

A Review of the Colombo Cost-of-Living Index Number¹

THE Colombo cost-of-living index number was constructed by the Statistics Section of the Commerce Department and published in the *Ceylon Trade Journal* in September, 1940. Since then it is being compiled and published monthly by the Statistics Department. The index was calculated back up to August, 1939. In September, 1942, slight alterations in the weighting of cloth, tea and coconut oil were made. Soon afterwards, in June, 1943, the index was completely revised and an entirely new system of weights was adopted. This revision changed the character of the index so much that it would, perhaps, be better to regard the revised series not as a continuation of the old index, but as a different one. For brevity we shall call the first series C1 and the revised series C2.

Family-Budget Enquiry, 1940

The index C1 was based on the data collected by a working-class family budget survey. The Report of the Survey published in the *Trade Journal*, September, 1940, does not mention the exact period in which the inquiry was undertaken. The enquiry covered a period of 14 days and the Report claims it to be "intensive and widespread".

The sample selected for investigation was spread over all the working-class areas of the city and was selected at random. Altogether 351 budgets were accepted for construction of the index.

Adequacy of the Sample

The Report does not give the percentage of the sample-population to the total working-class population of Colombo. Without this information the adequacy of the sample cannot be properly judged.

The working class population or even the total population of Colombo City for the year 1940, is not available. The Census of 1931 and 1946 give the figures at 284,155 and 355,374 respectively. The average rate of growth during this period, therefore, was 4.748 per year and assuming this growth-rate to prevail in the period 1931 to 1940, the estimated population of 1940 would be 326,887. The year 1931 was, however, a depression year while 1940 was a year of higher employment in cities. Hence the actual increase, perhaps, was much higher than the average rate. The figure 326,887 can, therefore, be regarded as the lower limit of our estimate. Let us assume that the percentage of working-class population to the total population in the city lies

1. I am grateful to Mr. H. Nandi and Mr. S. Bhattacharya of the Indian Statistical Institute, Calcutta, for carefully going through the MSS. and offering many criticisms.

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between 75 per cent. and 90 per cent. i.e., between 245,165 and 294,198. The Report gives the average population per working-class family as 5.64. The total population surveyed was, therefore, 1,980, i.e., 0.7 to 0.8 per cent. or less of the total working-class population. The Bombay family-Budget enquiry was based on a 3 per cent. sample, though the sample-population was 1,469 families. The Madras enquiry was based on a 3 per cent. sample with a sample population of 641 families. The Madras sample was, however, very carefully selected. For such a small working-class population as that of Colombo, a sample covering 6 to 10 per cent. of the total working class families in the city, would, perhaps, give more satisfactory results.

Inclusion of Workers of Unorganised Industries

The families surveyed were mostly of workers who were not employed in any organised industry and whose earnings were irregular. This is a serious drawback of the index. For the cost-of-living index is needed mostly in settling wage-disputes, in fixing minimum wages and in granting compensation for higher prices, and these problems arise mostly in organised industries. There is no reason to believe that the workers with irregular income and employed in unorganised industries would have the same standard of living as the workers of organised industries enjoying a regular income. The habits of life and the ways of consuming of the two groups are likely to differ much. It would be wrong, therefore, to infer the cost-of-living of one group from that of the other. The error arising out of this factor could have been easily avoided, if the families were chosen industry-wise, instead of area-wise, the later method being employed only in case of unorganised workers.

Income Limits

The Report of the Survey does not give any income limit of the working-class families investigated. Absence of an income limit may reduce the homogeneity of the sample and increase the sampling error. Economists would further deplore the omission of income distribution in the Report. For, such omission prevents a factual study of demand and its measurement and of consumption, etc. The authorities seem to have kept the construction of the index number as their sole aim and were not conscious of the other valuable uses of such data.

The Index Number

Both the indices C₁ and C₂ have been compiled by averaging the price-relatives for different commodities, generally consumed by the workers, weighted arithmetic average being used to combine the price-relatives. For the index C₁, the average prices for the period, November, 1938 to April, 1939 are taken as the base period prices. The selection of this period as the base-period is justified, for prices were fairly steady during this period and it facilitated comparison of war and post-war period prices with the year preceding the war.

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The index C2 has November, 1942, as its base. The selection of this period as the base period has no justification, except that of expediency. The prices were rising steeply in this period and the consumption-pattern was in a flux. The new base was adopted and the index was revised, because it was proposed to link the high-price allowance to the cost-of-living index on a sliding scale, which gave the index a social importance which it never enjoyed before.

Method of Compilation

In both C1 and C2 the method of compilation and the articles included are the same, the difference being in the weights used and in the method of selecting the weights and the base period. A separate index is constructed for each of the sub-groups: Food, Fuel and Light, Rent, Clothing and Miscellaneous items and the general index is obtained by combining them by the method of weighted arithmetic average.

Items Included

In the food-group 19 items were selected which gave a coverage of 98.5 per cent. of the total expenditure on food, as shown in the Report of September, 1940. The Report of June, 1943, does not mention the coverage. In housing, the average rent of thirty selected houses is taken. In the miscellaneous group, expenditures on amusement, charities and ceremonies, and services are excluded. The exclusion of amusements on which taxes, were heavy during the war period, has lowered the index figures somewhat.

The way in which the index for cloth is constructed makes the index liable to serious criticism. An index of cloth prices constructed entirely for a different purpose, with a system of weights, which have no relationship whatsoever to the expenditures of workers on cloth, was adopted without alteration. This index number of retail prices of piece-goods was "prepared to examine the effects of the quotas" and "the weights for this index are obtained from the total imports and local production for the four years 1935-1938". It is sought to justify the use of the index on the ground that "it was not possible to obtain full details as to expenditures on various types of clothing within the period of investigation. Only an estimated figure of the average monthly expenditure on clothing was, therefore, available". It is difficult to understand, however, why, in spite of an "intensive" investigation lasting for 14 days, the investigators failed to obtain any information about the types of cloth generally consumed by the working-class families. An index constructed with these types of cloth and weighted according to "the estimated figure of the average monthly expenditure" would have given much better results.

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In September, 1942, the clothing index was slightly improved by omitting luxury articles, such as art-silk, printed goods and broad-stuffs. Even then it remained unfit for inclusion in the cost-of-living index, because of its different systems of weighting and choosing the types of cloth.

Units Undefined

The exact interpretation of C1 is difficult ; for, the quantities which are used for weighting are not given. In the case of C2 we are given a sample composition of the complex of commodities, the change in the value of which the index tries to measure.

The units of the commodities at which price-quotations are obtained are not given either in C1 or in C2. For example the price index of rice was 111 and 208 in 1940 and 1942 respectively, showing a rise of 97 points in the period. In what unit was the price-quotations obtained—was it in rupees *per lb.*, or *per measure*, or *per cwt.* ? The exact definition of the unit of price-quotations is important for, the price-change per cwt. and per lb. may not be the same. Secondly, units of price-quotations affect the weights and thus the average of the prices. Hence the commodities, the price-quotations of which are obtained in units higher than that at which workers make their purchases, get an excessive weight. Moreover exact interpretation of the price-change of services, education, etc., becomes difficult, unless the units of price-quotations are clearly defined.

Weights Used

In C1 the following system of weights obtained from the family-budget enquiry of 1940, was adopted :—

Food	..	..	..	..	52·40
Fuel and Light	..	..	..	..	6·28
Rent	..	..	..	..	15·96
Clothing	..	..	..	..	8·36
Miscellaneous	..	..	..	..	17·00

					100·00

In C2 the weights were completely altered. In justification of the new weights, the Report published in the *Trade Journal*, June, 1943, (and also in a *Sessional Paper* of that year), says : “ During the latter half of the year it became evident that with the radical changes in the basic food-stuff, the reduction in the rice-element in food and the inability to obtain certain articles included in the budget, . . . a revision of the family-budget should be undertaken. A Committee examined the question and made certain recommendations.

As a result of these recommendations the revised budget at prices ruling in November, 1942, is now adopted as the basis of the index from November, 1942". What exactly those recommendations were, are not known, nor can we get any information about the reasons for making them. The Report gives a detailed list of expenditures on different items, but it does not say anything about the methods by which the list was compiled. Was it based on a family-budget enquiry? if so, what was the size of the sample? How was it selected? What was the income range? It is not possible to get any information on these matters from the reports. It is not possible, therefore, to pass any judgment on the merits of these weights from a direct study of the Report.

It is possible, however, to examine the family-budget presented in the Report for internal consistency by an indirect method—by calculating the change in the physical volume of consumption in the two periods 1940 and 1942.

Let P_0 be the price of an article in the period T_0 and P_1 the price in the period T_1 . Let the expenditure on an article in the two periods be V_0 and V_1 respectively. The quantities consumed in the two periods T_0 and T_1 are given by V_0/P_0 and V_1/P_1 . The percentage change in the physical volume of consumption R_{01} in the period T_1 as compared to the period T_0 is given by:

$$R_{01} = V_1 P_0 / V_0 P_1 \times 100.$$

The family budget reports of September, 1940, and June, 1943, give the volumes of expenditures V_0 and V_1 in the two periods. The price indices P_0 and P_1 are obtained from the cost-of-living index number C.I. The Report of 1940 does not mention at what date the enquiry was undertaken, or, at what prices the expenditures of the working-class families were calculated. Nor does it give any information about the quantities of the articles purchased. It is reasonable to assume, however, that the average price of the quarter of the year which preceded the publication of the report, determined the consumption-pattern and, therefore, the volume of expenditures given in the Report. Thus we may choose the median prices of April-June of 1940, as the standard price P_0 which determined the volume of expenditure V_0 shown in the Report. Similarly the standard price P_1 —the median price of October-November of 1942—may be assumed to be the determinant of the volume of expenditures V_1 of this period.

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TABLE I

Percentage change in the Physical Volume of Consumption in 1942
(R_{01}) with 1940 as base

<i>Item</i> (1)	P_0 (2)	V_0 (Rs.) (3)	P_1 (4)	V_1 (Rs.) (5)	R_{01} (6)
1. Rice	111	11.28	208	2.84	1345
2. Condiments	105	1.86	212	4.85	129
3. Pulses	128	0.30	250	1.80	307
4. Onions	96	0.49	191	0.92	94
5. Potatoes	118	0.21	197	5.50	1569
6. Vegetables	113	1.66	195	9.73	340
7. Fish	97	4.35	227	6.48	64
8. Meat	116	1.09	142	1.20	95
9. Eggs	91	0.12	218	0.00	0
10. Tea	131	0.46	311	2.40	220
11. Sugar	127	1.06	220	2.20	120
12. Milk	98	1.26	117	1.72	114
13. Coconut	107	1.30	200	4.20	173
14. Coconut Oil	105	0.45	213	0.72	79
15. Bread	103	0.52	142	11.00	1536
16. Flour	92	0.01	166	10.27	56918
17. Fruits	104	0.17	133	0.00	0
18. Jam and Butter	103	0.04	181	0.00	0
19. Kerosene Oil	107	1.47	181	1.79	104
20. Firewood	99	1.69	305	5.40	104
21. Matches	100	0.15	150	0.21	93
22. Tobacco	100	1.74	150	2.61	100
23. Betel	122	0.81	180	2.27	190
24. Soap	107	0.43	125	0.54	107
25. Liquor	103	0.76	120	0.92	104
26. Dhoby	100	1.48	120	1.78	100
27. Barber	100	0.68	144	0.98	100
28. Transport	113	0.96	119	1.14	113
29. Medicine	112	0.36	198	0.73	115
30. Utensils	143	0.15	193	0.29	143
31. Education	142	0.66	295	1.95	142
32. Clothing	126	4.41	224	0.95	114
33. Rent	97	8.42	90	7.20	92

The various items shown in the consumption pattern of the two periods may be classified into four groups according to the change produced in the physical volume of consumption. In the first group are those articles which have disappeared from consumption ; in the second are those which have decreased in consumption ; the third group consists of the articles which have not changed in volume of consumption, and the fourth group is made up of those articles which have increased in consumption. Column (3) of Table 2 shows the percentage increase or decrease in price. It will be noticed that except in the case of rent, in every other case the prices have increased. How far are these consumption changes justifiable? Decrease in the consumption of Groups I and II may be explained by rise in price and scarcity in supply. Failure of the articles of Group III to decrease, and the increase of Group IV, in spite of a rise in prices may be explained, first, by a rise in real income of the working-class ; and second, by the principle of substitution. A third explanation of change in taste is ruled out because of the shortness of the interval.

Income and Consumption

Unfortunately, we do not have any wage-index or pay-roll index in Ceylon, which would give us an indication of the change in the income of the working-class families. If we are to study the effects of income-change on consumption we must make an " intelligent " guess about the probable change in the worker's income. It is possible to make such a guess if we assume that the wage increase has been in the same proportion as the increase in the national income in the period under review. It is necessary to point out that such an assumption is not strictly true and is made merely to obtain the roughest idea about the change in wage rate. The constituent elements of the national income, namely, profits, wages, salaries, interest, rent, etc., do not all rise or fall at the same time or to the same extent. In times of prosperity and of depression wages lag behind profits, while the other elements lag behind wages. This lag is greater in the earlier phases of prosperity and depression. The year 1939 may be regarded as the starting point of a prosperity cycle in Ceylon. It is reasonable to believe that whatever increment-rate the national income showed in this phase was largely due to rise in the rate of profits and other variable income rates. By 1942, the wage-rate increment must have contributed to some extent to the increment of the national income ; but even then it must have lagged behind profit-rate, since the year was still in the earlier phase of the prosperity cycle. To the extent that the wage-rates lagged behind profits rate and national income increment, the true rise in the wage rate would be less than the rise in the profits rate and the rate of increment

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TABLE II

Percentage Change in Price and Volume of Consumption in 1942
with base in 1940

<i>Group</i>	<i>Item</i>	<i>Percentage increase (+), or, decrease(-) in price</i>	<i>Percentage increase (+), or, decrease(-) in volume of consumption</i>	<i>Percentage increase (+), or, decrease (-), in volume of Imports in 1942 with base in 1940</i>
(I)	(2)	(3)	(4)	(5)
I.	1. Eggs ..	.. + 140	- 100	—
	2. Fruits ..	.. + 28	- 100	—
	3. Jam and Butter ..	.. + 76	- 100	—
II.	4. Rice ..	.. + 87	- 87	—
	5. Onions ..	.. + 98	- 6	- 3.5
	6. Fish ..	.. + 134	- 36	—
	7. Meat ..	.. + 22	- 5	—
	8. Coconut Oil ..	.. + 103	- 21	—
	9. Matches ..	.. + 50	- 7	—
	10. Rent ..	.. - 7	- 8	—
	11. Cereals (as a group) ..	.. + 48	- 19	- 40.5
III.	12. Tobacco ..	.. + 50	0	—
	13. Dhoby ..	.. + 20	0	—
	14. Barber ..	.. + 44	0	—
IV.	15. Condiments ..	.. + 102	+ 29	- 4.5
	16. Pulses ..	.. + 95	+ 207	- 45.2
	17. Potatoes ..	.. + 67	+ 1469	- 5.5
	18. Vegetables ..	.. + 73	+ 240	+ 115.0
	19. Tea ..	.. + 137	+ 120	—
	20. Sugar ..	.. + 73	+ 20	+ 3.0
	21. Milk ..	.. + 19	+ 14	—
	22. Coconut ..	.. + 87	+ 73	—
	23. Bread ..	.. + 37	+ 1435	—
	24. Flour ..	.. + 80	+ 55918	—
	25. Kerosene Oil ..	.. + 13	+ 4	+ 27.0
	26. Firewood ..	.. + 208	+ 4	—
	27. Betel ..	.. + 48	+ 90	—
	28. Soap ..	.. + 17	+ 4	—
	29. Liquor ..	.. + 17	+ 4	—
	30. Transport ..	.. + 5	+ 13	—
	31. Utensils ..	.. + 38	+ 43	—
	32. Medicines ..	.. + 77	+ 15	—
	33. Education ..	.. + 108	+ 42	—
	34. Clothing ..	.. + 8	+ 14	—

of the national income.² Thus our assumption of proportionate increases in the national income rate and the wage-rate gives us an overestimate of the rise in the wage-rate, and the true wage-rate increase would be less than what we assume here.

For measuring the change in the national income, we shall use Dr. Das Gupta's national income estimates (published in the *Social Service Commission Report*), in the absence of any other more comprehensive and accurate data. We shall have to introduce two corrections, however, before we can use these estimates for our purpose.

(a) Correction for factor cost: We need, for our purpose, a measure of the change in the *real income* and not money income which we shall regard to be the same as the real income-change of the working-class. Real income is obtained by deflating money income estimates by a suitable price

2. That the assumption of constant ratio between the percentage rates of increment of the national income and the wage-rate gives an over-estimate of the wage-rate increase, in the rising phase of the national income, can be proved as follows:

Let the national income Y be made of two components Y_1 and Y_2 ; Y_1 representing the component which rises first and shows a lead, e.g., profits; and Y_2 the component which shows a lag, e.g., wages, salaries, etc. Then, $Y = Y_1 + Y_2$.

Let $Y = f(t)$, where t is time. Then the proportional rates of increment of Y , Y_1 and Y_2 are $\frac{1}{Y} \frac{dY}{dt}$, $\frac{1}{Y_1} \frac{dY_1}{dt}$, and $\frac{1}{Y_2} \frac{dY_2}{dt}$ respectively.

Since,

$$Y = Y_1 + Y_2 \dots\dots\dots(1)$$

We have, $\frac{dY}{dt} = \frac{dY_1}{dt} + \frac{dY_2}{dt}$

$$\frac{1}{Y} \frac{dY}{dt} = \frac{Y_1 \left(\frac{1}{Y_1} \frac{dY_1}{dt} \right) + \frac{1}{Y_2} \frac{dY_2}{dt}}{\frac{Y_1}{Y_2} + 1} \dots\dots\dots(2)$$

Now if $\frac{1}{Y_1} \frac{dY_1}{dt} > \frac{1}{Y_2} \frac{dY_2}{dt}$,

We have from (2) $\frac{1}{Y} \frac{dY}{dt} > \frac{Y_1 \left(\frac{1}{Y_2} \frac{dY_2}{dt} \right) + \frac{1}{Y_2} \frac{dY_2}{dt}}{\frac{Y_1}{Y_2} + 1}$

$$= \frac{\frac{1}{Y_2} \cdot \frac{dY_2}{dt} \left(\frac{Y_1}{Y_2} + 1 \right)}{\frac{Y_1}{Y_2} + 1}$$

$\therefore \frac{1}{Y} \frac{dY}{dt} > \frac{1}{Y_2} \frac{dY_2}{dt}$

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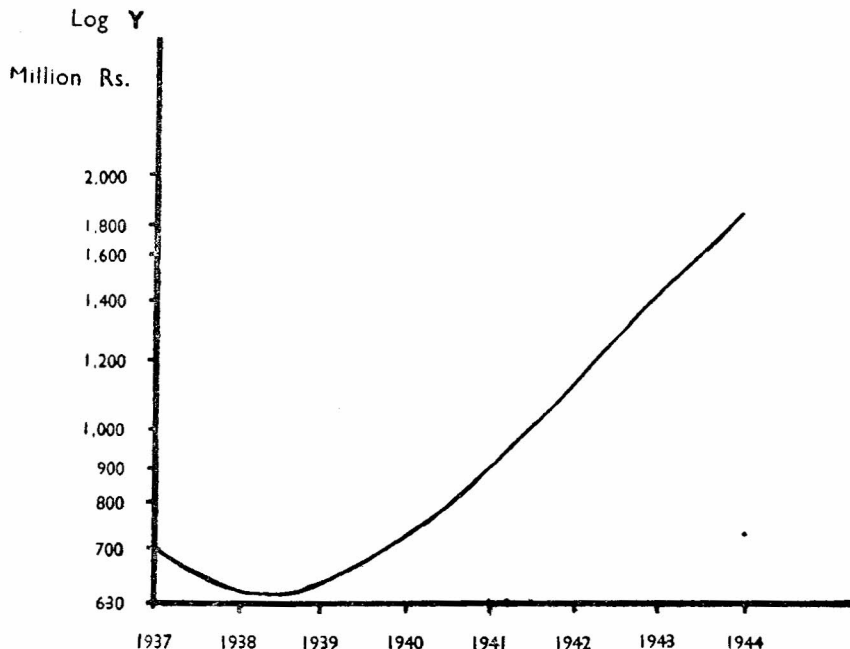


Diagram I. Nominal National Income at current prices (in semi-logarithmic scale)

index. Dr. Das Gupta's estimates give national incomes at factor cost. But if we are to deflate the money income by a price index, we must obtain the estimates at "current prices". National income estimates at factor cost do not include the effects produced by indirect taxation and subsidies, while the available price indices include such effects. Hence if we are to use any of the available index number of prices, we must not make any correction in the national income estimates for indirect taxes and subsidies. Thus, merely by re-adding the indirect taxation figures to Dr. Das Gupta's estimates, we can obtain national income figures at "current prices".

(b) Correction for price-changes: Money income estimates when corrected for price changes, will give us real income estimates. This is done by dividing the money income of a period, by a suitable index number of that period. There are only three index numbers available in Ceylon at present, namely, (i) the export price index number; (ii) the import price index number; and (iii) the cost of living index number. These indices constructed by the Statistics Department, give us the respective prices from 1939 onwards. In the absence of any index number of the general purchasing power of money, which is the most suitable index for deflating national income estimates, we must use any of these three indices. Which of these three indices will give us the most satisfactory result?

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TABLE III—Per Capita Money Income

Year (1)	National Income		Population (in million) (4)	Per capita Income	
	At factor-cost (in million Rs.) (2)	At current prices (in million Rs.) (3)		At factor-cost (Rs.) (5)	At current-prices (6)
1937	620·606	694·606	5·780	106	120
1938	583·502	654·165	5·864	96	112
1939	633·232*	684·349*	5·922	107	116
1940	732·265*	781·497*	5·981	122	131
1941	890·492*	946·413*	6·061	147	156
1942	1091·265	1173·085	6·083	179	193
1943	1422·137	1520·085	6·197	229	245
1944	1701·432	1826·992	6·384	267	286

* Interpolated values.

(i) The export price index can make a claim for the purpose on the ground that the major part of our national income is obtained from exports. If we assume that the export prices of the commodities, the major part of which is exported (cf. coconut) determine their domestic prices also, then the export prices would get a weightage of 50 per cent. in 1938 and 48 per cent. in 1942, which were the proportions in which export industries contributed to the total national output during those years. Thus the export price index would correctly deflate about half of the national income and for the other half it would be inappropriate.

(ii) From the point of view of consumption the import price index can make a better claim as a deflator of national income than the export price index. If we regard real per capita income as the amount of goods and services that an individual consumes and saves then the import price index would be a suitable deflator, only so far as imported goods are consumed. In Ceylon we spend most of our income on foreign goods but the exact proportion of this expenditure is not known. To the extent that we buy domestic services and domestic goods, import price index would be unsuitable as a deflator of national income.

(iii) For our purpose however, the cost-of-living index would be the most appropriate index to use. For, what we are concerned here is not money national income but money wage. We have assumed the *rate* of per capita income increment to be valid for wage-rate increment also. Thus by attributing to wages a rate of increment that we notice in the case of national income, we have obtained an upper limit of wage increase in this period. What would be the real worth of the worker's wage level thus obtained? Evidently the best answer would be to deflate the money wage index by the cost-of-living index, the money wage index being assumed to be the same as the national per capita income index.³

3. In so far as the Cost-of-Living Index is an under-estimation, the real-wage obtained by deflating money national income by Cost-of-Living Index would be over-estimated.

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Dr. Das Gupta has not given the figures of national income for the years 1939, 1940 and 1941, which we have interpolated by fitting a second degree polynomial to the estimates of other years. For the factor cost estimates the polynomial—

$$Y = 732.265 + 128.630 X + 29.597 X^2$$

with origin at 1st July, 1940 and units measured in millions, gives a satisfactory fit. For the current price estimates, the polynomial:

$$Y = 855.484 + 82.458 X + 8.471 X^2$$

with origin at 31st December, 1940, and units in millions seems to be suitable. In both cases the fit is satisfactory.

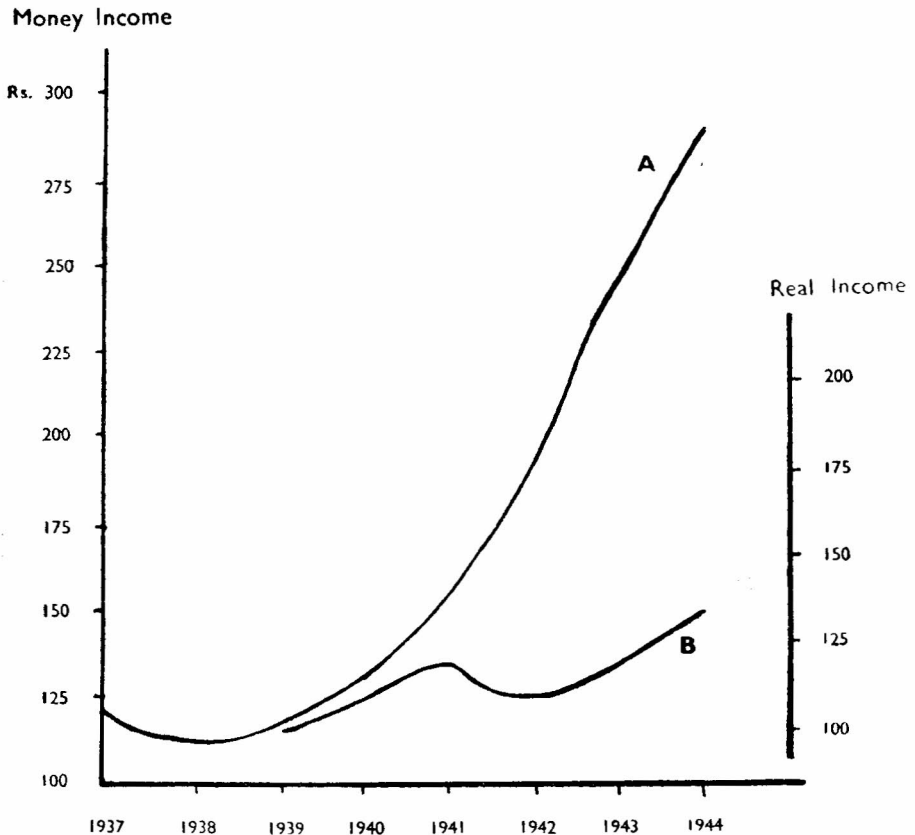


Diagram 2. **A** = Per-capita money income (at current prices)
B = Per-capita real income index with base at 1939 (cost-of-living index deflated)

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The real wage index (Table 4) at factor cost show a rise from 109.94 in 1940 to 110.16 in 1942—a rise of 0.2 per cent only.

At current prices the increase is from 109.02 in 1940 to 109.89 in 1942—a rise of 0.798 per cent. (See Table 5). In both cases the rise in real income must be regarded as insignificant.

TABLE IV
Real Income at Factor-Cost

Year	Per-capita Income of Factor-cost	Price-Index			Real income at factor-cost					
		Export-prices	Import-prices	Cost-of-living	Deflated by			Percentage change with base at 1939		
					Export-price Index	Import-price Index	Cost-of-living Index	Export-price deflated	Import-price deflated	Cost-of-living Index deflated
(I)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1937	106	—	—	—	—	—	—	—	—	—
1938	96	—	—	—	—	—	—	—	—	—
1939	107	141	102	108	0.7588	1.0490	0.9907	100.00	100.00	100.00
1940	122	147	124	112	0.8299	0.9838	1.0892	109.37	93.78	109.94
1941	147	163	151	122	0.9018	0.9735	1.2049	118.84	92.80	121.62
1942	179	188	239	164	0.9521	0.7489	1.0914	125.47	72.39	110.16
1943	229	202	308	195	1.1336	0.7435	1.1743	149.39	70.87	118.53
1944	267	232	399	200	1.1508	0.6691	1.3350	151.66	63.78	133.94

TABLE V
Real Income at Current Prices

Year	Per-capita income at current-prices (Rs.)	Real income at current prices					
		Deflated by			Percentage change with base at 1939		
		Export-price Index	Import-price Index	Cost-of-living Index	Export-price Deflated	Import-price Deflated	Cost-of-living Deflated
(I)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1937	120	—	—	—	—	—	—
1938	112	—	—	—	—	—	—
1939	116	0.8195	1.1329	1.0700	100.00	100.00	100.00
1940	131	0.8889	1.0537	1.1667	108.45	93.01	109.02
1941	156	0.9579	1.0341	1.2799	116.88	91.27	119.61
1942	193	1.0257	0.8069	1.1759	125.16	71.22	109.89
1943	245	1.2143	0.7963	1.2578	148.17	70.28	117.55
1944	286	1.2335	0.7172	1.4304	150.52	63.31	133.72

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Thus the explanation that the increase in the quantity of consumption due to increase in real income is untenable.

Even if we assume that the real wages had increased in this period, how could we explain the fall of consumption in Groups I and II and the failure of Group III to increase? Except rice the other articles were not rationed and there is no reason why they should not be increased in consumption, or at least, retained in their former position.

If we rule out change in taste and temperament, and a rise in real income, then the only explanation that remain to be disposed of is the substitution of relatively cheaper goods for costlier ones. In our example, Group IV has increased in consumption and Groups I and II have decreased, because, it may be asserted, the latter have been substituted by the former. But the assumption behind such substitution must be that Group IV was relatively cheaper than Groups I and II, or, that the rise in price of Groups I and II was greater than in Group IV. The relative prices in both these cases rose about the same amount, namely 66 per cent. in Groups I, II and III and 65 per cent. in Group IV. Thus the substitution cannot be explained by change in relative prices.

It may be argued that the institution of price control did not allow the supply factors to exert their influence on prices and, therefore, relative prices cannot be taken to indicate the relative substitution. Unfortunately we do not have any statistics of supply of commodities except those which are wholly imported. Column (5) in Table 2, show the percentage of quantities of imports of such articles in 1942 as compared to the imports in 1940. A closer study of this column shows that of the imported articles whose statistics are available, the change in the consumption of cereals, onions and vegetables are consistent with rise in price and decrease or increase in supply. In case of sugar and kerosene oil though there was a rise in supply, yet a rise in consumption was not warranted because these articles were rationed and only a part of the entire supply was made available for immediate consumption. In case of other commodities, an increase in consumption is shown, inspite of rise in prices, decrease in supply and non-increase in real income. Moreover the 1942 consumption pattern shows an increase in the consumption of rationed articles except rice, such as sugar, kerosene oil and cloth, which clearly demonstrate its arbitrary character. Thus the tenuous basis of the consumption pattern drawn up in 1942 for the construction of C₂ is evident and can be justified only when it is hedged with numerous assumptions of doubtful validity. This arbitrary character of the consumption pattern of C₂ is one of the major contributing factors responsible for making it unrelated to actual conditions.

Collection of Prices

What makes the index C₂ more unreal is the errors of price collection. The success of an index number depends not only on the methods of averaging

and weighting, but also—and more so—on the correctness of the prices collected for the purpose. If the price quotations are incorrect no statistical refinement can improve the efficiency of the index and it will inevitably fail to reflect correctly the variations in the cost of living. The investigators of the Statistics Department collect prices from approved shops and in cases of doubt are expected to make "test purchases" to verify the information given by the retailers. The method is efficient provided the officers take great care to get the correct prices after proper investigation. With the institution of price control and the appearance of the black market, the collection of the exact prices at which the working classes made their purchases became more difficult. The question arose whether the black market price should be taken cognisance of in constructing the index and if so what weights should be given to the black market price and what to the legal price. From the theoretical point of view the index should be based on the prices actually paid by the workers, whether the prices paid are legal or not. Otherwise the index will fail to measure what it purports to measure and will become unreal and fictitious. The collection of actual prices paid by the workers, however, is not easy and present grave administrative difficulties. For, information is needed not only about the prices but also about the quantities of the articles purchased, so that the index may be based on the weighted average of the black market and the legal market prices, the weighting being done by the quantities purchased from each of these markets. Evidently information of this nature can be obtained only if a direct and intimate contact is established with a sample of representative working class families. It ought not to be impossible to select such a representative sample as it is done now in case of rent. The workers so chosen may be given the necessary instructions to report the quantities and the prices of their weekly purchases correctly. The Statistics Department did not make any such attempt to solve the problem presented by the appearance of the black market prices, but avoided the issue by ignoring the black market altogether and basing the index on the legal prices alone even when no commodities were available in the legal market. In consequence the index lost all semblance of reality and to the extent the actual prices diverged from the controlled prices the errors of the index increased. In fairness to the Statistics Department it must be mentioned that even if the Department made any such attempt to obtain the real prices, it is doubtful how far it would have succeeded in view of the inadequacy of its equipment and staff. Statistics has never been the strong point of our administration and, till recently, the existence of the Department was regarded as more ornamental than useful.

The method of obtaining information regarding prices and quantities directly from the consumers has its usefulness even when price control is absent. It can be used as a check on the price-quotations supplied by the

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retailers. Secondly, any change in the consumption pattern can easily be detected and the index amended whenever the consumption pattern undergoes radical changes. It can be used to check the system of weighting also. If the costs permit, such a method will improve our cost-of-living index considerably.

In any case, sample surveys of retail prices from alternative sources should be organised from time to time to test the reliability of the approved retailers who supply price data and the efficiency of the price collectors.

Relationship of C1 and C2

It is worth while to point out an error, repeated every month since the revision of the old index. The Report of 1943 says, "In order to ascertain the change in the cost-of-living in the original basic period (November, 1938 to April, 1939), the new index number is multiplied by 1.83". Evidently by multiplying the total by 1.83 we will not get the same result as reconstructing the index with new weights for each constituent element. In order to compare the cost-of-living of pre-1942 period, it is necessary to reconstruct the index either with 1942 weights, or, with 1939 weight, or, to extend both C1 and C2 to the other period.

Economic Consequences of the Errors in the Index

In order to examine the economic consequences of these errors, it is necessary to find out first of all whether these errors have resulted in an over-estimation or an under-estimation of the true cost-of-living.

A. Errors of weighting :

- (a) The weight of cereals in C2 has been reduced. To the extent that the cereal prices were kept low by heavy subsidy, the lowering of weights gave us an over-estimation of the cost-of-living. If the former weights of cereals (as a group) had been retained we would have obtained a lower figure.
- (b) The prices of the most of the other items including the items in the food group, have risen higher than the cereal prices. Their weights also have been increased in the revised index. This must have resulted in an over-estimation of the true cost-of-living.

B. Errors of price quotations : On the other hand so far as the black market prices were ignored and the index was based on the controlled prices only, the index must have resulted in an under-estimation of the true cost-of-living. What the net effect of these two opposite factors has been, cannot be estimated. For, the error due to price quotation depended on the divergence between the control-prices and the black market prices and the quantities purchased from each market. So far as the actual prices diverged from the controlled prices, the index showed an under-estimation of the true cost-of-living.

In order to trace the effects of the index on the economic situation in the country, let us assume that the black market prices and purchases diverged from the legal market prices and purchases to a significant degree, so that the index number gave us an under-estimation. This assumption may be regarded as valid during the war period, when price control was severest and black market thrived most. So far as the cost-of-living index determined partially the money earnings of the workers and the employers, this under-estimation must have resulted in a lower wage than what it would have been, had the black market prices been taken cognisance of. Indirectly this fact along with the rise in prices and inflation must have resulted in transference of wealth from the wage-earner to the profit-earner. And, so far as 85 per cent of the profit earners are foreigners, this under-estimation has benefited them at the cost of the Ceylonese.

A second adverse effect may be traced to the commercial deals that we had during those days with our foreign buyers. In settling the prices of our products the cost factors—of which the index was one—were taken into consideration. The lower cost-of-living figures, therefore, must have resulted in a lower price for our exports than what we would have obtained had the index figures been higher. The foreign buyers, thus benefited by these errors at our expense, which caused a reduction in our national income.

The beneficial effect of such under-estimation on the economic situation must not be lost sight of in assessing the effects of the index. So far as it kept the purchasing power of the masses at a lower level, it must have contributed to some extent towards counteracting the inflationary pressure during the war.

The conclusions arrived above are valid—it must be remembered—under the strict assumption that the actual prices and quantities purchased by the workers diverged substantially from the controlled prices used in the construction of the index. If we assume, on the contrary, that the actual prices and the index number prices were identical, then the contrary effects could be traced down to the index, *viz.*, that the index benefited the workers and employees at the cost of the profit-earners, and the Ceylonese at the cost of the foreigners. These results would follow because of the weights adopted in the second series as contrasted with the first which gave the former an upward bias compared to the latter.

Working-Class Cost-of-Living Index and Middle-Class Employee's Cost-of-Living

In case of the middle-classes, it can be asserted without reservation, that the index C2 gives a serious under-estimation of their cost-of-living. For, the clothing and the miscellaneous groups in C2 show a much greater rise in prices relative to the food group as shown in Table 6 and Diagram 3. For middle-classes the weight of the former two groups are always higher than

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their weights in case of working-class indices. Thus the higher prices having a higher weight and the lower prices a lower weight, the middle-class cost-of-living must have increased much more than the working-class cost-of-living. C2 therefore gives an under-estimation of the rise in the middle-class cost-of-living.

From the theoretical point of view the middle-class cost-of-living cannot be measured by the cost-of-living index of the working-classes. To obtain a correct estimation of the change in the cost-of-living, it is necessary to

TABLE VI
Percentage Variation of Clothing and Miscellaneous Groups' Prices Relative to Food Prices

<i>Year</i>	<i>Food</i>	<i>Clothing</i>	<i>Miscellaneous Group</i>
(1)	(2)	(3)	(4)
1943	100	134	115
1944	100	153	125
1945	100	150	142
1946	100	159	137
1947	100	166	123

Percentage



Diagram 3. A = Food-prices
B = Cloth-prices as percentage of food-prices
C = Miscellaneous prices as percentage of food-prices

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construct a separate index for each separate group of people. In view of the cost involved, however, few countries ever attempt to achieve such an ideal state of statistics.

Summary of Conclusions

I. *Family Budget Survey :*

- (a) The sample selected for the survey in 1939-40 was rather small. In the next survey, which should be undertaken as soon as prices become more established, efforts should be made to collect family budgets from a larger sample, say, of one thousand families.
- (b) Stratified sub-samples of different areas and industries should be taken, the size of each sub-sample being approximately in proportion to the population in that area or industry from which it is selected. A separate sub-sample may be collected for unorganised industries.
- (c) The frequency distribution of the income-classes and the percentage distribution of expenditure according to income-groups should be given.
- (d) A separate survey of middle-class families may be undertaken.

II. *Selection of Articles :*

A broader selection of articles for inclusion in the index should be attempted. The quantity of each of the articles selected and the units of price quotations should be carefully defined.

III. *Price Collection :*

A system of counter-checks on the reported prices should be developed. This may consist of sample price collection from time to time from alternative sources and direct price reporting by the consumers.

IV. *Publication of the Price Relatives :*

The old system of publishing the individual price relatives suspended during the war years, should be restarted. This will remove, to a large extent, the paucity of the retail price statistics and will at the same time increase public confidence on the index by removing its mysterious character.

V. *Wage and Employment Indices :*

It is necessary to construct a wage index and an employment index, without which real-wage determination becomes difficult and the cost-of-living index loses much of its significance and usefulness.⁴

N. K. SARKAR

4. A popular criticism against the index frequently heard is that it has been consciously manipulated to give an under-estimation of the cost-of-living, in order to reduce the Government's expenditure on war allowances. The validity of such a criticism can be verified only by an officially appointed enquiry committee with the necessary statutory powers. Such an enquiry is beyond the scope of this article which is limited to the theoretical aspects of the index alone. It is difficult to understand, however, why such manipulation should be resorted to, when the necessary saving could be effected by altering the sliding scale of the war allowances.

A CRITICISM

The reader after going through the elaborate analysis made by Mr. Sarkar may wonder what it is all about. As far as I can see the purpose of this laborious research is to prove that the 1942 budget cannot be truly representative of the consumption pattern of the working classes in 1942. In order to do this he first sets out to prove that there has been no appreciable increase in the real national income. He makes use of Dr. Das Gupta's estimate published in the *Social Services Commission Report* which in the first place is incorrect—Dr. Das Gupta himself has corrected this in his book on the *The Ceylon Economy*. He then proceeds to interpolate for the year 1940 using a second degree polynomial; he does not say how many observations he used but apparently they could not have been more than 4 or 5. But still he claims that it gives a satisfactory fit. He then proceeds to deflate this by means of the Cost-of-Living Index number, which by the way is the index which is being criticised in the article. Having done all this he comes to the conclusion that there has been no change in the real National Income and consequently that there could have been no increase in consumption. He gives in group 4 of table 2, a list of items which show an increase in consumption. The principal items are bread, flour, potatoes, vegetables and pulses. There is nothing inconsistent in the increases of these items because—

- (a) bread and flour replaced rice between these years;
- (b) there was a very large production of yams during these years—an item which replaced potatoes. By potatoes Mr. Sarkar really means yams;
- (c) there was a very large increase in the production of vegetables;
- (d) as it is becoming more and more apparent the working classes have been definitely increasing their consumption of a number of items in the food budget.

2. However, I would have been myself extremely surprised if this 1942 budget did really turn out to be an exact representation of the pattern of consumption in 1942. This budget was not worked out on the basis of a family budget inquiry. It was merely an estimate made by a Special Committee as to what was likely to have been the pattern of consumption in 1942. It will be apparent to the reader that it would be absurd to make a statistical analysis to prove that such an artificial budget was not truly representative of the actual pattern of consumption. The reasons for appointing such a Committee to make the changes were as follows:—

It was well known that in 1942 rice practically went out of the market and was replaced by flour and bread. In the 1938-39 budget the largest weight was assigned to rice, which was the principal article of consumption of the working class. The price of rice was controlled at a subsidised level right throughout this period up to 1948. If while the consumption of rice had

decreased so much and the price of rice was controlled at a subsidised level, the cost-of-living index was continued to be computed on the same pre-war basis it would have obviously resulted in the cost-of-living Index remaining almost stationary, while the real cost-of-living was going up. To a large extent this is what happened in the United Kingdom where the basic budget of 1914 was never revised until 1947. The Government did not want this to happen in Ceylon, but it was not possible to conduct a full family budget inquiry in the unsettled conditions in 1942. Therefore the Government wanted only some fundamental changes in the Cereal group and in a few of the other important items to be made by the Special Committee. It would seem even from the analysis made by Mr. Sarkar that the committee had guessed at the real pattern of consumption very accurately. It would be quite unreasonable to expect the committee to have been 100% accurate in its guess. This is what Mr. Sarkar apparently expects it to have done.

3. Referring to the method adopted to link the new index to the old, Mr. Sarkar categorically states that it is an error. The cost-of-living index number is compiled to measure the change in the cost of maintaining a fixed standard of living at the basic period. But when the standard itself changes sharply as in times of war the formula becomes inapplicable and the statistician is faced with the problem of what to do. Is one to take the present pattern of consumption as basis or the basic pattern? They obviously give a different results. Or is one to use a complex mathematical formula whose meaning cannot be explained objectively? This is the problem which has been engaging the attention of international statisticians, for quite some time. As no practicable solution has been found yet one should not categorically state that any particular formula is wrong. It is not possible to say so because one is not sure of what one is trying to measure under the circumstances. But Mr. Sarkar is categorical even about a matter like this.

4. At the beginning of the article Mr. Sarkar says that 0.8% of the population is too small a sample to compile an adequate index of cost-of-living. Towards the end of the article he suggests that in order to obtain a more reliable index a monthly family budget survey should be carried out by the Statistics Department, of a selected number of families. I am not sure whether Mr. Sarkar is really serious about this suggestion and whether he appreciates the volume of work involved. If the monthly survey is to be confined only to a few families what is the purpose of taking a full family budget inquiry consisting of a large percentage of the population. In the very next month when the weights are revised using the weights given by the few selected families all the work done on the comprehensive family budget survey is thrown over board.

5. I am sorry I have had to be so critical about the article, but I considered it my duty to do so in order that the layman may not get an impression

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that the Government had done something quite incorrect in revising the basic family budget in 1942. An article like this from the hands of an important member of the Economics Department of the University is likely to be accepted by the layman at its face value unless the opposite point of view is also put to him.

K. WILLIAMS