

NOTES AND COMMENTS

MEASURING ECONOMIC GROWTH—A CRITIQUE OF THE VIEWS OF FELL AND GREENFIELD

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Gross national product and per capita product have long been accepted as measures of economic growth. Dissatisfaction has often been expressed with regard to their usefulness in reflecting economic development and the welfare of people.¹ Recently, Fell and Greenfield² have reiterated the weakness of the GNP measure to indicate the changes in income distribution. According to them,

“... National income aggregates have been subject to much criticism for their failure to give any indication of the distribution of the benefits of growth, and hence, any indication of the changing welfare patterns. A response to this challenge has been the development of Social Accounting Matrices in which the household sector is broken down by income level. . . . Once this has been done, then one can track the trends in income distribution, plan or assess government policies with regard to this and compare the situation between countries.”³

Therefore, they suggest “potentially very meaningful other ways of measuring economic growth once one has data on household income by income level.”⁴ Three methods of measuring economic growth have been considered by Fell and Greenfield. They are: (1) growth rates of different income groups weighted by income weights, (2) growth rates in different income groups weighted by population weights and (3) growth rates in different income groups weighted by inverse of income weights.

The three methods all lead to different growth rate estimates. Fell and Greenfield, however, leave the choice open and conclude, “The above weighting systems are of course arbitrary. But they are just as valid as the conventional measure of growth with its implicit weighting by base period income distribution.”⁵ The purpose of this paper is to examine in detail the merits of the methods suggested by Fell and Greenfield. This is accomplished by applying their methods to estimate the growth rates of Canada and its Atlantic Provinces. In addition,

¹Morgan, Theodore, *Economic Development—Concept and Strategy*, New York, Harper and Row, Chapter 6, 1975.

²Fell, H. A. and Greenfield, C. C., *Measuring Economic Growth*, *Review of Income and Wealth*, 29 (2), 205–208, 1983.

³*Ibid.*, p. 205.

⁴*Ibid.*, p. 205.

⁵*Ibid.*, p. 208.

the growth rate of per capita product has also been estimated for the sake of comparison. Fell and Greenfield take high, middle and low income categories and total population in these categories for estimating weighted growth rates. It may seem difficult to keep the components of these groups stable in real terms over time. Moreover, relating income categories to number of families, instead of number of persons, may be more meaningful. Nevertheless, the concepts used by Fell and Greenfield have been retained in the present paper in order to analyse the consequences of the resulting growth rate estimates.

(1) *Income Weights*

The rate of growth estimated by taking income weights of different levels of income corresponds to the method of measuring growth by taking the difference in the current year and base year GNP and then dividing by the base year GNP. Tables 1 and 2 measure the growth rates of the Canadian economy and the Atlantic Provinces, in current prices, by income categories and by overall performance. When we take income weights of different income levels and multiply with

TABLE 1
DISTRIBUTION OF INCOME AND POPULATION BY SIZE IN CANADA AND GROWTH ESTIMATES FOR 1980-81

Income Categories	Total Population (Million)	Total Income in 1980 (Millions of \$)	Total Income in 1981 (Millions of \$)	Growth Rate (%)
Low	13.527	70,516.483	68,570.496	-2.76
Middle	7.532	134,389.070	137,637.536	+2.42
Higher	2.926	87,785.832	125,130.286	+42.54
Total	23.985	292,691.385	331,338.318	+13.20

Sources: Calculations are based on the following sources of data:
 Statistics Canada, *Income Distribution by Size in Canada*, FG, CS, 13-207, p. 17, 1980 and pp. 20-21, 1981.
 Statistics Canada, *Canadian Statistical Review*, FG, CS, 11-003, p. 14, May 1983.
 Statistics Canada, *Provincial Economic Accounts*, FG, CS, 13-213, pp. 5-11, 1982.
 Statistics Canada, *National Income and Expenditure Accounts*, FG, CS, 13-001, p. 8, May 1983.

TABLE 2
DISTRIBUTION OF INCOME AND POPULATION BY SIZE IN ATLANTIC PROVINCES AND GROWTH ESTIMATES FOR 1980-81

Income Categories	Total Population	Total Income in 1980 (Millions of \$)	Total Income in 1981 (Millions of \$)	Growth Rate (%)
Low	1.403	7,306.030	7,696.626	+5.35
Middle	0.589	10,287.325	10,917.690	+6.13
Higher	0.134	4,017.573	6,534.765	+62.65
Total	2.126	21,610.298	25,149.081	+16.37

Sources: Same as Table 1.

their corresponding growth rates, their total equals that derived from the simple formula because the latter implicitly assigns income weights. Thus,

$$\begin{aligned}
 T_1^{-1} & \left[H_1 \left(\frac{H_2}{H_1} - 1 \right) + M_1 \left(\frac{M_2}{M_1} - 1 \right) + L_1 \left(\frac{L_2}{L_1} - 1 \right) \right] \\
 & = T_1^{-1} (H_2 + M_2 + L_2) - (H_1 + M_1 + L_1) \\
 & = \frac{T_2}{T_1} - 1 \quad \text{or} \quad \frac{T_2 - T_1}{T_1}.
 \end{aligned}$$

Where H_1, M_1, L_1 are base period incomes of high, middle and low income households and H_2, M_2 and L_2 are corresponding incomes in period 2. T_1 is the base period total income and T_2 is the current period total income. By this formula, the growth rate of the Canadian economy in 1980–81, at current prices, was 13.2 percent. The corresponding growth rate of the Atlantic Provinces was 16.37 percent. The overall growth rate does not reflect the growth rate in various income levels shown in Tables 1 and 2. Income weighted growth rates of the different income groups and the total are given in Table 3.

TABLE 3
INCOME WEIGHTED GROWTH RATES OF CANADA AND ATLANTIC PROVINCES, 1980–81

Income Categories	Canada			Atlantic Provinces		
	Income Weights (A)	Growth Rate (%) (B)	(A) × (B) (%)	Income Weights (A)	Growth Rate (%) (B)	(A) × (B) (%)
Low	0.241	-2.76	-0.67	0.338	+5.35	+1.81
Middle	0.459	+2.42	+1.11	0.476	+6.13	+2.91
Higher	0.300	+42.54	+12.76	0.186	+62.65	+11.65
Total	1.000		+13.20	1.000		+16.37

Sources: Same as Table 1.

(2) Population Weights

According to Fell and Greenfield, "Given concern for income distribution, then one might well prefer to use population for weighting."⁶ Normalizing the population figures of Tables 1 and 2 and using these to weight the growth rates in different income categories gives the result shown in Table 4. The population weighted growth rate of Canada falls from 13.2 percent to 4.39 percent and that of the Atlantic Provinces from 16.37 percent to 9.17 percent. This means that more rich than poor benefited from economic growth in Canada and the Atlantic Provinces; and more so in the former than in the latter. Thus, the Atlantic Provinces have performed better than Canada on this criterion.

⁶Ibid., p. 207.

TABLE 4
POPULATION WEIGHTED GROWTH RATES OF CANADA AND ATLANTIC PROVINCES, 1980-81

Income Categories	Canada			Atlantic Provinces		
	Population Weights (A)	Growth Rate (%) (B)	(A) × (B) (%)	Population Weights (A)	Growth Rate (%) (B)	(A) × (B)
Low	0.564	-2.76	-1.56	0.660	+5.35	+3.531
Middle	0.315	+2.42	+0.76	0.277	+6.13	+1.698
Higher	0.122	+42.54	+5.19	0.063	+62.65	3.947
Total	1.000		+4.39	1.00		+9.176

Sources: Same as Table 1.

(3) Inverse of Income Weights

From the point of view of economic theory the inverse of income weights "could be regarded as employing an approximation for the diminishing marginal utility of income."⁷ Moreover, according to Fell and Greenfield, "There could be countries, of course, where the lowest income group is the minority of the population. Depending upon the policies of the country, then one might not wish to weight by population. A preferred weighting, in any case, might be normalized inverse of income, or better, if the data were available, normalized inverse of wealth." Normalizing the inverse of income in Tables 1 and 2 and using this for weighting gives the results shown in Table 5. The results appear to be amazing for the Atlantic Provinces. The weighted growth rate rises to 35.5 percent as against 13.5 percent weighted growth rate for Canada.

Evaluation of These Methods

The method of measuring growth with inverse of income weights presumes that these weights correspond to diminishing marginal utility of income and there

TABLE 5
INVERSE OF INCOME WEIGHTED GROWTH RATES OF CANADA AND ATLANTIC PROVINCES, 1980-81

Income Categories	Canada			Atlantic Provinces		
	Inverse of Income Weights (A)	Growth Rate (%) (B)	(A) × (B) (%)	Inverse of Income Weights (B)	Growth Rate (%) (B)	(A) × (B) (%)
Low	0.43	-2.76	-1.1868	0.28	+5.35	+1.498
Middle	0.23	+2.42	+0.5566	0.20	+6.13	+1.226
Higher	0.34	+42.54	+14.4636	0.52	+62.65	+32.578
Total	1.000		+13.8334	1.000		+35.302

Sources: Same as Table 1.

⁷Ibid., p. 208.

are countries in which the higher income group produces the highest percentage of income. This, however, is not supported by the facts. In Canada, U.S. and other developed countries, it is the middle income group which produces the largest percentage of income. The higher income group, representing a small proportion of the population, may enjoy a higher per capita income and higher family income but the total income generated may be less than that of the middle income group. Assigning inverse of income weights, then, gives more weight to the higher and less to middle income group. This is contrary to what was assumed by Fell and Greenfield. They might have tried inverse of family income or per capita income instead.

Assigning population weights to growth of income, the second method of Fell and Greenfield, gives us an idea of people benefiting from economic growth. Can we say then that the growth of benefit to people in Canada was 4.39 percent and Atlantic Provinces was 9.17 percent even if income grew at the rate of 13.2 percent in Canada and 16.37 percent in the Atlantic Provinces? The answer would depend on whether or not population weights truly reflect the benefit to people from growth. A problem would arise when the percentage of population in the low income category falls, leading to a reduction in total income and hence a negative growth rate. This is so because we assign population weights of the base year population and ignore the current year's changes in group formation. Thus, the low income group in Canada shows a negative growth rate using both income weights and population weights, even though *per capita* income grew at the rate of 4.64 percent (Table 6). This was because the population in this group fell at a faster rate than total income, as a result of economic growth.

TABLE 6

GROWTH RATES OF PER CAPITA INCOME OF CANADA AND ATLANTIC PROVINCES, 1980-81

Income Categories	Canada			Atlantic Provinces		
	<i>Per Capita</i> Income (\$)		Growth Rate (%)	<i>Per Capita</i> Income (\$)		Growth Rate (%)
	1980	1981		1980	1981	
Low	5,213	5,455	+4.64	5,208	5,517	+5.93
Middle	17,844	17,926	+0.46	17,411	17,594	+1.05
Higher	30,000	31,503	+5.01	30,000	30,180	+0.60
Total	12,203	13,679	+12.10	10,167	11,266	+10.82

Sources: Same as Table 1.

Both the methods developed by Fell and Greenfield are fraught with problems. The inverse of income weights method does not accomplish the purpose of showing diminishing marginal utility of income and the population weights method is not suitable when as a result of economic growth the group formation of people changes. What then should be the appropriate measure of economic growth which reflects income distribution also? If the data of a country permits,

one can take the growth rate of *per capita* income for measuring overall growth of the economy and growth of *per capita* income by income categories for judging the distribution of growth. Again, if one wants to measure the real growth, *per capita* income at constant prices may be used for calculating the rate of growth.

Fell and Greenfield run into these methodological problems, perhaps, because they did not use actual data for estimating growth rates. Further, they also fail to visualize the proper framework within which they are working. Their method of estimating the growth rate by using the inverse of income as weights may run into the problems of measurement of utility and interpersonal comparisons of utility.

The use of Social Accounting Matrices or data relating to income and expenditure collected through household surveys is recommended by Fell and Greenfield for calculating growth rates. Since household surveys are recommended, would it not be appropriate to use family income categories and number of families rather than income categories and number of persons? The data relating to income distribution is available only for a few countries. Statistics Canada uses household surveys to collect data on income distribution among families⁸ and among persons.⁹ An upward bias in the survey results is noticed when one builds up the totals using survey data and compare it with the other data produced by Statistics Canada. The growth rate estimates, however, may not be affected as the same bias is introduced in the current year as well as in the base year.

⁸Statistics Canada, *Family Income Distribution by Size in Canada*, 1980 and 1981.

⁹Statistics Canada, *Income Distribution by Size in Canada*, 1980 and 1981.

ANNOUNCEMENTS

THE INTERNATIONAL ASSOCIATION FOR RESEARCH IN INCOME AND WEALTH

Financial Report, 1983

INCOME STATEMENT

<i>Revenue</i>	<i>1982</i>	<i>1983</i>
1. Institutional Members	\$23,902	\$24,000
(Number)	(26)	(26)
2. Members	11,880	12,600
(Number)	(360)	(360)
3. Subscribers	47,300	48,760
(Number)	(1075)	(1060)
4. Sales of publications and reprints	2,101	2,806
5. Interest	6,981	6,931
6. <i>Less</i> : Bad debts and other charges	-1,034	-885
Total revenue	\$91,130	\$94,212
<i>Expenditures</i>		
1. Printing and publishing	\$30,428	\$28,891
2. Salaries	33,326	37,416
3. Postage	3,367	3,934
4. Supplies and miscellaneous	5,313	7,714
5. Depreciation	1,550	2,607
6. Data processing	4,725	4,664
7. Reserve for conference expenses	3,500	3,500
8. Reserve for promotion expenses	1,000	1,000
Total expenditures	\$83,209	\$89,726
9. Addition to surplus from income	7,922	4,485
10. Bad debt recovery, institutional contributions for previous years, and realized capital gains	4,722	5,861
11. Change in reserve for conference expenses	426	-703
12. Change in reserve for promotional expenses	1,000	1,000

BALANCE SHEET

<i>Assets</i>	<i>1982</i>	<i>1983</i>
1. Cash	\$31,764	\$23,893
2. Securities	80,033	91,659
3. Accounts receivable	8,714	5,957
<i>Less</i> : Reserve for doubtful accounts	-1,500	-1,500
4. Office equipment	6,944	13,035
<i>Less</i> : Allowance for depreciation	-4,990	-5,291
Total assets	\$120,965	\$127,752
<i>Liabilities and Surplus</i>		
1. Accounts payable	6,627	6,998
2. Accrued liabilities	187	0
3. Prepayments of dues and subscriptions	32,087	28,048
4. Reserve for conference expenses	8,468	7,765
5. Reserve for promotional expenses	11,000	12,000
6. Accumulated general reserves	62,595	72,942
Total liabilities and surplus	\$120,965	\$127,752