers' values and do not allow for transportation and distribution costs, or for the diversion of current output into inventories. In order to pass from Mr. Shaw's estimates to estimates of the flow to ultimate consumers, at cost to them, we have assumed that for each of the four commodity groups, the ratio of transportation and distribution costs to producers' values was in the earlier decades the same as during 1919–33; the ratio of net flow to inventories to total output destined for domestic

TABLE 2

Net National Product (National Income) and
Net Capital Formation per Year, by Decades, 1879–1938
(columns 1, 2, 4, and 5 in millions of dollars)

	CURRENT PRICES			1929 PRICES		
DECADE	Net national product	Net capital formation	% (2) is of (1)	Net national product	Net capital formation	% (5) is of (4)
	(1)	(2)	(3)	(4)	(5)	(6)
1879–1888	10,310	1,073	10.4	15,175	1,766	11.6
1884–1893	11,527	1,348	11.7	18,087	2,524	14.0
1889–1898	12,425	1,489	12.0	21,189	3,145	14.8
1894–1903	15,084	1,747	11.6	26,126	3,509	13.4
1899–1908	20,615	2,329	11.3	32,402	4,110	12.7
1904–1913	26,640	2,918	11.0	38,744	4,808	12.4
1909–1918	36,934	4,158	11.3	45,034	5,817	12.9
1914–1923	55,919	6,489	11.6	53,826	6,250	11.6
1919–1928	71,887	7,792	10.8	68,598	6,905	10.1
1924–1933	70,064	4,652	6.6	73,316	4,217	5.8
1929–1938	61,274	1,930	3.1	71,110	1,610	2.3

consumption (this net flow to be subtracted from the latter to measure flow to ultimate users) was during the earlier decades the same as during 1919–28.

b) New construction

Mr. Shaw has also prepared estimates of the value of output (destined for domestic consumption) of all construction materials in current and constant prices. But these estimates include construction materials used for repairs and maintenance of a type not considered new construction and, on the other hand, fail to take account of transportation and distribution costs; diversion to inventories all along the line from producers of construction materials to construction enterprises; and most important, the cost of labor and other construction costs. To allow for all these items we have again assumed that the relations prevailing during

TABLE 3

Consumers' Durable Commodities and Share of Capital Formation (Gross and Net), including Consumers' Durable, in National Product (Gross and Net) per Year, by Decades, 1879–1938
(columns 1 and 2 in millions of dollars)

DECADE	CONSUMERS' DURABLE		SHARE OF CAPITAL FORMATION, INCL. CONSUMERS' DURABLE, IN NATIONAL PRODUCT			
			GROSS		NET	
	Current prices	1929 prices	Current prices	1929 prices	Current prices	1929 prices
	(1)	(2)	(3)	(4)	(5)	(6)
1879–1888	676	829	25.9	27.3	17.0	17.1
1884–1893	792	1,042	27.3	29.8	18.6	19.8
1889–1898	808	1,178	27.0	30.2	18.5	20.4
1894–1903	958	1,401	26.6	27.4	18.0	18.8
1899–1908	1,382	1,734	26.4	27.3	18.0	18.1
1904–1913	1,926	2,194	26.7	27.1	18.2	18.1
1909–1918	2,852	3,098	27.5	28.9	19.0	19.8
1914–1923	4,989	4,706	29.2	29.5	20.5	20.3
1919–1928	7,707	7,394	29.8	29.2	21.5	20.9
1924–1933	7,536	7,870	26.2	25.7	17.4	16.5
1929–1938	6,192	6,798	23.5	22.0	13.4	11.9

1919–28 (for ratio of net flow to inventories to output destined for domestic consumption) and 1919–33 (for ratios of transportation and distribution costs to producers' values and of value of new construction to estimated consumption of materials) held also for the earlier decades.

c) Consumption of producers' durable commodities and of construction

A thirteen-year life was assumed for producers' durable and a fifty-year life for construction (both along a straight line),

TABLE 4

Gross Capital Formation by Type of Product Components per Year, by Decades, 1879–1938

DECADE	GROSS CAPITAL FORMATION (millions of dollars)	PERCENTAGE SHARES OF			
		Producers' durable (gross)	All construction (gross)	Net flow to inventories	Net changes in claims against foreign countries
		BASED ON VALUES IN CURRENT PRICES			
1879–1888	2,305	24.0	62.0	+15.9	—1.9
1884–1893	2,737	21.4	70.9	+9.1	—1.5
1889–1898	2,939	21.1	71.2	+7.8	—0.03
1894–1903	3,531	23.8	64.8	+12.7	—1.3
1899–1908	4,680	27.2	65.6	+8.4	—1.3
1904–1913	5,988	26.8	65.1	+9.1	—1.0
1909–1918	8,481	30.4	46.8	+11.2	+11.6
1914–1923	13,288	30.5	38.7	+16.6	+14.2
1919–1928	16,181	30.5	52.7	+10.9	+6.0
1924–1933	13,063	34.0	64.0	—0.7	+2.8
1929–1938	10,151	41.6	55.6	+0.7	+2.0
		BASED ON VALUES IN 1929 PRICES			
1879–1888	3,897	19.3	68.7	+13.7	—1.7
1884–1893	5,125	17.6	76.5	+7.2	—1.3
1889–1898	6,106	16.9	76.8	+6.3	—0.03
1894–1903	7,019	18.9	71.1	+11.2	—1.2
1899–1908	8,207	22.7	71.3	+7.2	—1.2
1904–1913	9,785	22.8	70.3	+7.8	—0.9
1909–1918	11,569	24.2	56.3	+9.5	+10.0
1914–1923	13,219	28.6	45.4	+13.0	+12.9
1919–1928	15,011	31.7	55.1	+8.0	+5.1
1924–1933	13,199	34.8	64.6	—2.3	+2.9
1929–1938	10,827	41.5	56.9	—0.6	+2.2

both assumptions based on Table 33 in Solomon Fabricant's *Capital Consumption and Adjustment* (National Bureau of Economic Research, 1938), p. 181. Thus, a thirteen-year moving average of the annual figures on the flow of producers' durable (at cost to ultimate users) and a fifty-year moving average of construction (six decades, the two extremes at half weight) yielded the estimates. The flow of producers' durable had to be extrapolated from 1879 back to 1866, and construction, back to 1829–38. The former was estimated by interpolating between the 1879 figure and Mr.

TABLE 5

Net Capital Formation by Type of Product Components per Year, by Decades, 1879–1938

DECADE	NET CAPITAL FORMATION (millions of dollars)	PERCENTAGE SHARES OF			
		Producers' durable (net)	All construction (net)	Net flow to inventories	Net changes in claims against foreign countries
	BASED ON VALUES IN CURRENT PRICES				
1879–1888	1,073	19.0	50.8	+34.2	−4.0
1884–1893	1,348	11.6	72.8	+18.5	−3.0
1889–1898	1,489	7.7	77.0	+15.4	−0.1
1894–1903	1,747	11.8	65.1	+25.8	−2.7
1899–1908	2,329	17.8	67.8	+16.9	−2.5
1904–1913	2,918	14.6	68.7	+18.6	−2.0
1909–1918	4,158	16.8	36.7	+22.8	+23.7
1914–1923	6,489	18.5	18.4	+34.0	+29.1
1919–1928	7,792	19.7	45.3	+22.5	+12.4
1924–1933	4,652	19.8	74.4	−2.1	+7.8
1929–1938	1,930	46.8	38.3	+4.4	+10.5
	BASED ON VALUES IN 1929 PRICES				
1879–1888	1,766	15.7	57.9	+30.2	−3.9
1884–1893	2,524	9.5	78.6	+14.6	−2.7
1889–1898	3,145	6.1	81.7	+12.3	−0.1
1894–1903	3,509	9.3	70.8	+22.4	−2.5
1899–1908	4,110	14.7	73.2	+14.3	−2.3
1904–1913	4,808	12.3	73.4	+15.9	−1.7
1909–1918	5,817	12.7	48.5	+18.9	+19.8
1914–1923	6,250	19.1	26.0	+27.6	+27.3
1919–1928	6,905	24.0	47.4	+17.4	+11.2
1924–1933	4,247	20.8	77.3	−7.0	+8.9
1929–1938	1,610	40.2	49.1	−4.2	+15.0

Shaw's preliminary figure for 1869 and extrapolating back to 1866 by the output of pig iron. The extrapolation of total construction before the 1879–88 decade was based upon an index made up of: (1) net change in population in places of 2,500 and over (weight 5), (2) net change in population in places under 2,500 (weight 2), (3) net change in national income in constant prices (weight 3). Items (1) and (2) were taken from *Population Trends in the United States,* by W. S. Thompson and P. K. Whelpton (McGraw-Hill, 1933), p. 20; item (3) from *National Income in the United States,*

TABLE 6

Composition of Consumers' Outlay per Year, by Decades, 1879–1938

DECADE	CONSUMERS' OUTLAY (millions of dollars)	PERCENTAGE SHARES OF			
		Perishable	Semi-durable	Consumers' durable	Services not embodied in new commodities
	BASED ON VALUES IN CURRENT PRICES				
1879–1888	9,237	44.6	17.5	7.3	30.6
1884–1893	10,179	43.0	17.2	7.8	32.0
1889–1898	10,936	43.0	16.2	7.4	33.4
1894–1903	13,337	44.0	15.3	7.2	33.5
1899–1908	18,286	43.4	15.4	7.6	33.6
1904–1913	23,722	43.8	15.4	8.1	32.6
1909–1918	32,776	44.1	15.6	8.7	31.6
1914–1923	49,460	41.2	17.1	10.1	31.7
1919–1928	64,095	38.8	17.5	12.0	31.7
1924–1933	65,412	37.1	15.8	11.5	35.5
1929–1938	60,344	38.8	14.7	10.3	36.2
	BASED ON VALUES IN 1929 PRICES				
1879–1888	13,411	50.0	15.2	6.2	28.5
1884–1893	15,563	48.9	15.4	6.7	29.0
1889–1898	18,045	48.8	15.2	6.5	29.5
1894–1903	22,617	49.2	14.6	6.2	30.0
1899–1908	28,292	48.9	14.5	6.1	30.5
1904–1913	33,936	48.0	14.5	6.5	31.0
1909–1918	39,217	46.2	14.4	7.9	31.5
1914–1923	47,576	42.7	14.8	9.9	32.6
1919–1928	61,694	39.2	15.2	12.0	33.7
1924–1933	69,070	38.9	15.2	11.4	34.5
1929–1938	69,501	40.2	15.2	9.8	34.9

1799–1938, by Robert F. Martin (National Industrial Conference Board, 1939), Table 1, pp. 6-7.

These estimates were used for the earlier decades alone. For the years since 1919 we used the *Commodity Flow and Capital Formation* estimates but apportioned them between producers' equipment and construction on the basis of their relative weights as shown by the preliminary estimates computed by methods used for the earlier decades.

d) Net flow to inventories

Changes in stocks of monetary metals were measured on the basis of data in the *Annual Reports* of the Director of the Mint. Livestock figures were from *Gross Farm Income in the United States, 1869–1937*, by Frederick Strauss and Louis H. Bean, and from the Bureau of Agricultural Economics. Inventories in the hands of manufacturing firms were estimated by assuming that the ratio for the earlier decades of

TABLE 7

Two Estimates of National Income per Year, Compared by Decades, 1879–1938
Current Prices (columns 1–3 in millions of dollars)

DECADE	NATIONAL INCOME BASED ON: Commodity flow data	Extrapolation of present NBER estimates	DIFFERENCE (2) — (1)	DIFFERENCE AS % OF: Col. (1)	Value of services based on commodity flow data
	(1)	(2)	(3)	(4)	(5)
1879–1888	10,310	9,451	−859	−8.3	−30.4
1884–1893	11,527	11,739	212	1.8	6.5
1889–1898	12,425	13,268	843	6.8	23.1
1894–1903	15,084	17,112	2,028	13.4	45.4
1899–1908	20,615	24,191	3,576	17.3	58.1
1904–1913	26,640	30,405	3,765	14.1	48.6
1909–1918	36,934	40,653	3,719	10.1	35.9
1914–1923	55,949	56,612	663	1.2	4.2
1919–1928	71,887	71,245	−642	−0.9	−3.2
1924–1933	70,064	68,199	−1,865	−2.7	−8.0
1929–1938	61,274	60,580	−694	−1.1	−3.2

net flow to net increase in output of finished products was the same as for 1919–28.[20] Similar assumptions were made for agriculture, mining, and trade, estimates of gross volume of activity in constant prices being obtained by extrapolating the 1919–28 estimates back over the earlier decades; these extrapolations in turn were based upon indexes of crop production, mining output, and a combined index of all commodity output. Finally, the net flow to commodity inventories of farmers, mines, manufacturing firms, and trade was raised to comprise total net flow to commodity in-

TABLE 8

National Product and Capital Formation, 1919–1938
Current Prices (columns 1, 2, 4, and 5 in billions of dollars)

	GROSS		% (2)	NET		% (5)
YEAR	National product	Capital formation	IS OF (1)	National product	Capital formation	IS OF (4)
	(1)	(2)	(3)	(4)	(5)	(6)
1919	72.6	18.7	25.8	64.2	10.3	16.0
1920	84.2	21.5	25.3	74.2	11.4	15.3
1921	66.8	10.7	16.0	59.4	3.3	5.5
1922	67.8	11.6	17.1	60.7	4.5	7.4
1923	79.7	16.7	21.0	71.6	8.6	12.0
1924	80.1	13.9	17.4	72.1	5.9	8.1
1925	84.2	17.5	20.8	76.0	9.3	12.2
1926	90.4	18.0	19.9	81.6	9.2	11.3
1927	88.9	17.0	19.1	80.1	8.2	10.2
1928	90.8	16.5	18.2	81.7	7.4	9.0
1929	96.8	19.6	20.2	87.2	10.0	11.5
1930	86.5	13.4	15.5	77.3	4.2	5.4
1931	68.6	8.4	12.2	60.3	0.1	0.2
1932	50.1	3.0	6.0	42.9	—4.2	—9.7
1933	49.1	3.3	6.7	42.2	—3.6	—8.6
1934	57.0	4.9	8.6	49.5	—2.6	—5.2
1935	62.0	8.3	13.4	54.1	0.7	1.3
1936	70.8	13.3	18.8	62.9	5.4	8.5
1937	79.4	15.3	19.3	70.5	6.4	9.0
1938	74.6	12.0	16.1	65.5	2.9	4.4

[20] Except for 1913–18 when the estimate was extrapolated from 1919 by sample data from Dun and Bradstreet's.

ventories by a ratio based upon a comparison for 1919–28 of changes in these four groups of commodity inventories with changes in all commodity inventories as given in *Commodity Flow and Capital Formation,* Vol. One.

e) Changes in net claims against foreign countries

For the earlier decades the estimates are based on data in The Balance of Trade of the United States, by C. J. Bullock, J. H. Williams, and R. S. Tucker (*Review of Economic Statistics,* July 1919, pp. 224-52). In general, the procedure was to establish for each decade the balance of merchandise trade, then to raise it to the balance of merchandise trade, freight charges, interest charges, tourist expenditures, immigrant remittances, and miscellaneous items. These other items, unlike merchandise trade, not being available an-

TABLE 9

Service and Property Incomes as Shares of National Income or Aggregate Payments, Based on Values in Current Prices

Year or period	National income or aggregate payments per year (billions of dollars)	Percentage shares of			
		Wages & salaries	Entrepreneurial income or withdrawals	Service income (2) + (3)	Property income
	(1)	(2)	(3)	(4)	(5)
1850	2.2	36.4	44.7	81.1	18.9
1860	3.6	37.6	39.8	77.4	22.7
1870	6.6	49.2	31.9	81.1	18.9
1880	7.3	51.8	21.4	73.2	26.8
1890	12.0	54.0	24.8	78.8	21.2
1900	17.4	48.7	30.9	79.6	20.4
1910	29.2	48.9	28.8	77.7	22.4
1910	29.4	54.5	23.2	77.8	22.2
1909–18	36.2	54.7	23.4	78.2	21.8
1914–23	53.1	57.2	22.3	79.5	20.5
1919–23	64.5	59.0	21.8	80.8	19.2
1919–23	62.5	63.0	18.5	81.5	18.5
1919–28	68.2	63.1	17.7	80.8	19.2
1924–33	69.5	62.7	17.2	79.9	20.1
1929–38	63.6	64.0	17.0	81.0	19.0

nually, the raising ratio used for each decade had to be taken for the period in the study that was closest to the decade involved.

f) Value of services not embodied in new commodities

The estimate in both current and constant prices was derived for the last two decades by a comparison of estimates of national income, net capital formation, and the flow of finished commodities to ultimate consumers. The ratio for 1919–28 (in constant prices) of the value of these services to the value of consumers' finished commodities was extrapolated for 1909–18 on the basis of data in *High Level Consumption,* by W. H. Lough (McGraw-Hill, 1935); for earlier decades, on the basis of the composition of wage earners' cost of living as shown by U. S. Bureau of Labor Statistics and Massachusetts Bureau of Labor Statistics data.[21] With this ratio and estimates of perishable, semi-

TABLE 10

Consumers' Outlay per Consuming Unit per Year, by Decades, 1879–1938, 1929 Prices

DECADE	CONSUMERS' OUTLAY (millions of dollars)	CONSUMING UNITS (thousands)	OUTLAY PER CONSUMING UNIT (dollars)
1879–1888	13,411	37,414	358
1884–1893	15,563	42,238	368
1889–1898	18,045	47,084	383
1894–1903	22,617	52,068	434
1899–1908	28,292	57,634	491
1904–1913	33,936	63,549	534
1909–1918	39,217	69,086	568
1914–1923	47,576	74,497	639
1919–1928	61,694	80,632	765
1924–1933	69,070	86,779	796
1929–1938	69,501	91,802	757

21 It should also be noted that the division between commodities and services of the farmer's and the urban dweller's consumers' outlay is quite similar (see E. L. Kirkpatrick, *The Farmer's Standard of Living,* U. S. Department of Agriculture Bulletin 1466, Nov. 1926).

durable, and consumers' durable commodities, we estimated services, in constant prices. A price index of services was then derived from prices of commodities, on the assumption (based on the changes in the two indexes from 1919–28 to 1929–38) that changes in the former were about half of changes in the latter.

g) *Alternative estimates of national income*

Gross and net national product in Tables 1-6 were estimated by adding to consumers' outlay gross and net capital formation. In view of the obvious crudeness of the estimates, we experimented with another estimate of national income. For 1919–38 we took the recent National Bureau estimates of national income excluding government savings and unadjusted for the effects. on savings of enterprises, of inventory revaluation, of the use of the cost basis for depreciation and depletion deductions, and of the inclusion of capital gains and losses. We extrapolated this series back to 1910 by estimates in *Income in the United States* (National Bureau of Economic Research, 1921), Table 1, p. 13. It was then carried back from 1910 to 1870, for 1870, 1880, 1890, 1900, by W. I. King's estimates in *Wealth and Income of the People of the United States* (Macmillan, 1915), p. 132. To obtain *annual* estimates for the years prior to 1910, we interpolated by an index derived by multiplying comprehensive production indexes by the Bureau of Labor Statistics wholesale price index. The production indexes used for this purpose were: for the decade 1900–10, the Persons index of crop production, industrial production, and trade (see *Review of Economic Statistics*, Aug. 1933, p. 156); for the earlier decades a product of the Warren-Pearson per capita production index (see Cornell Agricultural Experiment Station *Farm Economics*, June 1937, p. 2497) and a total population index based on series in the *Statistical Abstract of the United States*.

From this series another estimate of the value of services

not embodied in new commodities can be obtained by subtracting net capital formation plus commodity flow to consumers.

The comparison in Table 7 shows fairly substantial differences between this annual series of national income estimates and the one used in Tables 1-6 (based on commodity flow and capital formation data). The differences during the last three overlapping decades are due exclusively to the omission in the new series of the adjustments mentioned above. The much more substantial differences for the decades from 1894–1903 through 1909–18 are due to other factors; and these differences are naturally relatively greater when related to the smaller, derivative item of the value of services not embodied in new commodities.

We decided to use the estimates based on commodity flow and capital formation data, because their derivation was better known to us than that of Mr. King's estimates for the years before 1910; and because the relative movement of the value of services not embodied in new commodities and its size, as derived in Tables 1-6, agreed so much better with the few other data on the subject that are available than the residual estimates for the same item derived by comparing this new extrapolated series on national income with the other components. Yet the differences in Table 7 do indicate a possible error in both series and serve to emphasize the preliminary character of the estimates in Tables 1-6 and the need for checking them in the light of further and more detailed analysis. It is our hope that such analysis will be developed in the work at the National Bureau by Mr. Shaw on commodity flow and capital formation, and by Lillian Epstein on national income, for a period back to 1880.

SOURCES OF TABLES 8-10

Table 8. Annual estimates of national income and net capital formation are from *National Income and Its Composition, 1919–1938*, Table 37, I, 269. Estimates of capital con-

sumption are by Mr. Fabricant (see his *Capital Consumption and Adjustment*), revised in minor respects and brought through 1938. The addition of these totals of capital consumption to net capital formation and national income yields gross capital formation and gross national product respectively.

Table 9. Estimates for 1880–1910 are from W. I. King's *Wealth and Income of the People of the United States* and cited in the article, National Income, in the *Encyclopedia of the Social Sciences.* Data from 1910 on are from W. I. King's *National Income and Its Purchasing Power* (National Bureau of Economic Research, 1930), and from *National Income and Its Composition, 1919–1938.* Mr. King's data were revised to attain greater comparability with our more recent estimates.

Table 10. Estimates of consumers' outlay are from Table 6. The number of consuming units is based upon estimates by Thompson and Whelpton (*op. cit.*, p. 169). These estimates, given at twenty-year intervals, were converted into an annual series by an interpolation based upon total population; decade averages were then computed from the annual series.

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