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# National Income in America and the United Kingdom<sup>1</sup>

By A. L. BOWLEY

MR. KUZNETS' Report for the National Bureau of Economic Research<sup>1</sup> gives an authoritative estimate of the National Income of the United States and its movement from 1919 to 1938. His definition for his major totals is "National Income is the net value of the services individuals and their property contribute to the production of economic goods; or the value of the commodities and services produced by the country's economic system minus the costs of the commodities (raw materials and capital equipment) and of services of enterprises consumed in the production process." It "may also be described as the sum of all payments by enterprises to individuals . . . and of the savings of enterprises after all costs and disbursements sustained in the production process have been deducted". This is broadly the same definition as that adopted by English writers, though there is room for much variation in detailed interpretation, which affects significantly direct comparisons between the two countries in any one year; but for comparison of the movements over a series of years, when the delimitations chosen are rigidly adhered to in each country, any discrepancies in exclusion or inclusion of special categories become relatively unimportant. In some treatments of income in the United States the changes in the value of capital, as indicated by stock exchange prices, have been included in changes of money income, and when this is done the picture of the movements in depression and boom is very materially altered. We are not, however, faced with this difficulty in Kuznets' study, and the statistics in the adjoined Table that show the movements up and down in the period 1926-1938 may be used with reasonable confidence. On the other hand, we ought not to make direct comparisons such as, in 1938 income per head was \$500 in U.S. and £90 in U.K., without minute attention to definition; still less should we affirm that at the current rate of exchange (£1 = \$4.9) income per head in U.K. was 88 per cent. of that in U.S.

<sup>1</sup> *National Income and Its Composition, 1919-1938*, by Simon Kuznets, assisted by Lillian Epstein and Elizabeth Jenks. National Bureau of Economic Research, New York, 1941. Two volumes, pp. xxx + 980. \$5.00.

It is clear from Column I of the Table that money income increased rapidly from 1921 to 1926 and made another upward spurt in 1929.

	(1)	(2)		(3)	(4)	(5) (6) (7) (8)			
	U.S.A. \$ billion <sup>1</sup>	Money Income		U.S.A.	U.K.	Real Income		Percentages of 1924.	
		U.K.	U.S.A.	U.K.	U.S.A.	U.K.	U.S.A.	U.S.A.	U.K.
		£ million	Per cent. of 1924.	Per cent. of 1924.	Total	Total	Per head	Per head	Per head
1919 .. ..	64.2	—	89	—	79	—	86	—	—
1920 .. ..	74.2	—	103	—	81	—	87	—	—
1921 .. ..	59.4	—	83	—	79	—	82	—	—
1922 .. ..	60.7	—	84	—	85	—	87	—	—
1923 .. ..	71.6	—	99	—	99	—	100	—	—
1924 .. ..	72.1	3900	100	100	100	100	100	100	100
1925 .. ..	76.0	3800	105	97	103	102	102	102	101
1926 .. ..	81.6	3750	113	96	110	99	107	98	98
1927 .. ..	80.1	3900	111	100	111	107	107	106	106
1928 .. ..	81.7	3925	113	101	113	107	107	106	106
1929 .. ..	87.2	3925	121	101	121	111	113	109	109
1930 .. ..	77.3	3800	107	98	111	107½	103	105	105
1931 .. ..	60.3	3450	84	88	97	105	88	102	102
1932 .. ..	42.9	3325	59	85	78	105	71	102	102
1933 .. ..	42.2	3550	59	91	79	109½	71	106	106
1934 .. ..	49.5	3700	68	96	87	115	78	111	111
1935 .. ..	54.4	3925	75	101	91	120½	81	115	115
1936 .. ..	62.9	4150	87	107	105	125	92	120	120
1937 .. ..	70.5	4350	98	112	113	127	99	121	121
1938 .. ..	65.5	4350	91	112	110	124	96	117	117

Column 1 is given by Kuznets, p. 137. Columns 3, 5, 7 are computed from his Tables, pp. 147-153. He obtains the data for Column 5 by dividing Column 1 by an index of prices. For Column 7 the whole population of the United States is used.

Column 2 is from *Royal Statistical Society's Journal*, 1940, "Some Constituents of the National Income," by A. L. Bowley, p. 517, Table IX, Total B. The entries for 1937, 1938 are revised in accordance with statistics in the White Paper Cmd. 6261.

Column 6 is from *Studies in National Income*, p. 192. Cambridge University Press. 1942. Edited by A. L. Bowley. The basis is an Index of Production of goods and services. Column 8 is deduced from Column 6. The estimates are of course subject to considerable margins of error.

<sup>1</sup> 1 billion = 1,000 million in U.S.

During the next four years the statistics indicate that income was halved. The recovery to 1937 did not bring the total to that of 14 years earlier. The amplitude of these movements is modified when the figures are adjusted by a price index (Column 5); the increase from 1921 to 1929 is greater than before, but the fall to 1933 is one-third instead of one-half. The recovery in total real income, thus measured, brings the index in 1937 to the level of 1928, and 14 per cent. above that of 1923. Another view is obtained when we deal with income per head (Column 7), also with price changes eliminated. With the growth of population rises are damped down and falls accentuated. In the period 1924-1938 in the United States Total Money Income fell 9 per cent., total "real income" rose 10 per cent. and real income per head fell 4 per cent.

In the United Kingdom Total Money Income was nearly stationary from 1924 to 1929 (the fall in 1926 being attributable to the coal and general strike of that year); the fall in the next three or four years was only one-sixth, and the subsequent recovery brought the

figures to 11 per cent. above that of 1929. Through nearly the whole of the period prices were falling, and "real income" in total and per head, thus measured, were in 1938 respectively about 24 and 17 per cent. higher than in 1924. The contrast between the changes in the two countries is so marked that no adjustment of definitions or of methods of estimate can explain it away.

We pass now from the general results to questions of detail. Income of residents from property abroad is included, that of non-residents from property in the States is excluded. Activities, such as those within a household, are not included; "the only non-monetary items included are goods retained by producers for their own consumption, payments in kind by enterprises to ultimate consumers and imputed income of owner-occupied houses." Governmental services are valued "at the total payments made for them by individuals and enterprises respectively" in the form of taxes, fees, etc.; this is chosen in preference to taking the cost to governments of services and goods they use. "Mere changes in capital value due to changes in monetary conditions or to extraordinary events that cannot be anticipated or regarded as calculable hazards of productive activity were not considered part of production," and were not included. The definition is practically equivalent to that commonly used in the United Kingdom in those estimates where transfers of income not in return for services are subtracted.

Though the definitions ostensibly cover the same period for the two countries, the methods of approach are radically different. In the United Kingdom, except for returns of profits from companies under Schedule D and Schedule C, the estimates are mainly based on individuals' incomes, as reported for Income Tax, and separate estimates for salaries and wages. These methods cannot be used in the States, nor can Kuznets' method be used here, for want of adequate statistics. Kuznets proceeds by aggregating returns reported annually by "enterprises" to the Bureau of Commerce, and published periodically under "Statistics of Income"; where these are not complete for his purpose, he uses information and estimates from other sources, which are set out in detail in Part IV of his book. In Part II the results are given under 10 main headings. Some results, for the first and last years of his period, are:—

*Percentage Distribution of Income according to Source*

	1924	1938
Agriculture .. .. .	16.5	8.4
Mining .. .. .	2.7	1.7
Manufacturing .. .. .	24.6	19.4
Construction .. .. .	3.0	2.6
Transport and other Public Utilities ..	9.0	8.5
Trade .. .. .	15.5	14.3
Finance .. .. .	10.3	10.1
Services .. .. .	9.3	13.7
Governmental .. .. .	5.7	16.7
Miscellaneous .. .. .	3.4	4.6
	100.0	100.0

The changes over the period—relative (or absolute) decline in Agriculture and indeed in all but the last three divisions—are very striking. Relief payments, which increased from \$59Mn. in 1931 to \$2,621Mn. in 1938, are included under Governmental; but excluding them, Governmental Wages and Salaries increased from \$3,646Mn. to \$5,862Mn. in the period and interest from \$1,044Mn. to \$1,689 Mn.

The Services division includes incomes from professions and a great miscellany of direct services not included under other divisions. The estimates are from various services which are given in detail on pp. 767–807. A more general heading of service, as contrasted with production, would include a considerable part of all except the first four divisions in the Table just given.

Rent, if not included in income arising from enterprises, etc., under other headings, is treated as property income in the real estate industry, and real estate together with banking and insurance comes under Finance. In 1938 net income originating from Finance consisted of banking \$814Mn., insurance \$1,274Mn. and real estate \$4,462Mn.

In each of the major and minor divisions income is separated according to its Distribution, under the headings Wages and Salaries, Other payments to employees, Entrepreneurial withdrawals, Entrepreneurial savings, Rent, Dividends, and Corporation and Governmental Net Savings. The divisions are not, however, clear cut. Salaries are not in general separated from wages, and there is no clear distinction between a highly paid salaried executive and an entrepreneur, nor between operatives and farmers in agriculture. Entrepreneurial withdrawals mean the money taken from the business by employers for their private use; the figures can only be obtained by broad assumptions and estimates; the results are said to be “extremely crude” (p. 405), and in these circumstances it seems a pity that so much space is devoted to them. The analysis that relates to distribution is so complicated and in many respects so inconclusive that it is not possible to summarise it, nor to compare it safely with any corresponding figures for the United Kingdom. The detail can no doubt be used for special purposes; it occupies pp. 539–847.

*Real Income.* The totals for National Income are converted by index-numbers of prices to their value at 1929 prices. Two index-numbers are considered; the first is the Bureau of Labour Statistics (B.L.S.) cost-of-living index adjusted by other estimates for the agricultural community; the second was based largely upon the price adjustment work in the author's *Capital Flow and Capital Formation*, together with estimates for rent, fuel and services. The details are not given—the only case where the statistical tables are not superabundant—and it is hardly possible to criticise them. The average of the two index-numbers (which in 1936 and 1937 differ by 6 per cent. from each other) is used for adjusting the totals for “Consumers’

Outlay”, that is in effect total income less investment in durable goods. Modified index-numbers are used for income including investment. The results are as given in Columns 5 and 7 in the Table above. In selected years we have :—

		Total Income \$ billion	Price Index	Total Income at 1929 prices \$ billion	Per head \$
1924	.. ..	72.1	100.4	71.7	633
1929	.. ..	87.2	100.0	87.2	716
1933	.. ..	42.2	74.4	56.7	451
1938	.. ..	65.5	82.8	79.0	607

No doubt the data are sufficient to show that the fall and rise from 1929 to 1938 was partly a price phenomenon and that real income per head was no greater in 1938 than in 1924. But there are three major criticisms of the method. First the B.L.S. index is based on a fixed budget, and no attention is paid to modifications of the change of pattern of expenditure, such as are indicated by a comparison of Laspeyre’s and Paasche’s formulæ, and in relation to which there is a copious literature. Secondly there is no analysis which compares the purchases in the budgets used by the B.L.S. with the goods produced by enterprises; the “coverage” may not be the same. Thirdly, there is no comparison with any index of production.

The third criticism may be developed. If we write in general terms  $Q, q$ , for quantities in the first and last year, and  $P, p$ , for their prices, we have :—

$$\begin{aligned} \text{Income-index} &= 100 \Sigma (pq) \div \Sigma (PQ) = V \\ \text{Price-index} &= 100 \Sigma (pQ) \div \Sigma (PQ) = I_1, \text{ or } 100 \Sigma (pq) \div \Sigma (Pq) = I_2 \\ \text{Quantity-index} &= 100 \Sigma (Pq) \div \Sigma (PQ) = J_1, \text{ or } 100 \Sigma (pq) \div \Sigma (pQ) \\ &= J_2 \end{aligned}$$

$$\text{Then } V = \frac{I}{100} I_1 J_2 = \frac{I}{100} I_2 J_1$$

$J$  measures real income, for Kuznets’ method is to compute  $V$  and  $I$  separately, and take the index of real income (or “income at 1929 prices”<sup>1</sup>) as  $100V \div I = J$ .

Now very many difficulties are eliminated if we compute  $J$  directly; and at the same time such a computation, with the difference between  $J_1$  and  $J_2$ , brings out the essential ambiguity or indefiniteness of the conception of real income and of the process of eliminating price changes.

It may be suggested to the National Bureau to study the relationship between the existing index of production in the United States and the estimate of the movement of income at 1929 prices given in this book.

*Reliability of the Estimates.* Chapter XII is devoted to estimating

<sup>1</sup> Kuznets does not use the term “real income”.

margins of error in very many of the statistics given. The "probable maximum error" for the change in total income is given as about 20 per cent. for any one year. If this statement is taken literally, it suggests that the enormous labour spent in producing this book was largely wasted. The author is indeed pessimistic—"As to the possibility that the usefulness of the estimates is fatally impaired by the wide margins of error attributable to them, the only relevant comment is that we believe our estimates to be as good as can be made from available data" (p. 536). But it is doubtful whether the procedure does lead to so wide a margin. Each of three investigators, who had detailed knowledge of the data and methods, set down for each of some 520 estimates in each of 20 years his impression of "the maximum to which the estimate was likely to be subject", and their impressions were averaged (by geometric means!). For totals little attention seems to have been paid to the possibility that the errors in items may have cancelled each other, perhaps on the ground that very many errors were due to incompleteness of data, so that estimates may have been in defect rather than excess. The "maximum likely" is an ambiguous phrase, and we should be more interested in the errors which were probable. An error of 20 per cent. is much greater than that held to be attributable to British and other well-based income statistics, apart from differences in definition. It is surprising that the author does not consider that errors in comparisons over a period are significantly less than those attributed to one year (pp. 529-535). Since in most cases the estimates were derived from the same sources and under the same definitions year by year, it might be expected that errors of omission or in method would be of nearly the same magnitude and sign throughout, and consequently an error of the ratio one year to another would be small. Further, such errors are equally likely to be positive or negative, and their aggregate effect is better computed by the square root of the sum of their squares than by simple addition. It may be hoped in fact that the percentage series given in Column 3 of the Table above is much more accurate than Kuznets implied. If indeed the fall of 7 per cent. from 1937 to 1938 may mean anything between a fall of 27 and a rise of 13 per cent., then the whole book would be waste paper, except for its record of details.

The differences between the present estimate of total income and those current earlier by W. I. King, by the Department of Commerce, and in Kuznets' *National Income and Capital Formation* are analysed in Chapter X. They are largely due to differences of definition, and partly to better sources of information or more complete returns. Differences of definition may be very important. For example, if change in the Stock Exchange value of capital is taken as a change in income, total income in 1933 might appear to be negative. For 1921 King's estimate was \$88 billion, Kuznets' \$59 billion; the difference is partly due to King's treatment of net savings, partly

to his inclusion of the annual value of durable goods accruing to owner-users, partly to many other details of definition and partly to less complete information. When King's details are re-assembled so as to be comparable in scope with Kuznets', the totals for 1921 are respectively \$61 and \$57 billion, and this margin (far less than Kuznets' 20 per cent. above) is of the order to be expected when, as for 1921, statistics were in many cases wanting.

As a note to this paper it is not out of place to deal with a special problem which has been brought to the foreground by the second White Paper on War Finance.

#### CHANGE IN VALUE OF INVENTORIES OR STOCKS OF MATERIALS

It is convenient to analyse Kuznets' and Colin Clark's treatments of this problem together.

The profits of an undertaking, after depreciation of fixed capital is allowed for, may be in part distributed as interest or dividends, part placed to reserve, and parts used in increasing fixed capital and in increasing stocks of materials.<sup>1</sup> In the measurement of the last named difficulties occur.

For simplicity of notation consider only one kind of material. Each term may then be regarded as an abbreviation for a composite aggregate.

Write  $q_0, q_1$  for the quantities of material in stock at the beginning and end of a year, and  $p_0, p_1$  respectively for the market or current prices per unit.

Then the increased value of the stock may be written

$$\begin{aligned} X &= p_1 q_1 - p_0 q_0 = (q_1 - q_0)p + q_1(p_1 - p) + q_0(p - p_0), \\ &= \frac{1}{2}(q_1 - q_0)(p_0 + p_1) + \frac{1}{2}(q_1 + q_0)(p_1 - p_0), \end{aligned} \quad (1)$$

where  $p$  may be taken as any measurement of prices during the year. The first term is a measurement of the change due to increase of quantity, the second of that due to an increase of price.

Since in Kuznets' measurement of income changes in value of fixed capital due to market price movements are not included, he holds that, for consistency, change in the value of stocks due to change of price should also be excluded. Thus  $(q_1 - q_0)p$  should replace  $X$  as the part of the income allotted to increase of stock.

Kuznets' definition of income is: National Income produced = value of commodities and services produced, less wealth consumed in this production, all valued at current prices.

The relevant part of Clark's definition<sup>2</sup> may be written: Income from an industry = surplus of proceeds over purchases, plus increment of stock, valued at the average current prices over the period.

Write  $S$  for value of sales,  $B$  for value of material bought,  $C$  for

<sup>1</sup> Throughout the expression for increase may be negative, if in fact there is a decrease in the algebraic treatment this creates no difficulty.

<sup>2</sup> *National Income and Outlay*, p. 293.

value of material consumed,  $D$  for value of increase in stocks =  $B - C$ .

Kuznets' definition then gives

$$I_1 = (S + D) - (C + D) = S - C = S + D - B \quad (2)$$

since  $D$  is produced, and also used in production.

Clark's definition gives  $S - B + D = S - C$

Thus the definitions cover the same values.

Write  $q$  for the quantity consumed in the year,  $bq$  for the quantity bought.

$$\text{Then } q_1 = q_0 + bq - q \quad (3)$$

For  $C$ , Kuznets considers that  $q$  should be valued at the average price of the year,  $\bar{p}$ , so that  $C = q\bar{p}$ , and  $I_1 = S - q\bar{p}$ . But according to him the prevalent practice in America is to take

$$C_1 = q_0 p_0 + bq p' - q_1 p_1 = B - X \quad (4)$$

where  $p'$  is average price of purchases, so that income reckoned, as it is, from employers' reports is  $I_2 = S - C_1$ .

$$I_1 - I_2 = C_1 - C, \text{ and, eliminating } b \text{ by equations (3) and (4),} \\ = q_0(p_0 - \bar{p}) + q_1(p' - p_1) + q(p' - \bar{p}) \quad (5)$$

In the absence of evidence to the contrary, Kuznets takes  $p' = \bar{p}$ , so that he adds to the estimate  $I_2$  the quantity

$$q_0(p_0 - \bar{p}) + q_1(\bar{p} - p_1)$$

This is positive when prices are falling throughout the year.

Clark's analysis takes a different course. For returns to Schedule D of the Income Tax, on which his figures are based, the manufacturer is permitted to return  $X = p_1 q_1 - p_0 q_0$ , or to reckon all stocks at cost value, whichever he prefers. Clark holds that he will choose the latter method if prices are rising, and states that in this case there is no difference between this and the true result. That is, he takes  $D = (q_1 - q_0)\bar{p}$  as the method used by the employer in assessing cost. This differs from the American method described above,<sup>1</sup> which only gives the correct result if prices are stationary.

When prices are falling,  $X$  is chosen, and to get the true income there must be added  $D - X = q_0(p_0 - \bar{p}) + q_1(\bar{p} - p_1)$ . That is, the same correction has to be made to suit the British statistics as, for other reasons, to suit the American statistics. The American correction, however, is necessary also when prices are rising, for their estimate does not depend on anything corresponding to Schedule D.

The differences depend largely on the accountants' method of valuation. Clark appears to give no evidence<sup>2</sup> that the practice he names is that followed, or allowed by the Inland Revenue.

<sup>1</sup> It is to be remembered that  $C_1$  refers to the amount consumed, while  $D$  refers to the increment, and that  $C = B - D$ ,  $C_1 = B - X$ , so that  $C_1 - C = D - X$ . The American method in fact uses the former of the two allowed for the British Income Tax.

<sup>2</sup> Mr. Maizel, who follows and extends his figures in *Economica*, May, 1941, p. 161, adds nothing on this point.

If the phrase "stocks reckoned at cost price" is taken literally as the original cost bale by bale we get a more complicated result, which is worked out in *Studies in National Income*, pp. 119-121.<sup>1</sup> This takes into account the relation of the stock held at the beginning of a year to the annual consumption, and also the lapse of time between the purchase and use of the stock. In some cases, which are not abnormal, Clark's conclusions are reversed, and in all are modified.

The use of the average price of the year for  $p'$  in equation (5) is open to criticism. For example, in Great Britain in 1938 prices fell during the first six months and were stationary or rising in the latter part of the year. If the stock existing at the end of 1938 had been bought during the latter four months the correction made in the White Paper Cmd. 6347, computed by Maizel, is on a wrong basis. For this year in Great Britain the figures are as follow:—

Prices :	1930 = 100		Difference
1937 Sept.-Dec.	112.0 = $p'$	Given $p_0q_0 = 1794$ , $p_1q_1 = 1743$	— 51 = X
1937 Dec.	109.2 = $p_0$	Hence $\bar{p}q_0 = 1701$ , $\bar{p}q_1 = 1774$	+ 73 = Z
1938 Jan.-Dec.	103.5 = $\bar{p}$	and $p'q_0 = 1840$ , $p'q_1 = 1750$	— 90 = Y
1938 Sept.-Dec.	102.1 = $p''$		
1938 Dec.	101.7 = $p_1$		

Here Y is the change in cost assuming that the quantities in stock at the end of the year were bought at the average prices of the preceding three months. According to Clark, the manufacturer chose X, while the true value is Z. But on the literal cost basis he would choose Y. Possibly, however, he would take the current value at the beginning of the year, and compute  $p''q_1 - p_0q_0 = -44$ .

Kuznets, following Fabricant (*Revaluation of Fixed Assets*, Bulletin of the National Bureau of Economic Research, No. 62, 1936), makes the correction on the basis of average annual values for each industry separately. Clark, having estimated the aggregates for  $p_0q_0$  and  $p_1q_1$  on a sampling basis, adjusts the prices for the beginning, end and average for the year *en masse* by the Board of Trade Index of Wholesale Prices for Industrial Materials and Manufactures. This may introduce serious errors, since the increase or decrease of stocks in different industries no doubt varied, while the price changes also varied, and also the weighting for the Board of Trade Index is not the same as that used in Clark's computation.<sup>2</sup> The whole procedure lacks seriously in statistical precision.

Return now to the main problem of definition (equation (1)). There the change in the value of stock is separated into change due to quantity and change due to price. Though there is no logical defence for keeping the Schedule D method for computing the National Income, but only the pragmatism that the data for making correction are uncertain, it can be argued that part of the stock can be sold at the current price and the receipts used as income, so that

<sup>1</sup> Now in the press.

<sup>2</sup> There is also the consideration that some manufacturers might find it advantageous to choose the formula X, others Z or Y.

*X* gives the right formula in both countries. In fact there is no clear-cut distinction between change in value of fixed or working capital and income: it is a matter of convenience and definition. In a balance sheet that sets on the receipt side income and on the expenditure side consumption and savings, any variant of the distinction can be used and the totals still equal each other.

It may be remarked that the arguments in favour of this kind of adjustment are largely based on the need for adjusting money income by the movement of prices to get comparisons of real income over a series of years. Much of the difficulty can be evaded if we proceed directly to measure real income by its equivalent, viz., an index of production. Here money value only enters as weights. We still have the dilemma that the result is affected by the choice of the year for establishing the weights; but this is inevitable since the change of real income depends on the relative values which people assign to different goods at different dates.