THE CASE FOR SWITCHING TO A MACRO FORMULA

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Parliament and the government of Canada are committed to the principle of making equalization payments to ensure that provincial governments have sufficient revenues to provide reasonably comparable levels of public services at reasonably comparable levels of taxation.

-Section 36(2) of the
Constitution Act of 1982

When I joined the department, there was one person who understood how the (equalization) formula worked. Unfortunately, he retired.

- Paul Martin, June 7, 2001

Today, the provinces' entitlements to equalization payments are determined in accordance with what is called "the representative tax system". Over the years, a number of critics have proposed a switch to what is called "the macro formula". The proposal is now under consideration by the Ministry of Finance. My concern here is not with the pros and cons of the equalization program *per se*, but with the pros and cons of the two formulas for determining each province's entitlement. There are problems with both formulas, but I believe that the macro formula is preferable on balance.

Under both formulas, the Federal government provides transfers to certain provinces to make up for the shortfall in provincial revenue caused not because a province chooses lower than average tax rates, but because poorer provinces acquire less revenue per head than rich provinces when their tax rates are the same. Inevitably, the setting of provincial tax rates is a trade off for the residents of the province between goods bought by the government with tax revenue and goods bought by people with after-tax income. Equalization payments are not intended to compensate provinces that choose less publicly-supplied goods and more privately-supplied goods instead. Equalization payments are intended to compensate provinces that would acquire less publicly-supplied goods if all provincial tax rates were the same. The macro formula differs from the representative tax system in the interpretation of what it means for provincial tax rates to be the same. The representative tax system makes up the shortfall in provincial revenue as it would be if *all provinces levied average provincial tax rates on each and every tax base.* The macro formula makes up the shortfall in provincial revenue as it would be if *all provincial revenue were raised by income taxation at a common rate equal to the ratio of total provincial revenue to total national income.* These formulas will be explained in detail below.

To set the stage for the comparison of the formulas, consider the recent food fight between Mr. Harris and Mr. Hamm over the place of resource revenues in the equalization program. The dispute is about whether and by how much Nova Scotia's entitlement to equalization payments should be reduced when the province acquires revenue from oil royalties. Present rules are complicated -- all equalization rules are complicated -- but it is said that, for every dollar of revenue acquired by the province of Nova Scotia from oil royalties, about 70 cents would accrue to the Federal Government through a reduction in the provinces' equalization payments.

Mr. Harris argued that doctoring the equalization formula to allow Nova Scotia to keep its newly-acquired oil wealth would be an unjustified special privilege for Nova Scotia. As quoted in the *Globe and Mail*, "That's like somebody on welfare saying, 'Well, I won the $1-million dollar lottery and I have a $100,000 job, but I still want my welfare.'" For years and years, Nova Scotia has been a beneficiary of the existing Canadian equalization program. There

is no justification for abandoning or modifying the present formula now, when the formula works less blatantly in Nova Scotia's favour. Mr. Harris was absolutely right.

Mr. Hamm argued that the Canadian Constitution assigns resource revenues to the provinces, that the Atlantic provinces have been assured they would be the true beneficiaries of their resources, just as Ontario and Alberta are the beneficiaries of theirs, and that the intricacies of the equalization program engineer a grab by the Federal government of most of Nova Scotia's oil royalties, blocking the incentive for development of the oil fields. Speaking of the Offshore Accord at the Canadian Club on September 24, 2001, Mr Hamm based Nova Scotia's right on the interpretation of the Federal commitment by Mr. Trudeau "that until the provinces with resources off their shores have reached the average income in Canada, we intend to see that they get the overwhelming part of the resources from the offshore." Mr. Hamm was absolutely right.

The reader may well object that, as Mr. Harris and Mr. Hamm are in direct conflict on this matter, they cannot both be right, to which I reply, in the words of the old joke, that this is also right. I will return to this matter below.

A Comparison of Formulas

The contrast between the present equalization formula (the representative tax system) and the macro formula is best introduced in a deliberately simplified country. Canada (C) contains two provinces with equal populations, both provinces produce two goods, and all provincial revenue is raised by excise taxes on production. The provinces are North (N) and South (S). Production consists of apples (A) and oranges (O). Provinces are free to set any tax rates they please. Provincial tax rates on the two goods may differ within each province. Provincial tax rates on each good may differ from one province to the next.

There are four tax bases and four tax rates to be considered. The four tax bases are the dollar values of production of each good in each province. These are designated as B_{NA}, B_{NO}, B_{SA}, and B_{SO} where B_{NA} is the total value of the output of apples *per head* in the Northern provinces, and so on. The tax rates are t_{NA}, t_{NO}, t_{SA} and t_{SO} where t_{NA} is the tax rate on apples in the Northern province, and so on. Since tax bases are expressed as values, all tax rates must be expressed as proportions (or percentages) to ensure that products of base and rate, such as $B_{NA}t_{NA}$, come out as dollar values of tax revenue. Total revenue per head in the Northern province is

$$R_N = B_{NA}t_{NA} + B_{NO}t_{NO}$$

and total revenue per head in the Southern province is

$$R_S = B_{SA}t_{SA} + B_{SO}t_{SO}$$

An equalization formula specifies a payment to one of the two provinces, *either* E_N to the Northern province *or* E_S to the Southern province, depending which of the two provinces is the designated recipient under the formula.

The Representative Tax System: The guts of the present equalization formula is a pair of hypothetical divergences, D_N and D_S, of the two province's revenue per head from the national average. These divergences are hypothetical because they are assessed not at actual tax rates in each province, but, for each tax base, at average provincial tax rates in the nation as a whole.

These are

$$D_N = t_{CA}[B_{CA} - B_{NA}] + t_{CO}[B_{CO} - B_{NO}]$$

$$D_S = t_{CA}[B_{CA} - B_{SA}] + t_{CO}[B_{CO} - B_{SO}]$$

where t_{CA} and t_{CO} are the *average* provincial tax rates on apples and oranges in the two provinces together (C is mnemonic for Canada) and where B_{CA} and B_{CO} are the average provincial tax bases

for apples and oranges in the two provinces together.

Since the populations of the provinces are the same, Canadian average provincial tax bases for apples and oranges become

$$B_{CA} = (B_{NA} + B_{SA})/2 \quad \text{and} \quad B_{CO} = (B_{NO} + B_{SO})/2$$

and the Canadian average provincial tax rates for apples and oranges become

$$t_{CA} = (t_{NA} B_{NA} + t_{SA} B_{SA}) / (B_{NA} + B_{SA})$$

and $\quad t_{CO} = (t_{NO} B_{NO} + t_{SO} B_{SO}) / (B_{NO} + B_{SO})$

The terms in square brackets in the expressions for D_N and D_S are the shortfalls or excesses in each provincial tax base. For example, if $[B_{CA} - B_{NA}]$ is *positive*, the northern province has *less* than its share of the value of apples. It follows, as a matter of simple arithmetic, that $D_N + D_S = 0$. The divergences D_N and D_S are the same except that one is positive and the other is negative. This characteristic of equalization payments is retained when there are ten provinces rather than two. The sum of the divergences always adds up to 0. By definition, the province for which D is positive has the *low* tax base and the province for which D is negative has the *high* tax base.

Note that provincial tax revenues at national average tax rates could be equalized by requiring a transfer *from one province to another*. Under that procedure (equalization down as well as up), the province for which D is negative would pay an amount D to the province for which D is positive, ensuring that both province's *fiscal capacities* are the same. That is not the Canadian formula, though some commentators have argued it should be. Instead, under the Canadian equalization formula (the representative tax system), the Federal government supplies a transfer of D_N or D_S as the case may be to the province with the positive entitlement. The provinces' entitlements to equalization payments per head are

E_N = the larger of D_N and 0
  where $D_N = t_{CA}[B_{CA} - B_{NA}] + t_{CO}[B_{CO} - B_{NO}]$

and E_S = the larger of D_S and 0
  where $D_S = t_{CA}[B_{CA} - B_{SA}] + t_{CO}[B_{CO} - B_{SO}]$

The formula automatically supplies one province with a payment and the other province with nothing. Since Federal revenue is acquired by country-wide taxation, the equalization payment is ultimately from people in the non-recipient province to people in the recipient province.

The Macro Formula: The macro formula is much simpler. Like the representative tax system, it could be designed to transfer money from provincial government to provincial government or from the Federal government to the governments of recipient provinces. Suppose the latter. The provinces' entitlements to equalization payments per head are

$$E_N = \text{the larger of } t_C[Y_C - Y_N] \text{ and } 0$$

$$E_S = \text{the larger of } t_C[Y_C - Y_S] \text{ and } 0$$

where Y_N is income per head in the northern province, Y_S is income per head in the southern province, Y_C is income per head in Canada as a whole, and t_C is provincial revenue per head in Canada as a whole expressed as a fraction of average income per head. As long as Y_N and Y_S differ, one of E_N and E_S must be positive and the other must be 0. In other words, with two provinces, one gets equalization payments and the other does not.

Since the tax bases are specified per head and since the populations of the two provinces are assumed to be the same, the incomes per head of the northern province, the southern province and Canada as a whole are

$$Y_N = B_{NA} + B_{NO}$$

$$Y_S = B_{SA} + B_{SO}$$

and $\quad Y_C = (Y_N + Y_S)/2$

and the average provincial tax rate is

$$t_C = (R_N + R_S)/(Y_N + Y_S)$$

where R_N and R_S are provincial revenues per head as defined above. The average provincial tax is the ratio of total provincial revenue to total national income.

Six technical points before we proceed:

a) Both equalization formula are easily generalized from two goods and two provinces with equal populations to many goods and many provinces with different populations. The Canadian formula incorporates 10 provinces and 33 taxes.

b) In deriving the equalization formula under the representative tax system, it has been supposed that all tax bases are expressed as values and all tax rates are expressed as proportions. A different procedure is equally feasible. Tax bases could have been expressed as quantities and tax rates as dollars per unit of quantity. For example, B_{NA} could have been interpreted as bushels of apples produced in the northern province, in which case t_{NA} would have to be expressed as dollars per bushel. With many tax bases, all bases could be expressed as values, all bases could be expressed as quantities, or some bases could be expressed as values and the rest as quantities. Canada adopts the third course, expressing bases as values or as quantities according to the way taxes are actually levied. For example, the bases for alcohol and tobacco taxes are quantities, and the bases for income taxes and gambling revenues are values.

c) The Canadian formula has a million special provisions, some of which will be discussed below.

d) The present equalization formula does

not allow the provinces "to provide reasonably comparable levels of services at reasonably comparable levels of taxation." It raises the provincial revenue of the "have not" provinces up to the national average as it would be in the absence of equalization payments, but the revenue of the "have" provinces remains well above the national average, with or without equalization payments. Provincial revenue per head in Alberta and Ontario remain well above provincial revenue per head in Newfoundland and Nova Scotia.

e) There is some question as to whether or not equalization payments are mandated by Section 36(2) of the Canadian constitution. The clause contains the tricky phrase "are committed to the principle." This is sometimes claimed to mean that section 36(2) is not justiciable, that it is no more than a vague expression of preference by the writers of the Canadian Constitution and that it would not be enforced by the Canadian Supreme Court. Knowledgeable people disagree about what the Supreme Court would do if the Federal Government chose to abolish the equalization program altogether.

f) When labour and capital are fully mobile between provinces, their after-tax incomes are the same in all provinces and equalization payments become a transfer from all Canadians to landowners in the recipient provinces.

Except for the rule that revenues are equalized up but not down, the macro formula equalizes provincial revenues per head *as they would be* if 1) all provincial revenue were acquired by personal income taxation 2) the rates of personal income taxation were the same in all provinces and 3) the common rate of the provincial personal income taxation were just equal to the ratio, as it is today, of the sum of all

provincial expenditure to the total national income in Canada as a whole. By contrast, the present equalization formula equalizes provincial revenues per head *as they would be* if 1) all provinces levied the same tax rates on each and every tax base (personal income tax, property tax and so on) and 2) the common rate of taxation on each base was just equal to the ratio, as it is today, of the sum over all provinces of the revenue on that base to the sum over all provinces of the measure of the base itself.

It is important to recognize that both suppositions are false. Provincial governments do not acquire all revenue from personal income taxation. Neither do they impose the same tax rates on each and every tax base. There is no direct route from the wording of the equalization clause in the Canadian constitution to the rules we impose today in its name. Equalization formulas different from that employed in Canada today would be equally implied and equally legitimate. Section 36(2) does not favour one formula over the other. With or without equalization payments, the mix of tax rates may differ radically from one province to another.

Nor are provincial governments required, or even induced, by the present equalization formula to impose the same tax rates on each tax base or to acquire the same revenue per head. Equalization payments are transfers without restrictions, to be used by recipient provinces as they please. If poor provinces would spend less per head in the absence of equalization, they have every incentive to spend less afterwards. With or without equalization payments, every province must balance the benefits of services provided by the government against the benefits of goods people buy for themselves. Typically, that balance warrants smaller expenditure in poor provinces.

There is one respect in which the present equalization formula is manifestly in conflict with the constitutional mandate. The present equalization formula is riddled with special rates

and *ad hoc* exceptions: the five province average in the determination of the tax base, equalization up but not down so that province with above average revenues before equalization payments remain so afterward, the tax back provisions on natural resources, the weird and arbitrary procedures required to place tax bases in different provinces or a common scale, the willingness of the Federal government to change the rules when outcomes do not look right on some unspecified criterion. The macro formula is not completely clean, but is almost certainly less subject to *ad hoc* exceptions.

Some Problems with the Present Equalization Formula

The Canadian equalization program is not a transfer from the Federal government to the governments of the recipient provinces. It is a transfer through the intermediation of the Federal government from the people of the provinces that receive no equalization payments to the people of the provinces that receive equalization payments. The distinction is important because too much of the discussion of equalization payments is conducted as though the provinces were people and as though governments with low tax bases were personally impoverished.

Equalization from Poor to Rich: The macro formula guarantees that equalization payments flow from people in rich provinces to people in poor provinces. That is immediately evident from inspection of the formula itself, for to treat income per head as the tax base in the formula, is to ensure that people in provinces with low incomes must gain at the expense of people in provinces with high incomes. By contrast, the present Canadian formula, based on the representative tax system, might transfer money the other way. Though not likely, it is certainly possible that the present formula could transfer money *from* provinces where people are on average poor *to* provinces where people are on average rich. Consider an extreme case. Suppose neither province taxes oranges so that all public

revenue is acquired from the taxation of apples. Perhaps the orange groves are situated in remote mountains where the tax collectors cannot find them. In that case, $t_{NO} = t_{SO} = t_{CO} = 0$ while t_{NA}, t_{SA} and t_{CA} are all positive. Suppose also that 1) the southern province grows more oranges than the northern province, 2) the northern province grows more apples than the southern provinces and 3) the prices of apples and oranges are such that total income in the southern province exceeds total income in the northern province. In symbols, $B_{SO} > B_{NO}$, $B_{NA} > B_{SA}$ and $Y_S > Y_N$.

Since only apples are taxed and since the northern province produces more apples, the southern province would be deemed the "have not" province under the Canadian equalization formula. The southern province would receive equalization payments even though people in the southern province are more prosperous than people in the northern province. This is mandated by the Canadian equalization formula because, to provide reasonably comparable public services, the southern province must levy a higher than average tax rate on apples. The southern province's tax on apples must be very high to provide average public revenue on its below average tax base. While formally in accordance with a plausible interpretation of 36(2), this outcome seems contrary to the spirit of the Canadian equalization program. By contrast, since $Y_S > Y_N$, the macro formula designates the northern province as the "have not" province and supplies the northern province with an equalization payment. To justify this outcome of the present Canadian formula, one must think of governments as rich or poor in themselves apart from the circumstances of their people.

Collective Income: Suppose that, in both provinces, apple orchards are privately owned but orange groves are run by the provincial government. All revenue from orange groves accrues in the first instance to the provincial governments. Think of the tax bases on orange groves, B_{NO} and B_{SO}, as dollars worth of revenue

from the orange industry (over and above the cost of labour, fertilizer and other such inputs). To suppose that orange groves are publicly-owned is equivalent to supposing that both province's tax rates on revenue from orange groves is 100% (i.e. $t_{NO} = t_{SO} = t_{CO} = 1$). Were that so, then a substantial part of any increase in the revenue from the orange industry in the recipient province would automatically revert through the equalization program to the Federal government. Suppose the northern province turns out to be the recipient of equalization payments.

Since $t_{CO} = 1$, the equalization payment to the northern province must be

$$E_N = t_{CA}[B_{CA} - B_{NA}] + [B_{CO} - B_{NO}] > 0$$

If, as we are assuming, the northern province contains half the population of the entire country, then half of any increase in the revenue of the northern province brought about by an expansion of the orange industry in that province is appropriated by the Federal government through a reduction in equalization payments. That follows immediately from the equalization formula above once it is recognized that $[B_{CO} - B_{NO}] = (B_{SO} - B_{NO})/2$. However, if the population of the northern province were only a small part of the population of the entire country, the increase in the northern province base for the orange industry (B_{NO}) would have an insignificant effect on the average base for the orange industry (B_{CO}), and virtually 100% of any increase in revenue would be lost through a dollar for dollar reduction in E_N, the northern provinces' entitlement to equalization. In effect, the whole of the additional revenue from an expansion of the orange industry would be Federalized.

For "oranges," read "oil." The special characteristic of petroleum revenues is that they accrue directly to the provincial government rather than as income to individual people who might then be taxed on that income at a rate no different from that on all other sources of

income. Royalties on petroleum and other natural resources are collectively owned, accruing to residents of the province though the intermediary of the provincial government. The unfortunate analogy between provinces and people that runs through so much of the discussion of equalization payments leads to the equalization of all sources of provincial revenue regardless of the impact on the residence of the province. As the population of Nova Scotia is only a small part of the population of Canada as a whole, the present equalization formula redirects most of the royalties on newly-discovered petroleum from the province of Nova Scotia, where they accrue in the first instance to the Federal government. Nova Scotia "owns" the royalties, but the revenue accrues elsewhere. Mr. Hamm has been caught in the peculiarities of the Canadian equalization formula.

By contrast, with a macro formula, royalties on newly-discovered petroleum accruing to the provincial government are counted as part of provincial income, and, if the average provincial tax rate is 25%, a dollar increase in royalties results in a 25 cent reduction in equalization payments, exactly like a dollar increase in any other source of provincial revenue.

Once oil is discovered in a province, the provincial government could appropriate the royalties for the residents of the province in either of two ways, directly or indirectly Residents would acquire royalties indirectly if the royalties accrued in the first instance to the provincial government, enabling the provincial government to reduce taxes or to increase public spending. Residents would acquire royalties directly if title to royalties were privatized. Royalties would then flow to a corporation owned equally by every resident in the province and required to disperse revenue from royalties as received. Personal incomes would rise, and so too would provincial tax receipts on a variety of bases, leaving residents as well off as they would be if royalties accrued in the first instance to the provincial government.

The present equalization formula (the representative tax system), reduces the province's entitlement a) dollar-for-dollar when royalties accrue to residents indirectly through the intermediary of the provincial government, but b) only in proportion to the national average rate of provincial taxation on income (about 25%) when royalties accrue to residents directly. That's crazy, for the money accrues to residents of the province one way or another. A macro formula draws no such distinction, for all provincial revenue is looked upon as though it were acquired through provincial income taxation.

Perverse Incentives for Provincial Governments: Any program of transfers from government to people or from government to government has perverse incentives. Inevitably, transfers induce recipients to alter their behaviour in ways that are beneficial to themselves but detrimental to the nation as a whole. This is not a sufficient case against transfers *per se*, for the benefits of a program may outweigh the cost. However, it is important to identify perverse incentives so that rules may be designed to minimize their ill-effects.

Among the perverse incentives of the Canadian equalization program are these:

i) Provinces have an incentive to levy high taxes on small bases and low taxes on large bases. Suppose the northern province receives equalization payments, has less than its share of oranges and has more than its share of apples, that is $B_{NO} < B_{CO} < B_{SO}$ and $B_{NA} > B_{CA} > B_{SA}$. In these circumstances, the northern province can alter its tax rates to increase its entitlement to equalization payments without at the same time reducing its own tax revenue. The trick is to influence average provincial tax rates appropriately by raising its own tax rate on its deficit base and lowering its own tax rate on its surplus base. The northern province wants t_{CO} to be high and t_{CA} to be low. It causes t_{CO} to be higher than otherwise by raising its tax on oranges, and it causes t_{CA} to be lower than

otherwise by lowering its own tax on apples. There is no Canada-wide interest in such maneuvers.

When a province has the overwhelming proportion of the national tax base for some source of taxation - potash in Saskatchewan is the standard example - it is in the interest of that province not to tax that base at all because it would lose equalization payments dollar for dollar. This is known as the "rate tax-back" problem. The Federal government has adopted special rules to modify the disincentives from the rate tax-back and the base tax-back problem, but such rules drive the equalization program farther and farther away from the ideal of section 36(2) of the Canadian constitution.

ii) Whenever provincial revenue - for example, from royalties on petroleum - is dissipated through the loss of equalization payments, the province acquires an incentive to convert that revenue into a new form with less impact on equalization payments. It is said that the government of Newfoundland is anxious to have the aluminum from Voisey Bay processed within Newfoundland not because it is efficient to do so, but because direct revenue from aluminum production would accrue to the Federal government through a reduction in Newfoundland's entitlement to equalization payments under the current Canadian formula. This is know as the "base tax-back" problem.

Complexity: With its thirty-three distinct tax bases, the present Canadian equalization formula is very complex and, more importantly, subject to negotiation between the Federal government and the provinces. Millions of dollars of transfers lost or gained may hang on small details that only a few negotiators know anything about. Whether the base is expressed in the first instance as a quantity or as a value, how many provinces to include in the determination of average base (the number today is five rather than ten), how to compare values or quantities of housing between rural and urban localities and between the provinces

with different land prices, and when to adjust the formula for the disincentives in the tax-back problems are among quantitatively-important details that cannot be settled with reference to the constitutional mandate and have to be resolved by negotiation.

Complexity itself might be unimportant if the design of equalization payments were like the design of rockets with an unambiguously right procedure that could be identified according to whether the thing strikes where it is supposed to strike. That is not so. The person identified by Mr. Martin as knowing how the formula worked did know the full details of the formula, but he had no scientific method for determining a "right" formula which, when properly explained, would be recognized as unambiguously correct by any and every appropriately-trained expert on the subject. Complexity in the equalization formula is a recipe for negotiation, compromise and conflict among provinces that stand to gain or lose according to how the final formula is chosen. Relying, as it does, on the provincial national accounts, the macro formula is much more straightforward, much less open to negotiation over the details of its design and much less conflict-laden.[1]

Taxes and Sales: There is a difficult line to be drawn between provincial tax revenue and provincial income from the sale of services. Sales of subway tickets are not included as one of the 33 tax bases in the equalization formula, for one would not wish to bump up Prince Edward Island's entitlement to equalization payments because Ontario has a subway while Prince Edward Island does not. Similarly, property tax may be high or low depending in part on how the provincial government's services to property are financed. Property tax is high to the extent that the cost of public expenditure on roads, water and electricity is covered by the revenue from the property tax. Property tax is low to the extent that the cost of these services is covered by user fees or if these services are not provided by government at all.

Such considerations ought to be irrelevant for the determination of entitlement to equalization payments. The rationale for equalization payments would base the property-component of each province's entitlement on the quality and value of the property itself rather than upon the provincial government's choice among methods of financing public services. Similarly, medical insurance premiums (one of the 33 categories in the Canadian system of equalization payments) may be high or low depending on the extent to which medical care is socialized in the province.

A Surreptitious Macro Formula: The Canadian system of equalization payments (the representative tax system) is not as different from the macro formula as advocates for both procedures would like to believe. Over half of all equalization payments are already based on personal income. Personal income taxation alone accounts for $4.6 billion out of a total of $10.6 billion of projected equalization payments for the years 2001-2002. But that is not all. Equalization payments attributable to personal and industrial property tax ($2.2 billion), medical insurance premiums ($12 million) and other games of chance ($19 million) are also based on personal income because there is no obviously-better measure of the tax base. The Canadian equalization formula is a complicated mishmash of rules and procedures.

These difficulties with the present equalization formula - equalization for the rich, collective income, perverse incentives, the boundary between taxes and sales and complexity - would be eliminated or rendered less troublesome by a macro formula. Surreptitiously we have half a macro formula already. Under a thorough-going macro formula, equalization would never favour rich provinces over poor provinces because, unlike the present equalization formula, the macro formula takes no notice of the mix of provincial tax rates on the different tax bases. Under the macro formula, the province with the larger income per head automatically receives the larger transfer per head. Nor is there a problem with collective income because all income, private income and collective income, is counted equivalently. Perverse incentives are not eliminated altogether, but the macro formula creates no incentive for a province to adjust its tax mix to increase its entitlement to equalization payments. And perhaps most importantly, relying as it does on measures of provincial income from the national accounts, the macro formula is very much simpler and very much less subject to negotiation than the present Canadian formula.

Some Problems with the Macro Formula

Taking account of ten provinces rather than just two and allowing for differences in population, the entitlement of province i under a macro formula (total entitlement rather than entitlement per head) is

$$E_i = \max\{0, t_C(Y_C - Y_i)N_i\}$$

where i refers to one of the ten provinces, Y_i is the income per head of province i, Y_C is income per head in Canada as a whole, N_i is the population of province i and t_C is the ratio of the sum of the tax revenues of all ten provinces to the national income of Canada. This formula is a generalization of the formula in the apples and oranges example above.

The formula is simpler and less subject to wrangling among the provinces than the present formula, but it is not entirely unproblematic. A number of variants (differing according to what is recognized as the income of the province) have been proposed.

Leisure: There might be an imputation for leisure. Ideally, the Federal government might compensate poor provinces according to their incomes as they would be if everybody in all provinces worked equally hard. I believe the measurement problems and the room for dispute among provinces in this imputation are serious enough that the imputation would do more harm than good.[2]

Needs: Equalization payments might recognize differences among provinces in their needs for public services as well as differences in the tax base. For example, the equalization formula might take account of British Columbia's extra expenditure on medical to care for the many old folk who retire to British Columbia for its scenery and climate. I do not want to discuss this reform here, except to say that the pros and cons are exactly the same under a macro formula as they are under the present representative tax system.[3]

Transfers: Provincial income might include transfers from the Federal government. Thus, with an average provincial tax rate (t_C) of 25%, an increase of $1 in unemployment insurance would lead to a 25 cent reduction in equalization payments. This seems to me to be a reasonable imputation in conformity with the spirit of Section 36(2). If earned income is recognized under the equalization formula, then unearned income should be recognized too.

Depreciation: Income would, ideally, be measured net of depreciation. Just as the income of a corporation is assessed for taxation net of depreciation, so too should the income of a province assessed for transfers under the equalization program. The principle in each case is that the appropriate measure of income is what one can spend during the year without being worse off at the end of the year than one was at the beginning.

Price Levels: Equalization might take account of differences among provinces in price levels. Suppose, for example, that the dollar value of income per head in the north is twice the dollar value of income per head in the south, but that prices in the north are on average four times the prices in the south so that the standard of living in the southern province is twice that of the northern province. Neither equalization formula takes cognizance of differences in price levels. Under a macro formula as under the present Canadian formula, the southern province would be the recipient province even though

people in the south are better off than people in the north. To correct for prices, a macro formula would be adjusted so that

$$E_i = \max\{0, t_C[(Y_C/P_C) - (Y_i/P_i)]N_i$$

where N_i is the population of province i and where P_i and P_C are consumer price indices in province i and in Canada as a whole. The pros and cons of this correction are the same for the present equalization formula as for the macro formula. An unwillingness to adjust the equalization formula for differences in price levels may be part of the reason why the Canadian North (the real north, not the northern province in our example) has never been part of the equalization program. Instead, the Canadian north has been subsidized under an entirely different program and on entirely difference principles.

Out-of-province Tax Base:[4] The general principle that public policy is beneficial or otherwise according to its impact upon people rather than upon governments warrants that account be taken within the macro formula for the benefits to the people of a province from their provincial government's right, in certain circumstances, to tax income accruing to people in other provinces. Reverting to our original example, suppose the northern province were entitled to levy a tax on orange groves everywhere, in the northern province and in the southern province as well. Were that so, the people of the north would be better off than a comparison of their personal incomes would suggest. One would want that privilege to be recognized in the design of an equalization program . An advantage of the concentration upon governments rather than people in the present equalization formula (the representative tax system) is that *all* provincial revenues are accounted for, regardless of whether the burden of the tax falls on people residing in the province or on people residing elsewhere. Out-of-province tax revenue can be accounted for within the macro formula as well, but the income of the province (the designated base of

the macro formula) must be carefully and appropriately defined.

Two important sources of out-of-province tax revenue are the corporation income tax and the taxation of revenue from natural resources in so far as the owners of the corporation or the resources are not residents of the province. If I, a resident of Ontario, own shares in a company doing business in Nova Scotia, then any tax levied on the earnings of that company by the province of Nova Scotia is in part a tax on me, and the revenue from my share of the tax burden is part of the collective income of the residents of Nova Scotia. In general, every province has an incentive to slough off as much as possible of the expenditure of the government of the province on residents elsewhere in the country, a phenomenon known as tax-exporting.

Taxation of out-of-province income might be recognized in the design of a macro formula by introducing a distinction between "personal" and "collective" income. If I own an orange grove, the revenue from that asset is my personal income. If my province owns an orange grove, the revenue from that asset is part of the collective income of the people of the province, benefitting me by allowing the province to provide more services at the same tax rates or to lower tax rates without diminishing the services it provides. Thus, in determining a province's entitlement under a macro formula, the total income of a province would be specified as follows:

total income
= after-tax personal income + collective income

= before-tax personal income
+ revenue from provincially-owned enterprises provincial revenue from sources out of province.

In this formula, collective income is the revenue of the province from all sources, including crown corporations and taxes levied on people from other provinces.

If I own an orange grove in another province, my return from that investment is part of my personal income which is taxed by my provincial government and recognized by the Federal government as part of personal income in the computation of equalization payments. My province's right to tax orange groves directly supplies me (together with everybody else in my province) with collective income which might be recognized by the Federal government *as if* the revenue from the tax were immediately redistributed to the residents of my province and then taxed by the provincial government like any other income.

With equalization determined by a macro formula, petroleum revenue in Nova Scotia and aluminum revenue in Newfoundland would be treated on a par with personal income. If, one way or another, provincial governments acquire 25% of the national income as revenue, then every dollar of increase in the income of the province - whether that income accrues in the first instance to the residents of the province or to the provincial government - would trigger a 25¢ decrease in that province's entitlement to equalization payments. Both Mr. Hamm and Mr. Harris should be able to live with that implication of equalization because the province keeps most of its resource revenue without special fiddling of the equalization formula.

One way to think about the treatment of non-resident tax payers under the macro formula is to suppose that, as in the petroleum example above, all tax payments by non-residents (royalties or the corporation income tax where the burden of the tax falls on property-holders or share-holders out of province) are transferred to a public corporation owned equally by all the residents of the province and obliged to pay out all revenue each year to its shareholders (the residents of the province) who are taxed on that revenue at the going rate for all personal income. Under a macro formula the implied tax rate would be the same as that on all other sources of personal income.

A Closing Question

The way Canadian politics is moving nowadays, it is not inconceivable that the neo-cons will in time acquire majorities in all the provincial legislatures. Suppose that turns out to be so, and suppose that, like Mrs. Thatcher, they replace all provincial taxes with a head tax. The provincial tax base becomes "people", the rate on that base becomes "$ per head", every province's tax base per head must be 1, and all entitlements to equalization payments under current Canadian formula are eliminated because every province's tax base per head - the B in the equalization formula - must, by definition, be exactly the same. With income per head as the provincial tax base, a macro formula still warrants equalization payments, but the current equalization formula, the representative tax system, does not.

The test of one's preference as between the present system of equalization payments and the macro formula is whether one believes that the triumph of the neo-cons warrants the elimination of equalization payments. Bear in mind that provinces may choose to supply different amounts of public services, with or without equalization payments and regardless of which formula is employed to determine entitlements. Normally, rich provinces would levy high taxes per head and supply relatively more public services, while poor provinces would levy low taxes per head and provide relatively less public services. To prefer the present Canadian system (the representative tax system), one would have to believe that, despite substantial differences among provinces in public expenditure and provision of services, equalization payments are warranted before the triumph of the neo-cons, but not afterwards. Section 36(2) can be twisted to convey that implication, but the abolition of equalization payments in response to a switch by the provinces to a head tax seems contrary to what I see as the real intent of the clause: to help poor provinces in meeting the cost of public services. If that is the real intent of 36(2) and if an equalization program is worth having at all, it would seem inappropriate to stop equalization payments in response to a regressive change in provincial tax policy, for a given provincial tax bill is the greater burden when one is poor than when one is rich.

APPENDIX 1: TAKING OFF THE SHACKLES

A good deal of attention has been paid of late to a suggestion by Kenneth Boessenkool that resource revenues be deleted altogether from the equalization formula[5]. The proposal is that the present equalization formula be maintained, except that resource revenues be excluded from the list of tax bases. It is as though, in the apples and oranges example, the equalization payment were based exclusively on the provinces' production of apples. Letting O stand for oil rather than oranges and letting A stand for "all other sources of taxation", the proposal would be to change E_N, the northern province's entitlement to equalization payments from

the larger of $t_{CA}[B_{CA} - B_{NA}] + t_{CO}[B_{CO} - B_{NO}]$ and 0

as warranted by the representative tax system, to

the larger of $t_{CA}[B_{CA} - B_{NA}]$ and 0

and to change the southern province's entitlement accordingly.

So far as I can tell there are two reasons for the suggestion: to remove the perverse incentives associated with petroleum revenues in the present equalization formula, and to make the equalization program more fair because royalties are a capital asset with a limited life span. I am not persuaded.

The problem giving rise to this suggestion is genuine. The present equalization formula takes away about 70% of additional resource revenue accruing to the government of a recipient

province, transferring the revenue to the Federal government through a reduction in the province's entitlement of equalization payments. This feature of the equalization program does diminish the provinces' incentive to acquire additional resource revenue and creates in its place an incentive to deflect resource revenue, ultimately accruing to the Federal government, into provincial employment or into the coffers of local businesses. This is the claim by Mr. Hamm referred to at the beginning of this essay. However, the problem is taken care of automatically by a switch to a macro formula which reduces the province's loss of resource revenue from about 70%, as it is alleged to be today, to about 25% which is the same as that for the acquisition of any other additional revenue. Sharing means that the net impact of gains or losses are moderated. If we are unprepared to tolerate that, we should give up the equalization program altogether.

The capitalization argument, if I understand it correctly, is just plain wrong. Suppose newly-discovered oil yields a stream of benefits of $100 per year for the next 15 years and then stops. Suppose the interest rate is 10%. At that rate, the fifteen year stream of income $100 per year could be converted by investment to a stream of income of $77.69 in perpetuity.[6] If perpetuities were the basis for entitlements, a province acquiring $100 worth of oil revenue for the next 15 years would be treated as though it acquired $77.69 of provincial revenue for ever and ever, even after the oil runs out. I can see no advantage in that.

Most importantly, the elimination from the equalization formula of income from non-renewable resources is wildly at variance with the spirit and intent of 36(2). Suppose that a vast deposit of oil is discovered in Prince Edward Island and that the revenue accrues in the first instance to the government of the province. The field is so rich that the government of the province can eliminate all other taxes and can at

the same time provide Islanders with public services available nowhere else in Canada. On the strength of this discovery, Prince Edward Island displaces Alberta as the richest province in Canada. But, with resource revenues ignored, Prince Edward Island continues to receive equalization because its remaining tax base is small. Whatever the purpose of a system of equalization payments, it is not that! If provincial revenue is to be shared at all, there would seem to be at least as strong a case for sharing revenue originating from undeserved good fortune as for sharing revenue originating from the skill or enterprise of the residents of the province.

APPENDIX 2: THE EFFICIENCY OF EQUALIZATION PAYMENTS: A TWO-SIDED COUNTEREXAMPLE

"One of the most intriguing things about equalization is that, from an economist's point of view, there is not just an equity case for equalization, but an economic efficiency argument for equalization. The economic efficiency argument for equalization is that if it's properly calibrated, it prevents people from moving for the wrong reasons"

Guillaume Bissonette
Director of Federal Provincial Relations
Department of Finance
Statement to the House of Commons Committee on Finance
February 17, 1994.

The choice between the representative tax system and the macro formula for the determination of equalization payments depends in part on what equalization payments are expected to achieve. There are commonly alleged to be three principal objectives, equality, efficiency and horizontal equity. As it is based upon provincial income per head, the macro formula must be the better generator of equality. The representative tax system yields a less than

complete association between provincial income per head, and equalization payments per head, and it may in some circumstances supply equalization payments to rich provinces. Since neither system induces all provinces to set equal tax rates on each and every tax base, neither system can be said to be the more conducive of horizontal equity. There is even some question as to whether the concept of horizontal equity is meaningful when transported from its natural home in the taxation of different people within the same jurisdiction to the taxation of people in different jurisdictions. If the representative tax system is to prove preferable on balance, it must be on grounds of efficiency. It must be demonstrable that, broadly speaking, the national income is likely to be higher when equalization payments are provided in accordance with the representative tax system than when equalization payments are provided in accordance with a macro formula.

The purpose of this appendix is to undermine the efficiency case indirectly, not by proving the macro formula to be superior, but by showing that equalization payments may not be efficiency-promoting at all. There are many aspects to efficiency, but, as suggested by the quotation from Mr. Bissonette, the association between equalization payments and the interprovincial allocation of labour has been considered especially important, and it is this aspect alone that will be examined here.

The efficiency argument is that a system of equalization payments eliminates differences among provinces in their *net fiscal benefits*[7], a term best explained by example. Consider a country with two provinces, East and West (north and south will return presently), each with a population of one million. Think of provincial public expenditure as the overhead cost of economic activity, expenditure without which no private business can be transacted. The provinces differ in that the Eastern province has an overhead cost of $10 billion ($1,000 per

head) and the Western province has an overhead cost of $20 billion ($2,000 per head). Essential to this example is that overhead costs are what they are regardless of how many or how few people live in each province, and that interprovincial migration, raising the population of one province and lowering the population of the other, leaves both provinces' overhead costs unchanged. Overhead cost may be for roads that must be built from one end of the province to the other, regardless of the volume of traffic, or to finance transfers to poor people who never leave their province.

If tax payers are free to migrate from one province to another, then the wage in the Western province must be $1,000 higher than the wage in the Eastern province. That must be so because, if wages in the two provinces were equal, then after-tax incomes would have to be unequal, inducing migration from the Western province to the Eastern province. Migration would continue, raising the wage in the Western province and lowering the wage in the Eastern province, until after-tax incomes are equalized. The resulting interprovincial allocation of labour would, nevertheless, be inefficient because the marginal product of labour is $1,000 higher in the West than in the East, implying that the national income could be raised by $1,000 for each would-be migrant who can be induced to remain in the Western province. Since each province's overhead cost is invariant, a person can be said to generate a "net fiscal benefit" of $2,000 by residing in the West or a net fiscal benefit of $1,000 by residing in the East. An equalization payment of a billion dollars to the West would equalize net fiscal benefits in the two provinces, raising the population of the West, equalizing marginal products of labour in the two provinces and maximizing the total produce of the two provinces together.

Disparities in net fiscal benefits can arise in

other ways. A disparity would emerge if people were less skilled on average in one province than in the other, if overhead costs were the same and if public revenue were acquired by a proportional or progressive income tax. In that case, net fiscal benefits would vary in each province according to a person's skill, but, for each skill, a gap would emerge between net fiscal benefits in the two provinces, generating precisely the inefficient interprovincial allocation of labour described in the preceding paragraph.

The key assumption in the argument for the efficiency of equalization payments is that *each person's benefit from any given amount of public expenditure is independent of the size of the population*. Drop that assumption, and net fiscal benefits vanish, together with the migration argument for the provision of equalization payments. In fact the assumption is not true of most provincial public expenditure. It is not true of education, medical care or police protection where total expenditure for any given quality of service is more or less proportional to the population. For these services, there need be no net fiscal benefits at all and the introduction of a system of equalization payments would be inefficient on balance. The problem becomes somewhat murky when inequality of earning capacity is taken into account, but such inequality is usually abstracted away in the equalization literature, and will be here as well.

An extended example will illustrate the inefficiency of equalization payments when the total cost of public service is proportional to the population served. It will also be shown that the inefficiency of equalization payments is not a consequence of a failure to account for differences among provinces in their needs for public services. Imagine a country with a northern provinces and a southern province, where the only role of the government in each province is to provide a police force to maintain order and where "differences in needs" between the provinces are represented by numbers of

policemen as proportions of the total population.

The crux of the example is that the required size of the police force in each province is a multiple of the population of the province, but that the multiple is larger in the sparsely-populated north than in the densely populated south. There is nothing special about policemen in this example; the sparsely-populated north might have been supposed to require more teachers and more doctors per person to provide a given quality of service. Specifically, *three* policemen are required for every ten regular workers in the north but only *one* policeman is required for every ten regular workers in the south. Think of policing as an all-or-nothing requirement. With the required number of policemen, there is no crime. With less than the required number of policemen, there is so much crime that civilized life becomes impossible. All workers are equally efficient as producers of marketable goods and as policemen. The rest of the assumptions in the example are chosen to focus as clearly as possible upon the effects of equalization payments on the efficiency of the economy as a whole.

A single consumption good is produced in both provinces. The good is produced with land and labour in accordance with production functions

$$Y^N = f(L^N) \text{ and } Y^S = g(L^S) \quad (1)$$

where Y is the total output of the good in a province, L is the corresponding input of labour, f and g are production functions and the superscripts N and S refer to the northern and southern provinces. Being invariant, inputs of land need not be included explicitly in the production functions. Think of the production functions as having constant returns to scale in labour and land together and as concave in labour alone, i.e. $f' > 0$, $f'' < 0$, $g' > 0$ and $g'' < 0$. In both provinces, the wage of labour, w, is equal to the marginal product of labour

$$w^N = f'(L^N) \text{ and } w^L = g'(L^N) \quad (2)$$

Consumption per worker, c, is the difference between one's wage and his tax

$$c^N = w^N(1 - t^N) \text{ and } c^S = w^S(1 - t^S) \qquad (3)$$

where t is the tax rate as a percent of earnings. The residual products after the payment of wages - $Y^N - w^N L^N$ in the north and $Y^S - w^S L^S$ in the south - accrues to landowners who live abroad. There is no transport cost for goods and no impediments to the free mobility of workers between the provinces. Workers allocate themselves between the two provinces to equalize consumption per head.

$$c^N = c^S \qquad (4)$$

Suppose initially that there is no program of equalization payments or any transfers from the Federal government to the provinces. All public expenditure in each province is financed by taxation in the province. Since landowners are assumed to live elsewhere, public revenue must be acquired from the tax on workers in the province.

On these assumptions, the relation between the total population, P, and the number of regular workers, L, in each province becomes

$$P^N = L^N + .3L^N \text{ and } P^S = L^S + .1L^S \qquad (5)$$

In both provinces, total revenue equals total expenditure, i.e.

$$t^N w^N P^N = .3L^N w^N \text{ and } t^S w^S P^S = .1L^S w^S \quad (6)$$

It is now a simple matter to compute tax rates as they would be in the absence of equalization payments or other transfers among the provinces. Substituting equation 5 into equation 3, we see at once that

$$t^N = .3/(1.3) = .231 \text{ and } t^S = .1/(1.1) = .091 \quad (7)$$

The northern province has the higher tax rate because it has the greater need for public services, but the assumed free mobility of labour between provinces ensures that consumption is the same in both provinces, i.e. that $c^N = c^S$. There is no harm in supposing that the common

value of consumption is equal to 1. Thus, the wage in the north must exceed the wage in the south to compensate for the higher taxes that northerners must pay. From equation 3, it follows at once that

$$w^N = 1/(1 - t^N) = 1.3 \text{ and } w^S = 1/(1 - t^S) = 1.1 \quad (8)$$

Now consider equalization payments as they would be a) under the present Canadian formula and b) if account were taken of differences among provinces in their needs for public services. The present Canadian formula provides payments from the federal government to the government of the province with the smaller tax base per head. Specifically, under the Canadian formula, the entitlements to equalization payments per head, E^N and E^S, of the northern and southern provinces become

$$E^N = \text{the larger of } \{ t^*(w^* - w^N), 0 \} \qquad (9)$$

and

$$E^S = \text{the larger of } \{ t^*(w^* - w^S), 0 \} \qquad (10)$$

where P^N and P^S are populations in the two provinces, where t^* is the population-weighted average tax rate in the two provinces, where w^* is the population-weighted average wage in the two provinces and where, as a matter of simple arithmetic, only one of E^N and E^S can be positive and the other must be zero. Note in passing that there is no difference here between the representative tax system and the macro formula. With only one good in the economy, the tax bases under the two formulas have to be the same.

If it just so happens that the populations of the two provinces are the same (as might be the case if the territory of the sparsely-populated northern province were very much larger than the territory of the densely-populated southern province), then the average wage, w^*, would have to be 1.2, which is half way between w^N and w^S. There is no harm in supposing that to be so. On this assumption the national average provincial tax rate, t^*, becomes

$$t^* = [t^N w^N + t^S w^S]/[w^N + w^S]$$

$$= [(.231)(1.3) + (.091)(1.1)]/[1.3 + 1.1] = .167 \quad (11)$$

The Canadian equalization program provides the poorer provinces with just enough extra revenue to acquire the average provincial tax revenue when it levies the average provincial tax rates on its own, smaller than average, tax base. In this example, w is the only tax base, t is the tax rate on that base.

With the numbers we have chosen, equalization per head in the two provinces becomes

$$E^N = \text{the larger of } \{1.67(1.2 - 1.3), 0\} = 0 \quad (12)$$

and

$$E^S = \text{the larger of } \{1.67(1.2 - 1.1), 0\} = .017 \quad (13)$$

With only two provinces, there can be at most one recipient of equalization payments, the province with the lower tax base per head. The equalization payment is financed by Federal taxation which may be on labour, on land or a combination of the two. The effect of the provision of equalization payments is to lower the tax rate and increase the population of the *southern* province.

By contrast, a needs-based equalization formula, as recommended by Shah[8], supplies a different pattern of equalization payments. Under a needs-based formula, a province would be designated as "have-not" and entitled to an equalization payment in accordance with the sum of the shortfall in provincial revenue and the excess of the needs of its residents. In our example, the northern province needs more policemen than the southern provinces and, other things being equal, would receive equalization payments on that account. On the innocuous simplifying assumption that a) consumption per head is 1 in both provinces and b) that populations are the same in the two provinces, the required expenditures per head - R^N in the northern province and R^S in the southern province - are

$$R^N = .3L^N w^N/P^N = .3[P^N/1.3][1/(1- t^N)]/P^N = .3 \quad (14)$$

and

$$R^S = .1L^S w^S/P^S = .1[P^S/1.1][1/(1- t^S)]/P^S = .1 \quad (15)$$

The average requirement per head, R*, in both provinces together becomes

$$R^* = (R^N + R^S)/2 = .2 \quad (16)$$

Thus, the adjustment to the equalization payment per head to account for differences in need for public expenditure in the northern province becomes

$$A^N = R^N - R^* = .3 - .2 = .1 \quad (17)$$

in the northern province and

$$A^S = R^S - R^* = .1 - .2 = -.1 \quad (18)$$

in the southern province. Then, with an equalization formula that takes needs into account, the equalization payment per head becomes

$$E^N = \text{the larger of } \{ t^*(w^* - w^N) + A^N, 0\}$$
$$= -.017 + .1 = .083 \quad (19)$$

for the northern province and

$$E^S = \text{the larger of } \{ t^*(w^* - w^S) + A^S, 0\} = 0 \quad (20)$$

for the southern province. With a needs-based equalization formula, the northern province replaces the southern province as the have-not province entitled to equalization payments. The effect of the provision of equalization payments is to lower the tax rate and increase the population of the *northern* province. The example illustrates as starkly as possible the contrast between these systems of equalization payments and raises the question not just which system is best, but how and on what criterion we might go about choosing between them.

Our question now becomes whether the allocation of labour is most conducive to the maximization of total output under the present Canadian system of equalization payments in accordance with equations 9 and 10 , under a

needs-based equalization formula in accordance with equations 19 and 20, or without equalization payments at all.

The efficient allocation of labour is whatever serves to maximize total output of goods with the available labour force when a fixed part of the population in each province has to be employed as police. Specifically, the efficient allocation of labour is whatever serves to maximize

$$Y^N + Y^S = f(L^N) + g(L^S) \qquad (21)$$

subject to the constraint (an immediate consequence of equation 5) that

$$P = 1.3L^N + 1.1L^S \qquad (22)$$

where P is the total population in the country as a whole. Strictly-speaking, the total output of private good, $Y^N + Y^S$, is less than the national income because the national income, as commonly defined, includes the value of the services of the police as well. However, the usual measure of the national income is a defective indicator of people's welfare in this context because expenditure on the police is really a cost of production, an expenditure without which nothing can be produced but not a contributor to people's welfare in its own right.

It follows immediately that the *efficient* allocation of labour between the provinces - the values of L^N and L^S that serve to maximize total output in equation 21 with respect to the labour constraint in equation 22 - is identified by the equation

$$1.1f'(L^N) = 1.3g'(L^S) \qquad (23)$$

The marginal product of labour in equilibrium is higher in the province with the larger requirement for public services. But, from equations 2, 3, 4 and 8, it follows that equation 23 is precisely the *equilibrium* condition in the absence of equalization payments when workers allocate themselves between provinces to maximize consumption, ensuring that workers'

consumption in the two provinces is exactly the same. Workers do not go to the northern province unless their productivity there is high enough to compensate for the larger requirement of the services of the police. The numbers of workers people in each province can, in principle, be computed from equation 23 together with the accounting identity in equation 20 connecting the total population, P, with the allocation of ordinary workers in the two provinces,

That, on our simplifying assumptions, is the end of the matter. With no differences in ability among workers, when required provincial expenditure depends on the population of the province and when competition ensures that labour is equally well off in both provinces, there is no call for equalization payments at all. Tax-based equalization (the Canadian rule) causes too many workers to settle in the southern province. Tax-and-needs-based equalization causes too many workers to settle in the northern province. Both equalization formulae purport to correct for net fiscal benefits in interprovincial migration. Both see net fiscal benefits where there are none. Both are efficiency reducing.

The moral of the story is that one cannot determine in practice whether equalization-induced migration is on balance efficient or inefficient. It can be efficient when each person's benefit from any given provincial expenditure is independent of population or when a fixed public overhead cost is required. It can be inefficient when the total cost of a given quality of public service is proportional to the population. In the one case, equalization payments can equalize net fiscal benefits among provinces. In the other case, there are no net fiscal benefits to equalize, and a system of equalization payments can be expected to create a misallocation of labour where there was none before.

ENDNOTES

1. To appreciate just how arcane and complex the present equalization formula really is, one should read over the full description of the equalization program in "Federal-Provincial Fiscal Arrangements Regulations, 1999", *Canada Gazette*, Part II, Vol. 134, No. 7, page 529-85. Anyone involved in the design of equalization rules should have a look at this. For example on pages 556 and 557, one reads that the base of the property tax is determined "by the formula $[\{(A+B+C)xD\} +E] +[\{((F+G)xH)+I\}xJ]+[\{(KxL\}xN]$". The meaning of each letter is then explained. As part of this explanation, we are told that "B is equal to the product of (i) the product of the population of the province in the preceding year and (A) 0.580172 in the case of Newfoundland, (B)0.513686 in the case of Prince Edward Island"...and so, on with a different number for each province... "and (ii) a fraction whose numerator is the aggregate, over the ten provinces, of the amount calculated under A and whose denominator is the aggregate, over the 10 provinces, of the product referred to in subparagraph (i)". The reader is not told how the list of numbers, one for each province, is chosen. For a statement of each province's entitlement under each category of taxation, see "Provincial Fiscal Equalization, First Estimate, 2001-2002", Federal Provincial Relations Division, Department of Finance, March 20, 2001.

    This goes on and on for over fifty pages! Millions and millions of dollars worth of Federal civil servants' time must have been spent producing this stuff, and additional millions of dollars of Provincial civil servants' time must have been spent both pouring over it to check that one's province is not disadvantaged, and in negotiating with Federal civil servants over the details.

    My quarrel is not with the Department of Finance, but with the rules that the Department of Finance is obligated by Parliament to apply. Though the rules are to a large degree arbitrary, I have no reason to believe that the Department of Finance has behaved irresponsibly or inefficiently in designing these rules. The present equalization formula leaves no other choice.

    I would expect a macro formula to be infinitely simpler and self-explanatory because the tax bases in the macro formula are directly from the provincial national accounts. Admittedly, the national accounts are complicated too, but these have to be produced with or without an application to the equalization program.

2. This adjustment has been discussed, though not recommended, by Julie Aubut and Francois Vaillancourt in "Using GDP in Equalization Calculations: Are there Meaningful Measurement Issues?", a paper submitted to the Department of Finance.

3. This has been advocated by Anwar Shah in "Fiscal Needs and Equalization ", *Canadian Public Policy*, 1996, 99-115.

4. Out-of-province taxation, referred to as tax exporting, is discussed in some detail in Stephen Barro, "Macro Vs RST Measures of Fiscal Capacity: Theoretical Foundations and Implications for Canada", a paper submitted to the Department of Finance.

5. Kenneth J. Boesenkool, *Taking off the Shackles: Equalization and the Development of Nonrenewable Resources in Atlantic Canada*, Atlantic Institute for Market Studies, May 2001.

6. At a rate of interest of 10%, the present value of a stream of income of $100 for the next 15 years is $[100/(0.1)](1 - e^{-1.5})$, yielding an annual flow of $100(1 - e^{-1.5}) = $77.69 forever.

7. There is a huge literature on the subject. See especially James M. Buchanan and Richard E. Wagner, "An Efficiency Basis for Federal Fiscal Equalization" in Julius Margolis ed. *The Analysis of Public Output*, 1970, and Robin W. Boadway and Frank Flatters, "Efficiency and Equalization Payments in a Federal System of Government", *Canadian Journal of Economics*, 1982, 613-633.

8. Cited in footnote 3 above.