Regional Dimensions
of Federal Fiscal Activities, 1992-97

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The period of fiscal restraint that characterised federal budgetary policy during most of the 1990s was accompanied by major changes in federal-provincial fiscal arrangements. While total federal spending remained virtually unchanged from 1992 to 1997, federal transfers to provincial and local governments fell by over $6 billion (19.8 %). As a result, the share of these transfers in total federal spending dropped from 17.0 % to 13.6 % during the same period. Federal fiscal restraint has aggravated regional grievances as each province claims that is not receiving "fair treatment" from the federal government.

The debate on fiscal federalism has traditionally been focused on intergovernmental transfers. This narrow focus may not be warranted since these transfers account for a small share of total federal spending. It seems that federal fiscal restraint provided the background for a shift in the federal approach to redistribution among provinces (hereafter called horizontal redistribution), a shift that involves a more direct delivery of federal programs to individuals across the country and lower financial support for provincially-delivered programs. In our view, this change in federal policy requires a different approach to the measurement of horizontal redistribution. First, we need to replace the traditional focus on federal intergovernmental transfers with an analysis of the regional distribution of all federal revenues and expen-

ditures. Second, we need to make more transparent the role of the federal government in horizontal redistribution by concentrating on the programs it delivers directly and the taxes it collects in each province for federal purposes only. The main purpose of this paper is two fold:

▸ we develop the appropriate methodology for measuring the degree of horizontal redistribution generated by the direct fiscal activity of the federal government, which removes the noise generated by intergovernmental fiscal relations whereby the federal government takes from a province with one hand and gives back with the other.
▸ we provide estimates of horizontal redistribution for the average of 1992-1997 using the above methodology. Since this period marks the change in direction in federal policy, these estimates will serve as a marker for evaluating the dynamics of this new federal policy as they unfold through time.

Separating the direct component of the federal fiscal activity from inter-governmental grants and the revenue used to finance them shows that the federal government produces horizontal redistribution by "subsidising" the residents of poorer provinces for the provision of federal programs delivered and "taxing" those of the richer provinces on the public good they received from the federal government. Our results show that, on average during the 1992-1997 period, the price per dollar of federal spending paid in each province is directly related to the relative economic position of a province. Compared to an average price of 84 cents, the subsidy to "have not" provinces varied from 65 cents in Newfoundland to 17 cents in Quebec. "Have" provinces paid an above-average price with the excess ranging from 22 cents in Alberta to 15 cents in Ontario. Our calculations show that, on average, one percentage point change in provincial income relative to the national average altered the positive or negative subsidy by approximately 2 cents per dollar of net federal spending. The paper is organised as follows. In the following section, our methodology is explained. Then, we present our estimates of horizontal redistribution for 1992-1997 under the assumption of independent fiscal systems. Finally, we offer some concluding comments.

Methodology

As shown in Table 1, the degree of horizontal redistribution has been analysed in several studies. Most studies follow the so-called fiscal balance approach by allocating to each province a portion of the federal taxes collected and the funds spent. Two basic methods have been used to calculate federal fiscal balances by

TABLE 1 Selected Studies of Horizontal Redistribution based on Federal Fiscal Balance Approach

Author(s)	Methodology
Banks(1997)	Cash-flow Method
Glynn (1997)	Benefit Method
McCraken (1993)	Variation of Cash-flow Method
Horry-Walker (1994)	Benefit Method
Mansell-Schlenker (1995)	Variation of Cash-flow Method
Ruggeri-Yu (2000)	Variation of Both Cash-flow and Benefit Method

province: the benefit method and the cash-flow method.[1] The benefit method focuses on the residence of those who receive the benefits of government services and make contributions to their financing. Taxes are allocated to the province where residents contributed to the federal revenues and expenditures are allocated to the province where residents receive the benefit from federal expenditures.[2] In contrast, the cash-flow method focuses on the location where revenues are collected and disbursements are made. In practice, different allocations apply only to a portion of the federal budget. On the revenue side, all taxes where the taxpayer is also the agent bearing their burden would be allocated in the same manner under both methods. These revenue sources include personal income taxes, direct taxes on consumers, such as the GST, and social insurance levies. In revenue terms, these items represent over 70 % of federal tax revenues. Differences in allocation involve only corporate taxes and indirect taxes. On the expenditure side, intergovernmental transfers and transfers to persons are also allocated in the same manner under both methods. These federal expenditures represent over 50 % of the total. Different allocations apply to transfers to business, interest on the debt and the purchase of goods and services.

The cash-flow method and its variations have been widely used in studies of horizontal redistribution. It forms the basis for the annual calculations of federal balances incorporated in the Provincial Economic Accounts and was used, with adjustments, in the studies by Banks (1977), McCraken (1993) and Mansell and Schlenker (1995). The benefit method was used in the calculations by Glynn (1977) and Horry and Walker (1994).

Our approach to the measurement of horizontal redistribution differs from the traditional approaches in three major areas. First, we cast federal fiscal balances within the framework of independent fiscal systems. Second, we derive **TABLE 2 Federal Revenues and Intergovernmental Transfers by Province, Averages**

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1.   A detailed comparison of these two approaches and its application to the federal balances in Quebec is found in a study by the C.D. Howe Institute (1977).
2.   One could argue, however, that not all government expenditures to a region can be counted as benefits to the region. We just follow the literature on the balance approach which treats each dollar spent in a region as benefits to that region.

1992-1997, $ million

	Federal Revenues	Intergovernmental Transfers	Net Federal Revenues
NF	2208	1582	626
PEI	632	313	319
NS	4990	1885	3105
NB	3550	1627	1923
QC	28490	8004	20486
ON	66594	7515	59077
MB	5569	1948	3621
SK	4639	1299	3340
AB	16580	1995	14585
BC	22657	2513	20144
Total	155909	28682	127226

a direct measure of horizontal redistribution. Finally, in calculating federal fiscal balances we use a variation of both cash-flow and benefit methods.

Federal fiscal balances are usually calculated for the purpose of measuring the extent of horizontal redistribution generated by the combination of the direct fiscal activity of the federal government and its indirect involvement through intergovernmental grants. These balances convey the idea that, in some provinces, the federal government subsidises the provisions of public goods delivered by both federal and provincial-local governments. The data, however, show that the implicit notion in federal fiscal balances that intergovernmental transfers subsidise provincial expenditures is misleading. As shown in Table 2, on average during the 1992-1997 period, the residents of each province paid more than enough to the federal government to pay for the federal transfers to their provincial and local governments. Canadians in each province are currently making sufficient contributions to all levels of government to pay the full price of the public services provided by their provincial and local governments. From the perspective of independent fiscal systems, which involves full self-financing of provincial-local spending, what is being subsidised is the provision of direct federal spending by the fact that the residents of "have not" provinces pay less than the full price for the provision of federal programs. When federal fiscal balances are re-cast within the framework of independent fiscal systems, federal fiscal activity is separated into its two main components:

▸   direct spending and associated revenues, and
▸   intergovernmental transfers and associated revenues.

By focusing on the first component, we can evaluate the channels through which the federal government alters the economic position of different prov-

inces.

Federal intergovernmental transfers are not financed through some external revenue sources. The federal government collects from the residents of all provinces taxes in excess of its direct spending needs. It then returns part of those taxes to the provinces in proportions which differ from the shares of revenues collected in each province. From the perspective of independent fiscal systems, the taxes used to finance intergovernmental transfers are viewed as provincial taxes collected by the federal government on behalf of the provinces for reasons of administrative efficiency. Mechanically, the recasting of federal balances into the framework of independence fiscal systems is achieved by subtracting the amount of intergovernmental grants from both federal revenues and expenditures. Within the static framework of annual balances, the revenue mix involved in the implicit transfer of tax room to the provinces does not affect the results. A certain amount of tax revenue is shifted from the federal to the provincial accounts, whatever the source of this transfer may be. It should be stressed, however, that the choice of the revenue mix that would be shifted does have potentially significant implications. First, since different taxes have different effects on vertical redistribution, different tax mixes would have different effects on the distribution of the tax burden among individuals with different incomes within each province. The distribution of the total fiscal burden for all Canadians, of course, would remain unchanged. Second, since different taxes have different income elasticities, the dynamic implications of the revenue shift would differ depending on the revenue mix. The analysis of these dynamic implications would be necessary for the evaluation of specific proposals for transferring tax room to the provinces, but is beyond the scope of this paper.

Consistent with the change in the analytical framework, we present a new set of indicators of horizontal redistribution through federal direct spending and taxation. These indicators are based on the idea that, under independent fiscal systems, horizontal redistribution depends on the ratio of net revenues to net expenditures in that province. This ratio can be considered as the price paid in each province for the federal expenditures allocated to that province.

In order to determine the extent of the horizontal redistribution generated by direct federal fiscal activity, we need a set of prices associated with a counterfactual situation based on a known degree of redistribution. We first consider the case where all provinces paid the full price of the federal expenditures allocated to them, so that in each province net federal revenues are 100 % of net federal expenditures. As shown in the Appendix, this represents the case where federal fiscal activity does not generate horizontal redistribution under the assumption of a balanced budget. The difference between 100 and the actual price would be a biased indicator of horizontal redistribution for the 1992-1997 period because it would compare a balanced budget counterfactual with a deficit financing actual situation. Because of deficit financing, during the 1992-1997 period on average, the price paid by Canadians for one dollar of federal spending was 83.8 cents. A more

meaningful distributionally-neutral counterfactual is the situation where all provinces paid the average price. The difference between the average price and the actual price provides an indication of the subsidy received or net contribution made by a province. A contribution in excess of the average price may be viewed as the "federation tax" paid by "have" provinces to subsidise the provision of federal programs in "have not" provinces.

We also compare the actual degree of horizontal redistribution with that under the special case where redistribution is delivered exclusively through expenditures, in equal per capita amounts in each provinces while revenues are allocated as a constant percentage of income. As shown in part A of the Appendix, in this case, the price of direct federal spending in each province is proportional to provincial income relative to the national average, where the factor of proportionality is the ratio of total net federal revenues to expenditures. This result allows the calculation of the price of federal spending as the product of the income disparities and the average price of federal spending.

Since a major function of federal fiscal activity is to redistribute income among Canadians in different economic positions,[3] one would expect that the positive and negative subsidies on federal spending by province are related to the relative economic position of different provinces. To explore this relationship, we first calculate some indicators of income disparities among provinces. Since there is no unique measure of income disparities,[4] we use three different income concepts. The first is a comprehensive concept of income derived under the assumption that federal fiscal balances do not affect horizontal redistribution. Called neutral-fisc base income, it is derived as the sum of three components. The first component contains earned income from current production, net of government wages and salaries, as recorded in the provincial economic accounts (PEA). The second component includes other income received (superannuation, RRSP withdrawals and realised capital gains) and special adjustments (corporate income tax assigned to capital income and the employer portion of payroll taxes). We call the sum of these two components private income. We then incorporate the actual provincial-local fiscal balances and the federal balances allocated to each province in proportion to their shares of private income. The second income concept is personal income net of federal transfers. It includes nearly all the components of private income, except for undistributed corporate profits, but contains an inconsistent treatment of the federal government because it excludes the effect

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3.   The most recent estimates of this redistributional impact are found in Ruggeri et al (1996).
4.   Coulombe and Lee (1995), for example, used six different income measures:
           a) per capita gross provincial product deflated by provincial price indexes,
           b) the same measure deflated by national price indexes,
           c) earned income per capita,
           d) personal income minus government transfers per capita,
           e) personal income per capita, and
           f) personal disposable income per capita.

of taxes and of transfers to persons, but includes the effect of government wages. The final income concept is provincial net domestic product at factor cost. It contains only factor income generated from current production, including government wages and salaries plus total corporate profits, and incorporates the effect of regional differences in both production and relative output prices.

We then relate these measures of income disparities to the estimated federal positive and negative subsidies, measured by the difference between the price of net federal spending in each province and the average price. The estimated slope of the regression line provides our summary measure of the redistributional impact of the direct component of the federal fiscal system. It measures the change in the net subsidy per dollar of federal net spending associated with a one percentage point change in provincial income relative to the national average.

The third methodological issue involves the allocation of net federal revenues and expenditures to the various provinces. In this paper, we calculate federal fiscal balances by using a variation of the cash-flow and benefit methods which we call the aggregate transfer method. Two main features of this method should be emphasised. First, the analysis is confined to residents of Canada only. Therefore, we eliminate from the calculations the taxes paid by non-residents, including withholding taxes and the share of corporate taxes borne by non-residents, and the spending benefiting non-residents, including the interest on that portion of the federal debt owned by them. Second, our focus is on the jurisdiction rather than the individual. For example, on the revenue side each province is assigned the contribution it makes to the federal coffers through the burden borne by its residents as is done under the standard benefit approach. On the expenditure side, instead of assigning benefits to individuals on the basis of where the consumption of federal expenditures takes place (cash-flow approach) or where the benefits of such consumption are assumed to be enjoyed (benefit approach), we measure the economic gain that a province receives in terms of the factor income that is generated in that province by direct federal expenditures. In practice, this allocation procedure is a variation of the cash-flow method. Federal spending on wages and salaries is allocated on the basis of place of employment as in the PEA. The relative provincial shares of net provincial product at factor cost is used to allocate the non-wage component of federal direct spending.[5] In our calculations, we start with the data contained in the Provincial Economic Accounts (PEA), which are based on the cash-flow method, and then make a number of adjustments as explained in part B of the appendix.

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5.   We recognise that this is an approximation and that federal spending in a given provinces, both purchases and transfers, generate secondary economic effects in other provinces. Taking full account of these interactions would require a detailed general equilibrium model of the Canadian economy disaggregated by province to capture interprovincial flows.

TABLE 3 Federal Revenues and Expenditures by Province, Net of Intergovernmental Transfers, Averages of 1992-1997, $ million

	Net Revenues	Net Expenditures	Difference	Difference per Capita ($)	Ratio of Net Revenues to Net Expenditures (%)
NF	626	3388	-2,762	-4,849	18.5
PEI	319	907	-588	-4,379	35.2
NS	3,105	5831	-2,726	-2,940	53.3
NB	1,923	4,180	-2,257	-3,004	46.0
QC	20,486	30,700	-10,213	-1,415	66.7
ON	59,077	59,958	-880	-81	98.5
MB	3,621	6,637	-3,015	-2,678	54.6
SK	3,340	6,182	-2,843	-2,807	54.0
AB	14,585	13,711	873	320	106.4
BC	20,144	20,257	-113	-30	99.4
Total	127,226	151,750	-24,524	-843	83.8

Estimates of Horizontal Redistribution

The net federal revenues and expenditures calculated under the aggregate transfer method are shown in Table 3. The third column, called difference, shows the net federal balances by province. We notice that, during the 1992-1997 period on average, "have not" provinces received a net benefit from federal fiscal activity of $24.4 billion. This amount was financed entirely through borrowing because, among "have" provinces, a net contribution of $873 million by Alberta was more than offset by net benefits received by Ontario ($880 million) and B.C. ($113 million). On a per capita basis, the net gain ranged from $4,846 in Newfoundland to about $3,000 in New Brunswick and Nova Scotia, approximately $2,750 in Manitoba and Saskatchewan and $1,415 in Quebec. Alberta was the only net contributor with a per capita contribution of $320.

The last column of Table 3, which is reproduced as the first column of Table 4, shows the price paid in each province per dollar of federal net expenditure allocated to that province. We notice that there is wide variation in those prices which range from 18.5 cents in Newfoundland, to 66.7 cents in Quebec, 98.5 cents in Ontario and $1.64 in Alberta. The difference between the actual price in each province and the average price for all provinces (83.8 cents), shown in the third column of Table 4, is a measure of the positive or negative subsidy generated by the direct fiscal activity of the federal government. These differences show the traditional pattern of horizontal redistribution. All three "have" provinces pay prices in excess of the average, the difference being largest in Al-

TABLE 4 Difference in the Price of Federal Expenditures by Province, Average 1992-1997

	Provincial Price of Fed. Expenditure (1)	From 100 (100 - (1))	From Average Price (83.8-(1))	From Price under Equal Per Capita Expenditures		
				Neutral-Fisc Base Income	Pers. Inc. Minus Fed. Transfers to Persons	Net Domestic Product at Factor Cost
NF	18.5	81.5	65.4	32.6	37.7	35.6
PEI	35.2	64.8	48.6	20.3	25.1	26.7
NS	53.3	46.7	30.6	7.9	12.9	10.6
NB	46.0	54	37.8	16.5	18.7	18.8
QC	66.7	33.3	17.1	9.6	12.6	7.5
ON	98.5	1.5	-14.7	-7.0	-6.8	-7.0
MB	54.6	45.4	29.3	17.4	18.9	18.9
SK	54.0	46.0	29.8	16.6	13.5	20.7
AB	106.4	-6.4	-22.5	-8.5	-17.4	-3.7
BC	99.4	0.6	-15.6	-11.2	-13.1	-13.8

Note: Numbers in the last three columns are derived from subtracting (1) from the last three column of Table 5.

berta (22.5 cents) and smallest in Ontario (14.7 cents). The amount of the subsidy varies greatly among "have not" provinces. It ranges from nearly 65.3 cents in Newfoundland to about 30 cents in Nova Scotia, Manitoba and Saskatchewan and 17.1 cents in Quebec.

The difference between the actual price of federal expenditures by province and the price under a policy of equal per capita expenditures under the three concepts of income are shown in the last three columns of Table 3. Before discussing these differences, it is useful to analyse the data from which they were derived which are shown in Table 4. The first three columns present the ratio of provincial income to the national average under three income concepts. We notice that the widest range of these ratios, 58 percentage points as the difference between Alberta and Newfoundland, is associated with net national product at factor cost. This income concept tends to generate high relative income values for those provinces with above-average resource rents, as in the case of Alberta and Saskatchewan. A slightly smaller range, 55.7 points again between Alberta and Newfoundland, is found under neutral-fisc base income. The narrower range is associated with personal income minus federal transfers to persons primarily because this income concept excludes the effect of interprovincial differences in undistributed corporate earnings. For this income concept, the range is 42.4 percentage points and is measured by the difference between Ontario and Newfoundland. As mentioned in the preceding section, if we assume that horizontal redistribution is delivered exclusively through federal direct expenditures, by

TABLE 5 Price of Federal Expenditures by Province Under Equal Per Capita Expenditures, Average of 1992-1997

	Per Capita Values by Province as % of National Average			Price Under Equal Per Capita Expenditures		
	Neutral-Fisc Base Inc.	Pers. Inc. Minus Fed. Transfers to Persons	Net Domestic Product at Factor Cost	Neutral-Fisc Base Income	Pers. Inc. Minus Fed. Transfers to Persons	Net Domestic Product at Factor Cost
NF	61	67.0	64.5	51.1	56.2	54.1
PEI	66.2	71.9	73.9	55.5	60.3	61.9
NS	73	79.0	76.2	61.1	66.2	63.9
NB	74.6	77.2	77.4	62.5	64.7	64.9
QC	91.1	94.7	88.6	76.4	79.4	74.3
ON	109.3	109.4	109.2	91.6	91.7	91.5
MB	85.9	87.6	87.7	72.0	73.4	73.5
SK	84.2	80.5	89.2	70.6	67.5	74.7
AB	116.7	106.2	122.5	97.8	89	102.7
BC	105.3	103.0	102.2	88.3	86.3	85.6

assuming that they are allocated on an equal per capita basis in each province while revenues are allocated as a constant percentage of income, the price of direct federal spending in each province is proportional to the relative income ratio in each province, where the factor of proportionality is the ratio of federal net revenues to net expenditures. These prices are shown in the last three columns of Table 5 and were calculated as the product of the income disparities and the average price. Under this redistributional scheme, the benefits are positively related to the size of the income disparities. Provinces with smaller disparities would not benefit much from this policy. Compared to the average price of 83.8 cents per dollar of federal net expenditures, Quebec would gain about 7 cents, Manitoba 10 cents and Saskatchewan 15 cents. The largest gain would be in Newfoundland with about 30 cents and PEI with over 20 cents. Among "have" provinces, the price of federal spending would exceed the average price by about 17 cents in Alberta, 8 cents in Ontario and 4 cents in B.C.

As a final step, we relate the values of income disparities to the estimated federal positive or negative subsidies by regressing the price of net federal spending relative to the average against the degree of income differentials. The results, in Table 6, show that the slope coefficients for all income measures are statistically significant. The estimated value of the slope indicates that, on average during the 1992-97 period, a one percentage point change in provincial income altered the positive or negative subsidy on direct federal spending by about 1.6 cents. This increases to 1.9 cents when income disparities are measured by personal income minus federal transfers because this concept of income generates a narrower range of regional income differentials. These results sug-

TABLE 6 Estimated Response of the Price of Federal Direct Spending by Province to Changes in Provincial Income Relative to National Average

Income Intercept	Intercept	Slope	R^2
Neutral-Fisc Base	152.93	-1.53	0.958
Income	(10.01)	(0.113)	
Federal Income Minus	188.12	-1.91	0.9498
Federal Transfers to Persons	(14.37)	(0.162)	
Net National Product at	161.89	-1.59	0.916
Factor Cost	(15.42)	(0.17)	

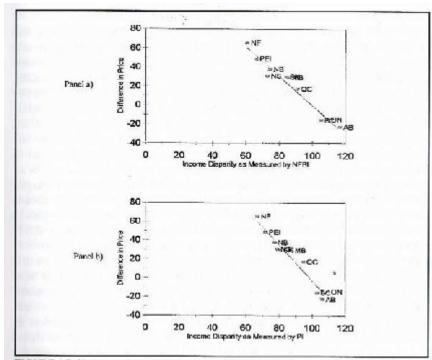Note: Numbers in parentheses are standard errors.

FIGURE 1 Difference in the Price of Federal Spending and Income Disparities as Measured by Neutral-Fisc Base Income (NFBI) and Personal Income Minus Federal Transfer to Persons (PI), Average 1992-97

gest that, during the 1992-97 period, the structure of direct federal spending and associated taxation incorporated a degree of horizontal redistribution that resulted in a reduction of subsidies on federal spending by about 2 cents for each percentage point reduction in provincial income relative to the national average.

The relationship between subsidies and income disparities under the neutral-fisc base income and personal income minus federal transfers to

persons in pictured in panels (a) and (b) of Figure 1, respectively. We notice two major differences between the two scatter diagrams. First, while they both represent a negative relationship, the scopes are slightly different. Secondly, the relative position of the scatter point for each province to the fitted regression line remains roughly the same except for Alberta and Saskatchewan (both moved from above-the-line to below-the-line position). This is not surprising since as mentioned above, Personal Income Minus Federal Transfers to Persons excludes the effect of interprovincial differences in undistributed corporate earnings. Alberta and Saskatchewan with the largest resources sector are affected the most under this income concept.

Conclusions

The federal government collects taxes from Canadians in all provinces and territories. It spends those taxes, plus any borrowed funds, partly to provide transfer payments to Canadians wherever they may reside, partly to provide public goods and services across the country, partly to help finance provincially delivered public expenditures in areas of national concern, and partly to help the poorer provinces in meeting their constitutional spending responsibilities. Through these activities, the federal government influences the economic position of individuals with different income levels and also affects the relative economic position of the various provinces). Traditionally, the emphasis with respect to horizontal redistribution has been placed on intergovernmental transfers. With these transfers representing less than 15 % of total federal spending, we argue that this emphasis is misplaced and suggest that redistributional analysis should focus on the entire package of federal fiscal activity. This change of emphasis is consistent with the shift in the direction of federal policy towards more direct delivery of programs to Canadians and less indirect delivery through intergovernmental grants. We also suggest that federal fiscal accounts should be recast in a manner that clearly separates the fiscal activities of federal and provincial-local governments. When horizontal redistribution is measured through the standard federal balances approach, no distinction is made between the effects of direct federal spending and intergovernmental transfers. A one dollar reduction in federal transfers to a province associated with a dollar increase in federal transfers to individuals will leave that province's balance unchanged although the economic effects of the two programs may be quite different. Separating the direct spending component of the federal fiscal system, and the associated revenue, from intergovernmental transfers will help highlight the need to differentiate the economic and fiscal effects of different federal programs. It will also add clarity to the debate on intergovernmental fiscal relations and may lead to more effective federal policies which address regional disparities in income and the ability of governments to provide public services.

A step in that direction is provided in this paper which focuses on the

redistributional impact of the direct spending by the federal government and the associated taxation. We considered the situation where provincial governments are fiscally independent in the sense that they finance their spending entirely from provincial revenue sources. Then voters across the country through their elected representatives decide collectively how to finance the constitutionally-mandated spending responsibilities of the federal government. There is a common view that the federal government provides subsidies to poorer provinces for both federal and provincial programs. This interpretation is misleading because the federal government collects in each province enough taxes to finance its intergovernmental transfers. The federal government in this respect acts as a tax collector for the provinces and returns the funds largely through block grants which come with no strings attached. If these taxes were collected by the provinces, they would have enough funds from their own sources to finance all their expenditures. Isolating the direct component of the federal fisc shows that horizontal redistribution is delivered by charging the residents of poorer provinces less than the average price of the federal programs delivered and those of richer provinces more than the average price. This price is affected not only by changes in federal expenditures, for a given level of revenue, but also by shifts from intergovernmental transfers to direct spending. For example, if the federal government cut $1 billion from transfers to provincial governments in Atlantic Canada and send the funds directly in the same region, the estimated price of federal net expenditures in Atlantic Canada would rise, suggesting that this policy shift reduced the degree horizontal in the region.

We calculated these prices for the 1992-1997 period. Our results showed that, on average during that period, the price per dollar of federal spending paid in each province was systematically related to the relative economic position of a province. Compared to an average price of 84 cents, the subsidy to "have not" provinces varied from 65 cents in Newfoundland, 49 cents in PEI, about 30 cents in Nova Scotia Manitoba and Saskatchewan to 17 cents in Quebec. "Have" provinces paid an excessive price which ranged from 22 cents in Alberta to 15 cents in Ontario. The degree of horizontal redistribution through the federal fiscal activity took the form of a linear relationship between the provincial income relative to the average and the positive or negative subsidy from the average price. Our calculations showed that, on average, one percentage point change in provincial income relative to the national average altered the positive or negative subsidy by almost 2 cents per dollar of net federal spending.

References

Banks, I. 1977. *The Provincial Distribution of Federal Government Expenditures: 1972-73, 1973-74 and 1974-74.* Discussion Paper No. 81. Ottawa: Economic Council of Canada.

Coulombe, S. and F. Lee. 1995. "Convergence Across Canadian Provinces". *Canadian Journal of Economics*, 28: 886-898.

C.D. Howe Institute. 1977. "Why Do Balances Differ on Federal Receipts and Expenditures in Quebec?" *Accent Quebec* 1.

Glynn, A. 1977. "The Net Provincial Expenditures Associated with Federal Government Expenditures, and Fiscal Autonomy", in The Institute of Intergovernmental Relations, *The Political Economy of Confederation*: 63-95. Kingston: Queens's University, The Institute of Intergovernmental Relations.

Horry, I.D. and M. Walker. 1994. *Government Spending Facts*. Vancouver: The Fraser Institute.

Mansell R. and M. Schlenker. 1995. "The Provincial Distribution of Federal Fiscal Balances". *Canadian Business Economics*, Winter: 3-19.

McCraken, M.C. 1993. "The Distribution of Federal Spending and Revenue by Province: Implications for Ontario and Other Provinces". *Informetrica.*

Ruggeri, G.C., D. Van Wart and R. Howard. 1996. *The Government as Robin Hood: Exploring the Myth*. Kingston: Queen's University, The School of Policy Studies.

Ruggeri, G.C. and W. Yu. 2000. "Federal Fiscal Balances and Redistribution in Canada, 1992-97". *The Canadian Tax Journal*, 48: 626–655.

Statistics Canada. *Provincial Economic Accounts*, cat. No. 13-213

Statistics Canada. *National Income and Expenditure Accounts*, 13-201

Statistics Canada. *Canada's International Investment Position*, Cat. No. 67-202.

Vermaeten, F., W. I. Gillespie and A. Vermaeten. 1994. "Tax Incidence in Canada". *The Canadian Tax Journal*, 42: 348-416.

Appendix

Price of Federal Net Expenditures in Selected Reference Cases

Let E= net federal expenditures, R = net federal revenues, P = population, Y income, i = i^{th} province and the corresponding lower case letters represent per capita values.

Distributionally-Neutral Counterfactual

Let us consider the case where neither revenues nor expenditures affect the distribution of per capita income by province by assuming that both per capita net federal revenues and expenditures are a fixed proportion of per capita income in each province.

Assumption 1: $e_i = ay_i$, where $a = E/Y$
Assumption 2: $r_i = by_i$, where $b = R/Y$

The price of net federal expenditures in this case is

$$r_i/e_i = by_i / ay_i = b/a = R/E$$

Therefore, distributional neutrality implies a constant price for all provinces. If, for example, expenditures are not distributed proportionally to income, then revenues must also be non-proportional to income in a manner that yields a constant price for all provinces.

Redistribution Only Through Expenditures

Assumption 1: Net federal expenditures per capita are equal in each province, i.e., $e_i = e$

Assumption 2. Net federal revenues per capita are a fixed percentage of per capita income in each province, i.e., $r_i = by_i$, where $b = R/Y$

It follows that

$$r_i/e_i = by_i/e = (R/Y)(y_i/(E/P))$$
$$= (R/E)(y_i/(Y/P))$$
$$= (R/E)(y_i/y)$$

Recognising that $r_i/e_i = Ri/Ei$, we have

$$Ri/Ei = (R/E)(y_i/y).$$

Therefore, the price of direct federal spending in each province is proportional to provincial per capita income relative to average capita income for the country, where the factor of proportionality is the ratio of total net federal revenues to expenditures.

Allocation of Federal Revenues and Expenditures by Province

We used PEA data for the following revenues items:

- ▸ personal income taxes, to which we added the dividend tax credit,
- ▸ the direct taxes on consumers, i.e., the GST and the Air Transportation Tax,
- ▸ payroll taxes, i.e., contributions to Employment Insurance and the Canada Pension Plan, and
- ▸ investment income.

For the above taxes the person liable for payment is also the person bearing the

burden of the tax, therefore, the allocation is the same under all three methods discussed in the text. We made adjustments to the allocation of corporate income tax (CIT) revenue and indirect tax revenue. For these two items we based our allocation on procedures used in tax incidence studies. It is recognised in those studies that the burden of corporate income taxes falls, in different proportions, on owners of capital (corporate or total capital), consumers and workers. Often, CIT revenues are allocated partly to consumers and partly to owners of corporate capital (see, for example, Ruggeri et al (1996) and Vermaeten et al (1996)). We followed that general approach and allocated 25 % of CIT to consumers and 75 % to owners of corporate capital. Since our analysis is confined to Canadian residents, we allocated a portion of the latter to non-residents on the basis of the share of dividends received by them. From the portion assigned to Canadian residents we subtracted the dividend tax credit, a tax expenditure which aims at reducing the CIT liability on recipients of dividends from Canadian corporations. The dividend tax credit was then added to the personal income tax revenue. The burden of indirect taxes is commonly assigned to consumers on the basis of the consumption of the taxed items and we followed that approach. Specifically, we allocated custom import duties on the basis of the provincial share of personal consumption expenditures, excise duties on the basis of the provincial share of alcoholic beverages and tobacco products, and excise taxes imposed on gasoline and other motor fuels on the basis of the provincial consumption of refined petroleum products. Miscellaneous indirect taxes are levied partly on tobacco products, partly on alcoholic beverages and partly on a mix of goods. Accordingly, they were allocated partly to consumers of tobacco products, partly to consumers of alcoholic beverages and partly to personal consumption expenditures.

We also used the PEA data for transfers to persons and business, intergovernmental transfers and investment spending. We used a different rationale for the allocation for the interest on the debt and current purchases. With respect to the second item we used an approach that maintains conceptual consistency with the treatment of transfers to persons. In the case of those transfers, the federal government sends checks to individuals and the amounts received by the recipients residing in a province are treated in all balance sheet approaches as a gain to that province. This treatment implies the assumption that the gain assigned to a province is the amount of income received by its residents. We propose that this principle should hold whether income is earned or is in the form of a transfer payment. Accordingly we have extended this principle to the allocation of government current purchases. In our allocation procedure, we divided this component of federal spending into two items:

▸   wages and salaries, and
▸   non-wage payments.

For the first item we used data on government wages salaries published by Statistics Canada. They yield a provincial distribution very similar to the allocation under the PEA. With respect to the second item, we argue that if the salary of a resident federal civil servant is treated as a gain to a province then a federal payment to a resident consultant or a payment to a private firm for goods produced in that province is also a gain to the same province. Since a provincial series on the income received by factors of production from federal non-wage spending in different provinces is not available, as an approximation we allocated this component of federal spending on the basis of the provincial share of net national product at factor cost.

Federal spending on the public debt involves cash payments to individuals and institutions holding government bonds as a quid pro quo for the funds borrowed. Since the costs of servicing the public debt in a given year are financed through current taxation, that tax revenue is fully allocated to those who bear its burden. To maintain consistency, all the expenditures that are financed through current taxation must also be allocated. Various approaches may be used for this allocation. One may treat these expenditures as transfer payments and allocate them to the recipients based on province of residence. Alternatively, one may argue that the interest on the debt is a measure of the benefit from consuming public goods and services before they are fully paid. Therefore, these expenditures could be allocated on the basis of the provincial share of federal spending net of debt servicing costs. We can also argue that the interest on the debt should be allocated on the basis of the provincial shares of federal tax revenue as taxpayers benefited from deficit financing by facing a lower tax load than under full financing of federal spending. In our calculations we used the first approach, which is consistent with our treatment of other spending components based on the recipients of federal funds, recognizing that to a certain extent it involves an arbitrary choice. In allocating the interest on the debt to the recipients of interest income, we recognised that federal bonds may be held in both sheltered and unsheltered form. Since the interest on the first component is not recorded, we used as an approximation the provincial distribution of RRSP contributions. Our allocation was then based on the simple average of the provincial share of interest income, recorded for income tax purposes, and the provincial share of RRSP contributions. Compared to the allocation to federal spending, this procedure will assign a larger share of debt servicing costs to the richer provinces. The difference among provinces is much smaller when the comparison is with the allocation according to the share of federal tax revenues.