

USING GDP IN EQUALIZATION CALCULATIONS :

ARE THERE MEANINGFUL MEASUREMENT ISSUES?†

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INTRODUCTION

The purpose of this paper is to examine how taking into account both the tax status of some parts of the gross domestic product (GDP) and the exclusion of GDP of either some revenues or productive activities modifies the GDP of Canadian provinces. This is of interest since different macro approaches to equalization, such as a modified net product measure, a macro measure with weighted income components, using more than one macro measure, or an adjusted GDP, have been recently proposed by various analysts.¹ The possible quantitative impact of measurement errors on the appropriateness of these measures has, however, been neglected. The first part of this paper will present the analytical framework, summarizing the different measurement questions raised. The second part will estimate the changes in the GDP of the ten Canadian provinces for one year when

the eight relevant issues presented in the first section of this paper are taken into consideration. The year chosen is 1992 since data for the problems quantified were available for that year. This will then allow us to calculate an adjusted GDP and modify estimates of differences in income. The results found in the second part are analyzed in the third and final part of this document.

1. ANALYTICAL FRAMEWORK

1.1 The Choice of Issues Quantified

As mentioned above, this paper will focus on measurement weaknesses that arise because 1) some economic activities are not included in GDP by design, 2) others are ill-measured and, finally, 3) some nontaxable items are included in GDP, while some taxable revenues that are not are simply omitted. A list of those weaknesses is presented in Table 1 below.

Table 1 is composed of three columns. The first one identifies 14 problems listed by Statistics Canada. Only five of the 14 problems appear relevant to the authors for two reasons. The first reason is related to the fact that, in order to have an impact on equalization, these problems must lead to changes in the income of different provinces when included in the estimation of the adjusted GDP. However, not all of them do. For example, the method of valuing the services and output of banks and the case of personal and unincorporated businesses only require relocation to another sector of the national accounts. This does not influence the value of GDP. The second reason refers to the quantitative measurement of the problems. It is necessary to be able to measure or quantify the different problems in order to adjust the provincial GDP. A good example of this lack of measurement feasibility is the case of certain government activities classed as intermediate production. It is almost impossible to find an agreement on how to divide final and intermediate goods and services provided by the government.²

1 Federal-Provincial Relations Division, Department of Finance, *Literature Review of Macro Approaches to Measuring Fiscal Capacity*, 2000, 14-15.

2 Statistics Canada, *A User Guide to the Canadian System of National Accounts*, Catalogue 13-589E, 1989, 90-91.

TABLE 1
Problems Related to the Measurement of GDP in the National Accounts

Problems Listed by Statistics Canada (1)	Problems Found Relevant by Aubut and Vaillancourt (2)	Relevant Problems That Have Been Measured (3)
Classification of some government activities as intermediate of final production (T)	No	No
Inappropriate method of valuing services and output of banks (T)	No	No
Treatment of interest on the public debt as transfers rather than final expenditures (T)	No	No
Mix of units in the personal and unincorporated business sector (T)	No	No
Difficulty of data reconciliation for establishments and enterprises (M)	No	No
Lack of real income estimations (M)	No	No
Treatment of consumer durables as fixed assets (T)	No	No
Inaccurate estimates of consumption by sector (M)	No	No
Inappropriate treatment of commercial buildings and industrial equipment leasing arrangement (M)	No	No
Noninclusion of capital gains and losses (T)	Noninclusion of capital gains and losses	Noninclusion of capital gains and losses
Noninclusion of the underground economy (M)	Noninclusion of the underground economy	Noninclusion of the underground economy
Noninclusion of household services (T)	Noninclusion of household services	Noninclusion of household services
–	Noninclusion of volunteer work (T)	Noninclusion of volunteer work
–	Noninclusion of leisure activities (T)	No
Noninclusion of nonreproducible natural resources (T)	Noninclusion of nonreproducible natural resources	Noninclusion of nonreproducible natural resources
Treatment of trusteed pension funds (M) and (TT)	Treatment of trusteed pension funds	Treatment of trusteed pension funds
–	Treatment of imputed elements (TT)	Treatment of imputed elements
–	Treatment of total income from the Aboriginal population living on reservations (TT)	Treatment of revenues from the Aboriginal population living on reservations

Source :

(1) : Statistics Canada, *A User Guide to the Canadian System of National Accounts*, Catalogue 13-589E, 1989, 89-99.

(2) and (3) : Authors.

Notes : T = theoretical problem; M = measurement problem; TT = tax treatment

The second column of Table 1 lists the five relevant problems of the first column, and adds four supplementary problems found of interest by the authors or raised by participants in the August 2001 conference. The volunteer work and leisure activities issues are related to the monetary value of time and should therefore be included in the adjusted GDP. However, the monetary value of leisure activities has not been measured by province and could not therefore be included in the final estimate of the adjusted GDP. Two nontaxable items, the revenues of Aboriginals living on reserves and imputed items such as residential rent and farm products consumed directly in farm households, must also be considered when dealing with equalization. The tax status of inflows and outflows of private pension funds is also of interest. This is reflected in Table 1, as shown in the third column, listing the eight final problems that will be analyzed for each of the ten provinces to show the gaps in income that may appear when they are taken into account.

1.2 Problem Analysis

This section puts forward the reasons why the eight problems listed in the last column of Table 1 would have an impact on equalization if they were added to or subtracted from a GDP indicator used for equalization and presents the quantitative evidence on their importance.

1.2.1 *Capital gains and losses*

Statistics Canada concludes that "... the general consensus is that in the context of the production system no place exists for capital gains and losses as they do not reflect output, nor are they transfer payments".³ However, capital gains and losses do represent capital income, often earned in lieu of dividends or in the late nineties in lieu of labour income in the high-tech/dot-com sector. In that context, only realized capital gains and losses should be considered, while the unrealized ones should not be treated as a constituent of GDP. Because the amount of

net capital gains differs between provinces, its addition to the GDP of the different provinces will result in an increase in inter-provincial gaps that would affect equalization. The values of taxable capital gains and total capital gains for the ten Canadian provinces are shown in Table 2.

By federal law, only 75% of total capital gains are taxable in 1992. Since the *Taxation Statistics* only give the taxable capital gains, these values were multiplied by 1.33 to find the total capital gains for each province. Table 2 shows that if capital gains and losses were to be added in the definition of GDP, the GDP value of British Columbia would increase by almost 2.9 billion dollars (3.32% of its GDP), while the value of Newfoundland would only increase by 43 million dollars (0.47% of its GDP).

1.2.2 *The underground economy*

According to Statistics Canada, the underground economy is composed of two elements.⁴ The first one is made up of illegal activities, which should be recorded since they are conceptually part of production, but are not measured because they are hidden from the authorities. These activities include gambling, drug trafficking and prostitution. Although these activities do influence the value of production, "... they are left out of official statistics because there is no way of measuring them with sufficient reliability".⁵ The second element includes legal transactions that are unrecorded because they are not declared. Statistics Canada lists the following examples of legal activities included in the underground economy: "... working at a second job where neither wages are reported nor social security taxes paid; renting rooms such as in a small scale bed-and-breakfast

3 Statistics Canada, *A User Guide to the Canadian System of National Accounts*, Catalogue 13-589E, Occasional, 1989, p. 94.

4 Statistics Canada, *A User Guide to the Canadian System of National Accounts*, 13-589E, Occasional, 1989, p. 97.

5 Statistics Canada, *The Size of the Underground Economy in Canada*, Catalogue 13-603E, No. 2 - Occasional, 1994, p. 2.

TABLE 2

Value of Capital Gains and Losses,
Canada and Provinces, 1992, in Millions (Current \$)

Provinces	Taxable Capital Gains (1)	Total Capital Gains (2)	Total Capital Gains as a % of GDP (3)
Newfoundland	32	43	0.47
Prince Edward Island	31	41	1.88
Nova Scotia	166	221	1.24
New Brunswick	106	141	1.01
Québec	1,678	2,231	1.42
Ontario	3,477	4,625	1.65
Manitoba	193	256	1.08
Saskatchewan	222	295	1.40
Alberta	868	1,154	1.58
British Columbia	2,171	2,867	3.32
Canada	9,030	12,010	1.74

Source : (1) and (2) : Revenue Canada, Taxation Statistics, 1994, 122-141.

(3) : (2) / official provincial GDP [found in column (5) of Table 10] × 100.

Note : Realized profits on sale of securities for trustee pension funds are also included in the total capital gains. Their value is, however, very small (around 0.0006 % of GDP) and does not change the value of total capital gains.

operation and not declaring revenues; bartering goods or services where, for example, home improvement work is undertaken in exchange for book-keeping of equivalent value with no money exchanging hands; and skimming income off the top of a business by pocketing some of the cash transactions and not reporting them as income".⁶ Including these different activities could modify different parts of the GDP of various provinces and therefore have an impact on equalization.

The potential underground transactions from legal activities as a percentage of GDP for relevant items of the national accounts were estimated in a study by Gylliane Gervais for Statistics Canada in 1994. These estimations were made only for the entire country's expenditure-based GDP for the year 1992, and not for each individual province. In order to evaluate the differences between provinces, which is the goal of this paper, we used the percentages calculated for the country for each province. As shown in Table 3, only personal expenditure on consumer goods and services, residential construction, exports and imports were considered to have significant underground economy transactions. The estimates of the value of the underground activities for each of the four items listed above were then added to give the total value of underground activity in a given province.

Table 3 shows that, in each province, the underground transactions related to personal expenditure on consumer goods and services seem to be the most important components of total underground transactions. It also shows that the value of the underground economy in each province varies between 2.49% and 3.21% of the provinces' GDP. It is more important in Newfoundland and British Columbia, while it is least important in Prince Edward Island. Overall, the percentages for the different provinces are very similar.

1.2.3 Household services

While the implicit rent on owner-occupied dwellings is included in the measure of total production, other household services are not, even

6 *Ibid.*

if Canadians aged 15 and over allocated 23.7 billion hours on households' unpaid work in 1992.⁷ This type of work includes meal preparation, cleaning, repairs and maintenance, clothing care, child and adult care, household management and administration as well as transportation and travel.

Statistics Canada uses two kinds of methods to evaluate the monetary value of household services : the opportunity cost and the replacement cost methods.⁸ The former is based on the premise that time spent on household work could be spent doing other things. For the purpose of this paper, the opportunity cost before tax is used. In this case, the imputation of household work is based on average hourly earnings of people aged 15 and over, who were employed at the time of the census and had worked the previous year. The second method is based on the premise that goods and services can be purchased instead of spending unpaid time doing them as household services. The replacement method has two sub-categories : the generalist variant and the specialist variant. The generalist variant uses hourly earnings of domestic employees as a replacement cost for household services, while the specialist variant uses hourly earnings of a person working for a business and doing the same kind of work. Table 4 shows the imputed value of household services according to the three methods presented above.

One notices that the value of household work at replacement cost (generalist) is the one that yields the smallest change in Canada's GDP. Instead of increasing by 51.4% of its GDP when the first method is used, it only increases by 32.3% of its GDP. This method is therefore the one we use in the calculation of the adjusted

7 Statistics Canada, Households' Unpaid Work : Measurement and Valuation, Catalogue 13-603E, No. 3 – Occasional, 1995, 6-7.

8 Statistics Canada, Households' Unpaid Work : Measurement and Valuation, Catalogue 13-603E, No. 3 – Occasional, 1995, 24, 25 and 37.

TABLE 3

Value of the Underground Economy, Legal Activity Base,
Canada and Provinces, 1992, in Millions (Current \$)

Items	Potential Underground Transactions (%) (National) (1)	Newfoundland (2)	PEI (3)	Nova Scotia (4)	New Brunswick (5)	Québec (6)
Personal expenditure on consumer goods and services	3.5	249	54	434	335	3,460
Residential construction	8.1	44	10	80	59	788
Exports	0.6	12	1	18	19	196
Less : Imports	0.6	11	2	26	23	244
Value of underground Transactions (000 000\$)		295	64	506	390	4,199
% GDP		3.21	2.91	2.84	2.79	2.68

Items	Potential Underground Transactions (%) (National)	Ontario (7)	Manitoba (8)	Saskatchewan (9)	Alberta (10)	British Columbia (11)	Canada (12)
Personal expenditure on consumer goods and services	3.5	5,832	532	461	1,427	1,957	14,807
Residential construction	8.1	1,272	63	52	360	804	3,540
Exports	0.6	523	29	38	121	119	1,082
Less : Imports	0.6	568	28	21	81	110	1,120
Value of underground transactions (000 000\$)		7,061	597	530	1,827	2,771	18,309
% GDP		2.52	2.53	2.52	2.49	3.21	2.66

Sources : (1) : Smith (1997), p. 19.

(2) to (12) : Statistics Canada, *Provincial Economic Account, Annual Estimates, Catalogue 13-213 Annual, 1995, 3-23.*

Notes : Calculations for each item and province : relevant amount from *Provincial Economic Accounts* × % from (1) = columns (2) to (12).
For example, the value of underground transactions related to residential construction in Newfoundland in 1992 (in millions) is : 542 × 8.1% = 44.

TABLE 4

Value of Household Services, Three Methods,
 Canada and Provinces, 1992 (Current \$)

Provinces	Method 1 (1)		Method 2 (2)		Method 3 (3)	
	At Opportunity Cost Before Tax		At Replacement Cost (Specialist)		At Replacement Cost (Generalist)	
	Million \$	% GDP	Million \$	% GDP	Million \$	% GDP
Newfoundland	7217	78.6	5,268	57.4	3,454	37.6
PEI	1,432	65.2	1,169	53.2	1,207	54.9
Nova Scotia	11,077	62.2	8,491	47.7	7,104	39.9
New Brunswick	8,687	62.2	6,579	47.0	4,503	32.2
Québec	90,651	57.9	72,555	46.3	54,504	34.8
Ontario	139,589	49.8	111,291	39.7	87,854	31.4
Manitoba	12,058	51.0	9,819	41.5	8,204	34.7
Saskatchewan	9,221	43.9	7,836	37.3	5,964	28.4
Alberta	30,308	41.3	23,056	31.4	19,626	26.8
British Columbia	43,950	50.9	34,813	40.3	29,614	34.3
Canada	354,781	51.4	281,776	40.9	222,758	32.3

Source : Statistics Canada, *Households' Unpaid Work : Measurement and Valuation*, Catalogue 13-603E, No. 3, 1995, 73-76, from which was subtracted the value of volunteer work.

GDP since it reduces the effect of this correction. From the results calculated with this method, it is possible to conclude that the time spent on household services, and therefore its monetary value, is especially important in Prince Edward Island, while it is the least important in Saskatchewan and Alberta.

1.2.4 Volunteer work

Another activity that can be measured and added to the GDP is the monetary value of volunteer work. This element may change equalization calculations if taken into account because residents of different provinces do not spend the same amount of time doing volunteer work. Activities that can be classified as volunteer work include, for example, fund raising, answering a crisis line, delivering meals, doing clerical work, attending meetings and helping at a soup kitchen.⁹ As in the case of household services, the value of volunteer work

⁹ Statistics Canada, *Households' Unpaid Work : Measurement and Valuation*, Catalogue 13-603E, No. 3, 1995, p. 35.

is calculated by Statistics Canada using different approaches. The ones used here are again the opportunity cost, the replacement cost for a generalist and the replacement cost for a specialist. The same basic premises explained in the case of household services apply here for each method. Table 5 reports the results for each method.

As seen in Table 5, the method using the value of volunteer work at replacement cost (generalist) is the one yielding the smallest change in Canada's GDP. This method is therefore the one used in the estimation of the adjusted GDP. It imputes a value of 63.5 million dollars to Prince Edward Island's volunteer work (2.89% of its GDP) and a value of 1 billion dollars to Alberta's (1.49% of its GDP).

1.2.5 Nonreproducible natural resources

The extraction of nonreproducible natural resources, such as minerals (metals, nonmetals, fuels and structural materials), is the cause of another problem in the calculation of GDP. A new discovery of nonreproducible resources or its subsequent depletion is not recorded in GDP.

However, when the extraction of a mineral resource occurs, it must be subtracted from the stock of capital, since it is nonreproducible and cannot be replaced. If it is not recorded, it overvalues GDP, which does not reflect the true production of the different provinces.

In order to evaluate the value of extracted minerals, it is necessary to subtract the GDP at factor cost of the mining, quarrying and oil well industry from the mineral production in order to remove the value added (value of the exploitation activity) and therefore remain only with the value of the extracted resource. Table 6 shows these results as well as the value of extracted minerals as a percentage of GDP for each province.

The subtraction of the value of extracted minerals from the GDP value affects, in greater proportion, the provinces that rely the most on their mineral industry. This would therefore have the least effect on the income of Prince Edward Island, while it would have the largest one on the income of Alberta and Newfoundland (petroleum production).

Treatment of trustee pension funds

The problem related to the treatment of trustee pension funds may be broken down into two separate issues. First, employer and employee contributions as well as the investment income of pension funds and the total revenues of trustee pension funds are included in the GDP but are not taxable. Second, pensions are a taxable source of income which, however, is not included in the GDP.

Table 7 reports the total values for the two issues. Since only employee contributions were available to us per province, the values for the employer and employee contributions are based on the premise that employer contributions are distributed among provinces in the same proportions as employee contributions. The total value shown in column (3) is calculated by taking the percentage of employee contributions per province over the value for Canada and multiplying it by the total amount of both types of contributions for 1992. As for the distribution

of investment income among the provinces, the percentage of the sum of employee contributions per province over the sum for Canada of four years was multiplied by the total amount of investment revenue for 1992. This is shown in column (4). Since the revenues from pension funds are less than the total revenues of pension funds, we subtract the former from the latter to calculate the total amount that must be subtracted from the GDP.

From Table 7, one can conclude that the province of British Columbia will be the least affected by these changes; its GDP will only be decreased by 0.28%. However, the province of Newfoundland will see the value of its GDP decrease by 2.91%, which makes it the province the most affected by this.

1.2.7 Imputed elements

Imputed elements included in the GDP are outputs that are consumed by their producers and are therefore nontaxable items. Farm products consumed directly in farm households and imputed residential rents from housing occupied by their owners are examples of such elements. Table 8 presents the value of the imputed items in personal expenditures per province.

The value of imputed residential rent per province, not available publicly, was calculated from the data on the number of owner-occupied dwellings per province (1), the average value of a dwelling in each province (2) and the total imputed net residential rent and imputed residential capital consumption allowances for the country. Column (5) includes, for example, farm products consumed directly in farm households, and the estimated value of specific services delivered at no cost by financial institutions.¹⁰ From the results shown in Table 8, British Columbia is favored by this treatment of imputed elements since it represents 6.59% of its GDP that must be subtracted from the total value. On the other hand, Saskatchewan has a

10 Statistics Canada, *National Income and Expenditure Accounts, Annual Estimates 1981-1992*, Catalogue 13-201, 1993, p.75.

disadvantage since it only subtracts 3.20% from its GDP value.

TABLE 5

Value of Volunteer Work, Three Evaluation Methods,
 Canada and Provinces, 1992, (Current \$)

Provinces	Method 1 (1)		Method 2 (2)		Method 3 (3)	
	At Opportunity Cost Before Tax		At Replacement Cost (Specialist)		At Replacement Cost (Generalist)	
	Million \$	% GDP	Million \$	% GDP	Million \$	% GDP
Newfoundland	380	4.14	277	3.02	182	1.98
PEI	75	3.43	62	2.80	64	2.89
Nova Scotia	583	3.28	447	2.51	374	2.10
New Brunswick	457	3.27	346	2.48	237	1.70
Québec	4,771	3.04	3,819	2.44	2,869	1.83
Ontario	7,347	2.62	5,857	2.09	4,624	1.65
Manitoba	635	2.69	517	2.19	432	1.83
Saskatchewan	485	2.31	412	1.96	314	1.49
Alberta	1,595	2.18	1,213	1.66	1,033	1.41
British Columbia	2,313	2.68	1,832	2.12	1,559	1.81
Canada	18,705	2.72	14,830	2.22	11,724	1.70

Source : Statistics Canada, *Households' Unpaid Work : Measurement and Valuation*, Catalogue 13-603E, No. 3, 1995, 73-76, from which was subtracted the value of household services.

TABLE 6

Value of Nonreproducible Resources (Extracted Minerals),
 Canada and Provinces, 1992, in Millions (Current \$)

Provinces	Mineral Production (1)	GDP of Mining Industry (2)	Value of Extracted Minerals (3)	% of GDP (4)
Newfoundland	706	253	453	4.93
Prince Edward Island	2	1	1	0.05
Nova Scotia	523	332	192	1.08
New Brunswick	910	362	549	3.93
Québec	2,694	1,152	1,543	0.98
Ontario	4,776	2,582	2,195	0.78
Manitoba	1,082	504	578	2.45
Saskatchewan	3,158	2,380	778	3.70
Alberta	16,885	13,079	3,807	5.20
British Columbia	3,500	1,716	1,784	2.07
Canada	35,414	23,054	12,360	1.80

Sources : (1) : Statistics Canada, *General Review of the Mineral Industries*, Catalogue 26-201 Annual, 1994, 8-13, 1992.
 (2) : Statistics Canada, *Provincial Gross Domestic Product by Industry 1984-1997*, Catalogue 15-203-XPB, 1998, Table 1 for each province.
 (3) = (1) - (2); (4) = (3) / Provincial GDP (see column (5) of Table 10) × 100.

TABLE 7

Value of Revenues of Pension Funds and Revenues from Pension Funds, Canada and Provinces, 1992, in Millions (Current \$)

Provinces	Employee Contributions 1992 (1)	Sum of Employee Contributions 1972, 1982 and 1992 (2)	Employer and Employee Contributions 1992 (3)	Investment Income (4)	Total Revenues of Pension Funds (5)	Pensions Paid by Pension Funds (6)	Total to be Subtracted from GDP (7)	% of GDP Reduction (8)
Newfoundland	124	203	232	265	497	230	267	2.91
PEI	27	47	51	61	112	75	37	1.68
Nova Scotia	218	398	408	519	927	754	173	0.97
New Brunswick	161	294	301	384	685	511	174	1.25
Québec	1,699	2,477	3,182	3,233	6,415	4,015	2,400	1.53
Ontario	2,698	4,677	5,053	6,104	11,157	8,756	2,401	0.86
Manitoba	292	551	547	719	1,266	764	677	2.86
Saskatchewan	215	411	403	536	939	589	350	1.67
Alberta	530	964	1,030	1,258	2,288	1,408	880	1.20
British Columbia	727	1,320	1,362	1,723	3,085	2,853	232	0.28
Canada	6,758	11,983	12,657	15,639	28,296	19,992	8,304	1.21

Sources: (1),(2) and (6): Revenue Canada, Taxation Statistics, 1994, 121-141; 1984, 134-165; 1874, 60-91; 1964, 38-53.

(3) = (1) for province / (1) for Canada x 12,656,986,000.

(4) = (2) for province / (2) for Canada x 15,639,102,000.

(3) and (4) = Statistics Canada, *Trusted Pension Funds*, Catalogue 74-201, 1992, p. 46.

(5) = (3) + (4).

(7) = (5)-(6).

1.2.8 Total income of the Aboriginal population living on a reservation

The incomes of the Aboriginal population living on reservations are not taxable even though they are included in the GDP value of each province. Table 9 shows the values and the corresponding GDP percentage for each province as well as for Canada.

Results from Table 9 show that the province of Manitoba is the most affected province (1.23% GDP decrease), while PEI is not concerned since there are no reserves in this province.

2. ESTIMATES OF THE ADJUSTED GDP

The adjusted GDP can be estimated in as many steps as there are issues to be taken into consideration. The results for Canada, the equalization five standard provinces (Québec, Ontario, Manitoba, Saskatchewan and British Columbia) and the ten provinces are presented in Table 10 on the following page.

Table 10 is divided into two parts : the first four columns account for items that must be (1-3) or are (4) subtracted from the official GDP at market price, while columns (6) through (9) list the items that must be added to the GDP at market price. The last column of Table 10 corrects GDP for all the items presented by the authors in the first part of this document. The following section uses Table 10 as a starting point to analyze and comment on the results.

TABLE 8

Value of Imputed Items
Canada and Provinces, 1992, (current \$)

Provinces	Number of Owner-Occupied Dwellings, (1)	Average Value of Dwellings (\$), (2)	Total Value of Owner-Occupied Dwellings (Billion \$), (3)	Imputed Net Residential Rent (Million \$), (4)	Other Imputed Items (Farms/Financial Services) (Million \$), (5)	Total Imputed Items (Million \$), (6)	% of GDP, (7)
Newfoundland	143,060	67,980	9.72	206.99	121.64	328.63	3.58
PEI	34,580	84,420	2.92	62.13	29.36	91.49	4.17
Nova Scotia	241,150	83,079	20.03	426.41	235.94	642.35	3.72
New Brunswick	200,055	74,796	14.96	318.48	185.61	504.09	3.61
Québec	1,593,600	99,020	157.80	3,358.55	2,077.32	5,435.87	3.47
Ontario	2,523,396	170,259	429.63	9,144.18	3,717.36	12,861.54	4.59
Manitoba	278,385	85,937	23.92	509.00	313.53	822.53	3.48
Saskatchewan	256,440	72,198	18.51	394.06	277.88	671.94	3.20
Alberta	664,165	121,861	80.94	1,722.62	971.02	2,693.64	3.68
British Columbia	928,990	230,082	213.74	4,549.29	1,144.05	5,693.34	6.59
Canada	6,877,785	141,790	975.20	20,756.00	9,123.00	29,879.00	4.34

Sources: (1) and (2) = Statistics Canada, Profil statistique des communautés canadiennes (www.statcan.ca).

(3) = (1) x (2).

(4) = (3) for province / (3) for Canada x 20,756; Statistics Canada, *National Income and Expenditure Accounts, Annual estimates 1981-1992*, 1993, p. 75.

(5) = Statistics Canada, *National Income and Expenditure Accounts, Annual estimates 1981-1992*, 1993, p.75; distributed according to official GDP found in column (5) of Table 10.

(6) = (4) + (5).

TABLE 9

Total Income for the Aboriginal Population Living on Reserves,
Canada and Provinces, 1992, in Millions (Current \$)

Provinces	Total Income (1)	% of GDP (2)
Newfoundland	9.2	0.10
PEI	0.0	0.00
Nova Scotia	47.4	0.27
New Brunswick	39.4	0.28
Québec	260.0	0.17
Ontario	268.1	0.10
Manitoba	291.2	1.23
Saskatchewan	206.8	0.98
Alberta	183.7	0.25
British Columbia	388.2	0.45
Canada	1,697.0	0.25

Source : Beyond 20/20 : Population de 15 ans et plus selon le sexe, les groupes autochtones et les tranches de revenu total, Canada, provinces et territoires, 1995.

TABLE 10

Estimation of Adjusted GDP in Eight Steps,
Canada and Provinces, 1992, in Millions (Current \$)

Provinces	TO SUBTRACT FROM OFFICIAL GDP					TO ADD TO OFFICIAL GDP					Final Adjusted GDP (10)
	Income from Aboriginal Population (1)	Imputed Elements (2)	Non- reproducible Resources (3)	Trusteed Pension Funds (4)	Official GDP at Market Prices (5)	Capital Gains and Losses (6)	Underground Economy (7)	Household Services (8)	Volunteer Work (9)		
Newfoundland	9,173	8,853	8,729	8,915	9,182	9,225	9,477	12,636	9,364	12,098	
PEI	2,196	2,105	2,195	2,159	2,196	2,237	2,260	3,403	2,260	3,443	
Nova Scotia	17,753	17,138	17,608	17,627	17,800	18,021	18,306	24,904	18,174	24,931	
New Brunswick	13,928	13,464	13,418	13,793	13,967	14,108	14,357	18,470	14,204	17,973	
Québec	156,501	151,325	155,218	154,361	156,761	158,992	160,960	211,265	159,630	210,925	
Ontario	280,241	267,648	278,314	278,108	280,509	285,134	287,570	368,363	285,133	366,948	
Manitoba	23,340	22,809	23,053	22,954	23,631	23,887	24,228	31,835	24,063	30,752	
Saskatchewan	20,794	20,329	20,223	20,651	21,001	21,296	21,531	26,965	21,315	26,098	
Alberta	73,086	70,576	69,463	72,390	73,270	74,424	75,097	92,896	74,303	89,345	
British Columbia	85,949	80,644	84,553	86,105	86,337	89,204	89,108	115,951	87,896	115,051	
Canada	686,694	658,512	676,031	680,087	688,391	700,401	706,700	911,149	700,115	900,952	
5 standard provinces	566,825	542,754	561,361	562,179	568,239	578,513	583,397	754,379	578,037	749,772	

Sources : (1) = Table 9; (2) = Table 8; (3) = Table 6; (4) = Table 7; (5) = Statistics Canada, *Provincial Economics Accounts, Annual Estimates 1984-1997*, Catalogue 13-213 Annual, 1995; (6) = Table 2; (7) = Table 3; (8) = Table 4; (9) = Table 5; (10) = (5) - (1) to (4) + (6) to (9).

ANALYSIS OF THE RESULTS

Table 11 reports adjusted GDPs on a per capita basis. These results are then used to build Table 12, the final table necessary for the analysis. This analysis requires that an index using either Canada's value or the five reference provinces as a base (100) be constructed from Table 11. The former represents a base and target change index while the latter represents a base-only change index. These are respectively denoted in Table 12 by B&T and *B*. These results allow us to determine which provinces should receive transfers and which should not receive any compensation. Since the results do not differ significantly when using one index or the other, the following analysis focuses on the second index.

Looking at column (5) of Table 12, which presents the results related to the official GDP at market prices and therefore the starting point from which to compare the different changes, one can see that only three provinces (Ontario, Alberta and British Columbia) are not entitled to any monetary compensation since their index values are above 100. These results also show that Newfoundland and Prince Edward Island are the two provinces receiving the greatest amount of compensation since their index values are the lowest. Let us then analyze the changes in index values related to each of the eight proposed changes.

Examining first the three items that should be deleted from GDP in columns (1) through (3), one can notice that the index values of the same three provinces are above 100. However, each element affects equalization in a different manner. When the first element, total income of the aboriginal population living on reservations, is taken into consideration, the index value of only two provinces (Manitoba and Saskatchewan) drops by one point. This means that a greater part of their GDP is accounted for by income from Aborigines living on reservations, and that these provinces are therefore entitled to a slightly greater compensation. In general, the treatment of this item for equalization purposes does not lead to

any major changes. For most provinces, the treatment of imputed elements [column (2)] results in a slight increase in their index value. This is, however, not the case for British Columbia. Its index value decreases by two points, but does not change the fact that this province will not receive equalization payments. Accounting for the value of nonreproducible resources is done in column (3). This step has a noticeable impact on the index value of Alberta, which decreases from 114 to 109. This means that of all the Canadian provinces, Alberta is the one holding the greatest amount of nonreproducible resources, namely oil and gas. Other provinces are somewhat affected by the change due to the fact that they exploit nonreproducible resources : Newfoundland (iron), New Brunswick (potash), Manitoba (nickel) and Saskatchewan (potash and uranium). Finally, changes associated with inclusion of trustee pension funds in GDP calculation, which could add or subtract from GDP, have small repercussions. Newfoundland, PEI and Saskatchewan see their index value decreased by one point and two points for Manitoba, which is in their favor. As for Québec and British Columbia, their index value goes up by only one point.

Let us now analyze the changes due to items that are added to provincial GDPs. Column (6) shows the results for the addition of capital gains and losses. While five provinces are not at all affected by this change, four other provinces see their index value decrease by one point. This means that they are slightly favored when it comes to receiving compensations. The last province is, however, the one most affected by this change. The index values of British Columbia increase by 2 points, which can be explained by the higher proportion of retired people living there. This group of people, needing more income for their retirement, is more likely to realize capital gains.

TABLE 11

Adjusted GDP per Capita,
Canada and Provinces, 1992 (Current \$)

Provinces	TO SUBTRACT FROM OFFICIAL GDP					TO ADD TO OFFICIAL GDP					Final Adjusted GDP
	Income from Aboriginal Population (1)	Imputed Elements (2)	Non-reproducible Resources (3)	Trusted Pension Funds (4)	Official GDP at Market Prices (5)	Capital Gains and Losses (6)	Underground Economy (7)	Household Services (8)	Volunteer Work (9)		
Newfoundland	15,707	15,159	14,947	15,265	15,723	15,796	16,228	21,637	16,034	20,716	
PEI	16,636	15,947	16,629	16,356	16,636	16,947	17,121	25,780	17,121	26,083	
Nova Scotia	19,192	18,528	19,036	19,056	19,243	19,482	19,790	26,923	19,648	26,952	
New Brunswick	18,497	17,880	17,819	18,317	18,548	18,736	19,066	24,529	18,863	23,869	
Québec	21,873	21,150	21,694	21,753	21,909	22,221	22,496	29,527	22,310	29,479	
Ontario	26,324	25,141	26,143	26,123	26,349	26,783	27,012	34,601	26,783	34,468	
Manitoba	20,877	20,401	20,620	20,531	21,139	21,366	21,671	28,475	21,523	27,506	
Saskatchewan	20,628	20,168	20,072	20,487	20,834	21,127	21,360	26,751	21,146	25,891	
Alberta	27,590	26,643	26,222	27,327	27,659	28,095	28,349	35,068	28,049	33,728	
British Columbia	24,705	23,180	24,304	24,750	24,817	25,641	25,613	33,329	25,265	33,070	
Canada	24,059	23,072	23,685	23,827	24,119	24,539	24,760	31,923	24,529	31,566	
5 standard provinces	24,217	23,203	23,984	24,016	24,277	24,716	24,925	32,231	24,739	32,053	

Sources : Table 10; Population data found in : Statistics Canada, *Provincial Economic Accounts, Annual Estimates 1981-1994*, Catalogue 13-213 annual, 1995, 262-273.

TABLE 12

Index Using Canada or the Five Reference Provinces as a Base,
Canada and Provinces, 1992

Provinces	TO SUBTRACT FROM OFFICIAL GDP					TO ADD TO OFFICIAL GDP					Final Adjusted GDP (10)								
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		
	B	B&T	B	B&T	B	B&T	B	B&T	B	B&T	B	B&T	B	B&T	B	B&T	B	B&T	
Newfoundland	65	66	65	63	62	64	64	65	65	64	64	66	65	68	67	68	65	65	66
PEI	69	69	69	70	69	67	68	69	69	69	69	69	69	81	80	81	70	69	83
Nova Scotia	80	79	80	80	79	80	79	80	79	79	79	79	80	84	84	85	80	79	85
New Brunswick	77	77	77	75	74	77	76	77	76	76	76	77	76	77	76	77	77	76	76
Québec	91	90	92	91	90	91	91	91	90	91	90	91	90	92	92	92	91	90	93
Ontario	109	109	109	110	109	110	109	109	109	109	109	109	108	108	107	108	109	108	109
Manitoba	87	86	88	87	86	86	85	88	87	87	87	87	88	89	88	88	88	87	87
Saskatchewan	85	85	87	85	84	86	85	86	86	86	86	86	86	84	83	85	86	85	82
Alberta	115	114	115	111	109	114	114	115	114	114	114	114	114	110	109	114	114	113	107
British Columbia	103	102	100	103	101	104	103	103	102	104	104	103	103	104	103	104	103	102	105
Canada	100	99	100	99	99	100	99	100	99	100	99	100	99	100	100	100	100	99	100
5 standard provinces	101	100	101	101	100	101	101	101	100	101	101	101	101	101	100	101	101	100	102

Source: Table 11.

The effect of the addition of the value of the underground economy is not very important for most provinces. The index value of Ontario decreases by one point, while British Columbia's increases by one point. Yet this small modification does not change the fact that both provinces are not entitled to compensation from the federal government. When household services are taken into consideration, most provinces see their index values increase. It is important to notice the case of PEI for which the index value goes from 69 to 80. This reflects the fact that the value of household activities is very important in this province and, when taken into account, it reduces its equalization. Alberta is the province for which the value of household services is the least important, since its index value drops by five points. It is, nonetheless, still not entitled to any compensation. Column (8) of Table 12 presents the changes due to the addition of the value of volunteer work in each provincial GDP. These are minor modifications, since the index values of only three provinces (Ontario, Saskatchewan and Alberta) go down by one point.

The last column of Table 12 reports the changes in provincial index values when all of the eight different issues are taken into consideration simultaneously. The results reported here can therefore be interpreted as overall changes caused by the summation of the individual changes on the index calculated from the official GDP at market prices. One can notice that Prince Edward Island would be the province the most disadvantaged if the final adjusted GDP were used instead of the official GDP in order to determine the level of equalization needed. As for the three provinces that did not receive any compensation when the official GDP was used, their situation would remain the same because their index values are still above 100.

CONCLUSION

The first part of this paper shows that there are theoretical, measurement and tax treatment weaknesses in the national accounts that could have an impact on GDP calculation and hence on equalization. When the eight weaknesses that

were found relevant by the authors are quantified and taken into consideration in the GDP calculations for the ten Canadian provinces, changes in relative inter-provincial income arise, as shown in the second part of the paper. As a result, as shown in the third part of the paper, more or less inclusive definitions of GDP yield different equalization shares, with the key change being associated with household production.

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