MEASURING ECONOMIC GROWTH—A CRITIQUE OF ARYA'S[1] APPLICATION OF FELL AND GREENFIELD'S METHOD

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Moving from the hypothetical example in Fell and Greenfield[2] to a practical application in Arya reveals some problems that indicate that measuring economic growth with distributional aspects in mind may not be as simple as it originally looks. Basically, the problems revolve around two points 1) usually there are no income measurements available for groups of households (e.g. by size of income) that are conceptually close to GDP, and 2) the technique of separating households into sub-groups and calculating income growth rates for them has to be carefully considered. The difference in results obtained below compared to Arya's findings is due largely to the latter; grouping households into low, middle and high income categories according to their relative position in the distribution rather than to fixed dollar cut-offs reverses the results. We find that the low income group in Canada fared best in terms of income growth during 1980-81.

To our knowledge there are very few cases where household incomes are available on a fully comprehensive personal income basis, not to speak of GDP. Fully developed Social Accounting Matrices are rarely, if ever, available. Usually, what household surveys aim to produce on a regular basis is a measurement of an adjusted personal income concept—often imputed income items are omitted as well as income accruing to the non-household portion of the personal sector (e.g. investment income of non-profit making institutions, etc.). In some institutional settings and under certain conditions, the distribution of measured household income may be a good proxy for distributing net national income[3] but this is not necessarily so in general. To illustrate the substantial differences in aggregates measuring different concepts the following table presents Canadian data for the years under discussion.

If we understand him correctly, Arya distributes aggregates[4] on line (1) between low, middle and higher income categories according to the distribution of line 6 aggregates. The latter is known from survey results. An examination of the components that, in total, net out to the $100 billion difference in aggregates raises questions in our mind as to the *meaning* of such a distribution. Also, the

[1]Arya, P. L. Measuring Economic Growth—A critique of the views of Fell and Greenfield, *Review of Income and Wealth*, 30 (3), 377-382, 1984

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

[3]It seems to make more sense in this context to discuss the benefits of *net* growth rather than of the growth of GDP or GNP.

[4]Arya likely used an earlier set of National Accounts estimates for which a more recent revision has become available in the meantime. We are using the latest revision published in *National Income and Expenditure Accounts*, second quarter, Catalogue No. 13-001, October 1984.

TABLE 1

INCOME IN CANADA, 1980 AND 1981

Line		1980 ($ millions)	1981 ($ millions)
1	GNP at market prices[1]	297,556	339,797
2	Net national income[1]	234,232	261,912
3	Personal income[1]	244,712	288,529
4	Adjusted personal income[2]	205,080	243,553
5	Aggregate family income from survey[3]	196,811	229,790
6	Aggregate individual income from survey[3]	201,263	232,560

Source:

(1) Table 1, *National Income and Expenditure Accounts*, Statistics Canada Catalogue No. 13-001, 2nd Quarter 1984.

(2) Unpublished data compiled by Survey of Consumer Finances staff. Represents total of personal income components from which imputed income, income of non-covered populations (e.g. Yukon and Northwest Territories, elderly in insititutions) or income of non-profit-making institutions has been removed.

(3) *Income Distributions by Size in Canada*, Statistics Canada Catalogue No. 13-207 (annual) 1980 and 1981. Differences between survey aggregates (on line 5 and 6) and the adjusted personal income (line 4) represents the net between two countervailing influences: i) shortfall in the survey money income components due to response and non-response errors and ii) the counting of money income components that in the national accounts are considered interpersonal transfers (e.g. alimony, private pensions and annuities). The differences between line 5 and 6 are due to technical imperfections in the two separate weighting systems used by the survey and the differences due to the exclusion of *families* whose major source of income comes from military pay and allowances in one case and *persons* in the other.

method of the distribution seems hard to justify: are transfer payments (included in personal income but not in GNP) and retained earnings (included in GNP but not in personal income) similarly distributed? Neither can it be assumed that growth of the components accounting for the difference is uniform and equal to the overall growth of the aggregates measured by household surveys.

The second major problem in Arya's application has to do with the way he constructs his "low", "middle" and "higher" income category. He uses the published survey data on individual income recipients and divides them into categories using fixed points on the current dollar income scales. He acknowledges that this technique is not flawless as "It may seem difficult to keep 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."[5] It is not clear from the highly abstract note by Fell and Greenfield on which concepts their suggested technique should be applied.

We have used the same published data source but have chosen to work with a) relative rather than absolute cut-offs in current dollars and b) ranking of family units rather than individual income recipients. The results from this exercise are strikingly different from Arya's. We have also limited ourselves to examining the

[5]Arya, p. 378.

growth rate of family income as measured by the household survey (see line 5 in Table 1); this is a more limited but more realistic objective than drawing distributional conclusions about the growth of total GNP.

We selected from the published reports (Statistics Canada Catalogue No. 13-207) data on families and unattached individuals (i.e. persons living alone without relatives in the household; sort of families of size 1) ranked by their family income, as this is likely a much better indicator of socio-economic status than income of each individual receiving income. We divided all units into three categories, assigning the first and second quintile to the "low," the third quintile to the "middle" and the fourth and fifth quintile to the "higher" income categories. Tables 2 to 5 present the results for Canada based on definitions as explained above.[6]

TABLE 2

DISTRIBUTION OF INCOME AND ALL FAMILY UNITS[1] BY QUINTILE GROUPS IN CANADA AND GROWTH ESTIMATES FOR 1980-81

Income Category	All Family Units Number ('000)	%	Total Income in 1980 Amount ($ million)	%	Total Income in 1981 Amount ($ million)	%	Growth Rate of Total Income for 1980-81 %
Low	3,488	40.0	28,734	14.6	35,617	15.5	24.0
Middle	1,744	20.0	34,639	17.6	40,443	17.6	16.8
Higher	3,488	40.0	133,438	67.8	154,730	66.9	15.2
Total[2]	8,719	100.0	196,811	100.0	229,790	100.0	16.8

[1]Consists of all families and unattached individuals.

[2]Amounts may not add due to rounding.

Source: "Income Distributions by Size in Canada," 13-207, for 1980 and 1981; Tables 33 and 53 for 1980 and Tables 49 and 74 for 1981.

TABLE 3

INCOME WEIGHTED GROWTH RATES OF CANADA, 1980-81

Income Category	Income Weights (A)	Growth Rate (%) (B)	(A) × (B) (%)
Low	0.146	24.0	3.5
Middle	0.176	16.8	3.0
Higher	0.678	15.2	10.3
Total	1.000	—	16.8

Source: Same as Table 2.

[6]We reproduced only the "All Canada" results as it is irrelevant for our arguments to duplicate the exercise for the Atlantic region.

The correspondence between our and Arya's tables is as follows:

Chawla/Oja	Arya
Table 2	Table 1
Table 3	Table 2
Table 4	Table 3
Table 5	Table 4

TABLE 4

POPULATION WEIGHTED INCOME GROWTH RATES OF CANADA, 1980-81[1]

Income Category	Population Weights (A)	Growth Rate (%) (B)	(A)×(B) (%)
Low	0.400	24.0	9.60
Middle	0.200	16.8	3.36
Higher	0.400	15.2	6.08
Total	1.000	—	19.04

[1]"Population" refers to counts of families and unattached individuals.
Source: Same as Table 2.

TABLE 5

INVERSE OF INCOME WEIGHTED GROWTH RATES OF CANADA, 1980-81

Income Category	Inverse of Income Weight (A)	Growth Rate (%) (B)	(%)
Low	0.489	24.0	11.74
Middle	0.406	16.8	6.82
Higher	0.105	15.2	1.60
Total	1.000	—	20.16

Source: Same as Table 2.

According to Arya's Table 1, income of the low income group decreased, whereas that of the middle and higher income groups increased. This is quite contrary to the picture revealed by the movements in shares of total income of individuals classified into quintiles (see Table 79, "Income Distributions by Size in Canada, 1981," Catalogue 13-207). The published data show that individuals in the first three income quintiles slightly improved their relative shares of total income over the period 1980-81. Such contrasting conclusions between the published survey results and those derived from manipulated data are primarily due to the author's choice of classifying individuals into low, middle and higher income groups according to fixed dollar cut-offs on the current income scale. The number of individuals receiving less than $12,000 income in 1981 decreased compared to 1980. Aggregate income for the remaining smaller group also decreased, but it is misleading to conclude that income in current dollars for the "low income" category of individuals decreased. Our Table 2 confirms that income growth for the "low income" category between 1980 and 1981 was higher than for the "middle" and higher" group.

We have produced a couple of additional versions of weighted growth rates. In Table 4 each family unit is counted as one population element regardless of its size, whereas in Table 6 proper allowance for family size has been made. *Per capita* income (family income divided by family size) is used for ranking and classifying persons into the 3 income categories. In Table 7, growth rates are

TABLE 6

POPULATION WEIGHTED INCOME GROWTH RATES OF CANADA, 1980-81[1]

Income Category	Population Weights (A)	Growth Rate (%) (B)	(A)×(B) (%)
Low	0.400	19.4	7.76
Middle	0.200	16.8	3.36
Higher	0.400	16.0	6.40
Total	1.000	—	17.52

[1]"Population" here refers to counts of persons (adults and children) ranked by their per capita income (family income divided by number of persons in family).

Source: Statistics Canada, unpublished data from SCF 1981 and SCF 1982.

TABLE 7

GROWTH RATES OF PER UNIT INCOME[1] OF CANADA, 1980-81

Income Category	Per Unit Income[1] 1980	Per Unit Income[1] 1981	Growth Rate %
	dollars		
Low	8,238	9,935	20.6
Middle	19,862	22,569	13.6
Higher	38,256	42,945	12.3
Total	22,572	25,641	13.6

[1]Average income of families and unattached individuals.

Source: Same as Table 2.

based on average incomes of families and unattached individuals. These provide an interesting and realistic measure combining income and population weights. The ranking for Table 7 was kept the same as in Tables 2 to 5.

These examples by no means exhaust all possibilities. Further sophistication can be introduced; e.g. instead of calculating simple per capita incomes for ranking purposes as was done for Table 6, some equivalence scale can be applied to divide family income between family members in a more "equitable" way.[7]

However, regardless of the income unit and the ranking principle chosen, all our results show that the lowest income group experienced more growth in income than the middle or higher income group. This is in contradiction to Arya's findings.

We have tried to demonstrate in this note that drawing conclusions about who benefits from GNP growth may not be as simple as it appears on first glance. We raise some questions about using unrefined household survey results as proxies for distributing GNP. The integration of macro and distributional measurements

[7]We refer the reader to the helpful discussion *re* income recipiency and ranking principles in Frank A. Cowell, The Structure of American Income Inequality, *Review of Income and Wealth*, 30 (3), 351-375, 1984.

seems to us neither simple nor automatic. Secondly, working with distributional data over time has its own pitfalls and differences in definitional, ranking and grouping treatment can completely distort the results. These problems are likely more deep-seated and basic than the choice of weighting techniques that was the starting point of this discussion.