Miscellaneous Ramblings about the Representative Tax Structure, the Macro Formula and Fiscal Capacity

Dan Usher, July 2005

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) The Constitution of Canada

Though Canada had a system of equalization payments before the incorporation of 36(2) into the Constitution, the present system can be seen as an attempt to realize the objective of 36(2) by supplying enough extra revenue to provinces with low tax bases to enable them to acquire an average provincial revenue per head with provincial average tax rates. This paper is a comparison of two alternative equalization formula: the representative tax system in use today and the macro formula which has often been proposed as an alternative. The comparison is best introduced by means of simplified formula, neither of which corresponds exactly to the detail of the Canadian system as it is today. Qualifications will be listed once the stripped-down formulas have been presented.

The tax revenue of a province may be below the national average because the province's tax base is low or because the province chooses to impose low tax rates on that base. Broadly speaking the purpose of a system of equalization payments is to supply extra revenue to a province for the first reason but not the second. A province with a low tax base should be assisted. A province that chooses to impose low tax rates should not be assisted, for it is trading off private consumption for public provision in its own best interest. Thus, regardless of whether equalization payments are provided under the representative tax system or the macro formula, the payments are designed to compensate for differences in tax bases but not tax rates. In both formula, equalization payments are in accordance with differences in tax bases and on the assumption that provinces levy national-average provincial tax rates. Common tax rates would imply equal sacrifice in the spirit of 36(2). Different bases imply different provincial tax revenues in the event that rates are the same.

Under a simplified representative tax system,

"The required equalization payment to province i" =

"The tax revenue of province i as it would be <u>if</u> (i) province i had the Canadian average tax base per head for each of the 33 provincial taxes recognized in the representative tax system and <u>if</u> province i levied the average nation-wide provincial taxes on each of these bases."

minus

"The tax revenue acquired by province i as it would be if province the imposed average nation-wide provincial tax rates on its actual tax bases per head for each of the 33 taxes recognized in the representative tax system".

Specifically, the equalization payment, E_i^* , to province i under the simplified representative tax system becomes

$$E_i^* = \sum_{j=1}^{33} t_{Cj}(B_{Cj} - B_{ij})P_i \qquad (1)$$

where the subscript i refers to a province
the subscript j refers to one of the 33 provincial tax bases recognized in the representative tax system,
the subscript C refers to all provinces together, that is, to Canada as a whole,
E_i^* is province i's entitlement to equalization payments
P_i is the population of province i,
B_{ij} is the dollar value per person of the j^{th} tax base in the i^{th} province,
B_{Cj} is the dollar value per person of the j^{th} tax base in all provinces together, and
t_{Cj} is the average provincial tax rate on the j^{th} provincial tax base in all provinces together.

By contrast, under a simplified macro formula,

"The required equalization payment to province i" =

"Provincial tax revenue in province i as it would be if all tax revenue in province i were acquired by a provincial income tax levied at an imputed national average provincial income tax rate and if income per head in province i were the same as income per head in Canada as a whole"

minus

"Provincial tax revenue in province i as it would be if all tax revenue in province i were acquired by a provincial income tax levied at an imputed national average provincial income tax rate levied upon the actual income of the province."

Specifically, under the simplified macro formula , province i's equalization payment would be

$$E_i^* = t_C(Y_C - Y_i)P_i \qquad (2)$$

where E_i^* is province i's entitlement to equalization payments,
P_i is the population of province i,
Y_i is income per person in the i^{th} province,
Y_C is income per person in the all provinces together, and
t_C is total tax revenue in all ten provinces together as a proportion of total income in all provinces together.

To supply equalization payments according to the macro formula, a notional Canada-wide provincial income tax rate, t_C, must be computed. The computation is taken in two steps. First, for each province, a notional provincial income tax rate, t_i, is computed as the of total provincial government expenditure to total provincial income. Then, the national average provincial tax rate, t_C , is computed as the income-weighted average of imputed provincial tax rates, t_i , for all ten provinces. Specifically,

$$t_i = R_i / Y_i \tag{3}$$

and

$$t_C = \{\sum_{i=1}^{10} t_i Y_i P_i\} / \{\sum_{i=1}^{10} Y_i P_i\} \tag{4}$$

The macro formula is sets equalization payments as they would be if actual revenue in each province had been acquired by a provincial income tax at whatever rate turns out to be necessary for the purpose. When a province levies an income tax, its provincial income becomes one of the 33 tax bases in the representative tax system. The two formula would become identical if all provincial revenue were raised by means of a provincial income tax. Ideally, the measure of income for use in a macro formula is the classic definition: the amount people in the province can consume during the year without becoming worse off at the end of the year than they were at the beginning. In practice, governments must make do with some more tractable definition such as net provincial income per person.[1]

The several adjustments are made to the formula in equation (1) in deriving the Canadian equalization payments as it is today, and similar adjustments would probably (though not necessarily) be made to the formula in equation (2) if Canada adopted a macro formula instead. It is convenient to distinguish here between payments, E_i^*, as they would be with the idealized formulas in equations (1) and (2) and payments, E_i , as they are or would be in practice. The principle adjustments are these:

(i) Most importantly, the actual Canadian equalization formula is *up-but-not-down* as distinct from the idealized formula in equations (1) and (2) which are *down-as-well-as-up*. Equalization in accordance with these formulas would transfer revenue directly from rich provinces to poor provinces, leaving the Federal government to enforce the transfer. Revenues of the less prosperous provinces are raised to the Canadian average, but revenues of the more prosperous

---

[1]This measure of augmented personal income is similar, but not quite identical, to Alex MacNiven's three proposed based for a macro formula in *The Canadian Federal Provincial Equalization Regime: An Assessment*, Canadian Tax Paper # 109, Canadian Tax Foundation,2004. It is closest to what MacNiven calls GRP (gross regional product) except that personal income is augmented here by government revenue acquired independently of personal income rather than government expenditure as in the GRP. Public revenue saved, as in a heritage fund would be included in augmented personal income but not, so far as I can tell, in the GRP.

provinces are not lowered as equations (1) and (2) would suggest. Even with the actual Canadian equalization formula, the transfer must ultimately be to people in recipient provinces from people in the remaining provinces, but the transfer is not through the intermediary of the donor provinces. Transfers are financed by the Federal government instead. It has been argued, by Paul Hobson among others, that this adjustment is unwarranted. In its defense, one can make the argument that the Federal government is entitled under the constitution to give to provinces but not to take, though I suspect that this provision of the constitution could be somehow have been circumvented. To equalize up-but-not-down, it is necessary to set equalization payments at E_i rather than at E_i^* where

$$E_i = \text{the larger of } E_i^* \text{ and } 0 \qquad (5)$$

In other words, actual equalization payments can never be negative, as some payments would have to be if the formula were exactly in accordance with equation (1) or (2).

(ii) For each tax j, the measures of tax bases, B_{Cj} , for all provinces together is not as one might expect the sum over all ten provinces divided by the total population of Canada. It is instead an average over five provinces, British Columbia, Saskatchewan, Manitoba, Ontario and Quebec. The list excludes Alberta because it is rich and the Atlantic provinces because they are poor. One suspects that the designers of the formula looked at who gains and who loses without this adjustment, didn't like what it saw and adjusted the formula accordingly. A macro formula could be adjusted accordingly, though there is certainly no need to do so.

(iii) There is no corresponding adjustment is computing average provincial tax rates, t_{Cj}, in all ten provinces together. Average tax rates are computed as the ratio for each base of the sum of tax revenues over the ten provinces divided by the sum of their tax bases.

(iv) It is an implication of the representative tax system in equation (1) that if any recipient province has 100% of a tax base, that provinces loses most of its entire revenue from that base because its entitlement to equalization payments is reduced accordingly. In that case, the total dollar value of the national base (as distinct from dollar value per person) and the total dollar value of the provincial tax base must be one and the same, and the national average tax rate and the province's tax rate on that base must be the same as well. Specifically, when a tax base j is to be found in province i and nowhere else, the taxation of that base in province i leads to a reduction, ΔE_i^* , of the province's entitlement to equalization payment of

$$\Delta E_i^* = t_{Cj} (B_{Cj} - B_{cj}) P_i = - [t_{ij} B_{ij} P_i] (P_C - P_i)/P_C \qquad (6)$$

where $t_{ij} B_{ij}$ is province i's revenue from its taxation of the base j and where $(P_C - P_i)/P_C$ approaches 1 when the population of the province is a small proportion of the population of Canada as a whole. Better not to tax that base at all, for the alternative is to augment the incomes of residents of the province which might serve to increase revenue from other taxes with less harmful impacts on the equalization formula. To deal with this problem, the Canadian

equalization has adopted what is called a "generic solution". There is no comparable problem with the macro formula.

From here on, a number of specific cases will be considered in the attempt to identify the relative advantages of the macro formula and the representative tax system as employed in Canada today. The central question will be which formula is most in the spirit of 36(2). The standard classification of the effects of public policy under the headings of equity, efficiency and equality will be discussed briefly at the end of the paper.

A) Equalization Payments when All Provincial Revenue is Acquired by an Income Tax

Suppose all provincial revenue was raised by a tax on income, where the definition is more or less the same as "personal income" in the first of the 33 tax bases now used in computing equalization payments under the present Canadian formula. The tax on income would be the only provincial tax people pay; revenue from that tax would be the only revenue that provinces acquire other than transfers from the federal government. By construction, the representative tax system and the macro system are identical in their assignment of equalization payments because equation (2) boils down to equation (1) in that case. What can we say about this common formula?

(i) Looking at the formula and its application to the different provinces, most people would, I believe, be inclined to say that it is very much accordance with the letter and the spirit of section 36(2). The reference in 36(2) to "levels of taxation" would suggest that all provinces should be able to acquire the same revenue per head when they levy the national average provincial rate. Equalization in accordance with equation (1) or (2) allows them to do precisely that. The provincial income tax rate would be seen in this context as an indicator of sacrifice within the province to procure what government provides, the Canadian average provincial tax rate as an indicate of average sacrifice, and the equalization payment as the required corrective to keep sacrifice and results in balance. That, presumably, is what 36(2) is all about.

(ii) On the other hand, one might argue that there should be some recognition of differences among provinces in price levels. Suppose there are two provinces, S and N, with identical dollar values of income per head but where prices and wages - including the cost of all public services - are twice a high in province N as in province S. The provincial tax *rate* on income remains as an indicator of people's sacrifice to procure public services, but the amount of public services attainable at any given tax rate is only half as high in the north as in the south. Would we really be content and would we be in accordance with the spirit of 36(2) for people in province N to have to content themselves with half the public services as are available in province S in the event that their money incomes are the same. Bear in mind that there is no escape from this problem in extending the number of tax bases from 1 to 33 because, on average, the difference in price levels infects all sources of tax revenue. It is this consideration which leads us to quietly exclude northern provinces and territories from the application of the equalization formula. Perhaps price differences among the ten provinces are small enough and

the measurement problems in assessing price differences are large enough that the entire question should be ignored. Data are available by which the effect of price level differences could be assessed. Ideally, equalization payments should be paid if and only if the standard of living of a province is relatively low and regardless of whether price levels are high or low. The required correction would seem to be more straightforward for a macro formula, where only one price index need be employed, than for a macro formula.

(iii) To provide provincial governments with "sufficient revenue to provide reasonably comparable services" is not to ensure that they will do so. In fact, a government serving the interests of the people in its province would be unlikely to do so. For any given provincial income, the representative citizen would wish to maintain a balance privately-supplied and publicly-supplied types of goods. Suppose the average provincial tax rate is 20%, that the system of equalization payments enables all provincial governments to provide $3,000 of public services at a provincial tax rate of 20%, but that the pre-tax income of the province N is only $10,000 while the pre-tax income of the province S is $20,000. [The example works best if it is supposed that equalization is down as well as up in accordance with equations (1) and (2), so that the equalizations payments must be $1,000 *to* province N coupled with $1,000 *from* province S.] The system equalization payments allows both provinces to provide the same services at the same rates of tax, but it does not require them, or even provide them with an incentive, to do so. The reason for not equalizing public services is that there remains an imbalance between the provinces between private and public goods. The ratio of the values of the two types of goods is 8 to 3 in province N, but 16 to 3 in province S. With its low ratio of private to public goods, province N might in the interest of its people choose a provincial income tax rate below 20%, allowing people to acquire more private goods (with less public goods). With its high ratio of private to public goods, province S might in the interest of its people choose a provincial income tax rate above 20%, allowing people to acquire more public goods (with less private goods). The example is, of course, highly artificial. The principle it illustrates is not. Provincial governments enabled by a system of equalization payments to provide the same public services may, in the interest of their citizens, choose not to do so.

It is difficult to say how much weight to place on this consideration. The demand for public services may be very inelastic by comparison with the demand for private goods. The federal government may impose fixed expenditures on provincial governments, as when fixed provision of health services is mandated as a condition of the Canada health and social transfer. It is sometimes said that the system of equalization payments is intended to replicate the financial implications of a unitary state while at the same time providing provinces with the opportunity to arrange public provision under their jurisdiction in the interest of their residents. This argument falls apart because provincial governments retain the opportunity and incentive to provide different amounts of public services, even with a system of equalization payments in place.

(iv) Equalization among provinces does not necessarily provide equalization among people. The extra Federal taxation to finance the Canadian up-but-not-down system of equalization payments may take more from the poor throughout Canada than is provided to the

poor in the recipient provinces. Extra Federal taxation to finance a system of equalization payments must be harmful to poor people in rich provinces. Though unlikely, even poor people in poor provinces could made worse off if the governments of the recipient provinces used the revenue from the equalization program to lower the tax rates on the rich rather than to increase services that are beneficial to the poor. Whether equalization payments are in the end equalizing among people across Canada is a difficult empirical question to which I, for one, have no answer. I would guess that equalization payments are somewhat equalizing on balance, but one cannot rule out the possibility that equalization payments are disequalizing instead.

This consideration is sometimes said to be irrelevant because the purpose of equalization payments is to equalize among provinces rather than people. But that, in turn, raises the question of why equalization among provinces which is not simply a surrogate for equalization among people might be desirable. Provinces do not eat. Provinces do not sleep. Provinces do not get sick (except metaphorically) or die. But for the effect upon the distribution of income among people, why should anybody care whether provinces are enabled to raise the same revenue with the same tax rates? A system of equalization payments may be well be justified as promoting equality among people across Canada or as promoting efficiency in the Canadian economy. These justifications will be discussed briefly at the end of the paper. The main consideration here is that, apart from these underlying considerations, equality among provinces is no justification for anything.

(v) Considering these aspects of the equalization program - that it need not promote equality among people and that capacity to equalize public expenditures among provinces at nation-wide provincial tax rates is no guarantee that public expenditure will actually be equalized or even that it should be - many observers have begun to ask whether the equalization program is on balance desirable at all. Notwithstanding rhetoric about its identification with Canadian values, the program may in fact be counterproductive. It costs about ten billion dollars a year, a sum that redirected to real redistribution could provide a lump sum subsidy of over $300 a year every man, woman and child in Canada, $1,200 per year to a family of four, twice that if the tax structure were adjusted to draw back the subsidy from prosperous people. To be sure, tax rates would have to increase in poor provinces, but that may be a fair price to pay for the improvement in the living standard of poor Canadians throughout the country.

B) Oil Revenues and the Definition of Income

Continue to suppose that the only provincial tax imposed upon residents of a province is the tax on personal income, but add the assumption that the governments of some provinces acquire extra revenue from oil royalties paid by corporations rather than by people out of their incomes. Government revenue, R_i, in each province i becomes

$$R_i = t_i Y_i + O_i \qquad (7)$$

where Y_i is total personal income in province i, t_i is the provincial tax rate on personal income and O_i is oil revenue in in province i. Strict and ridged applications of both equalization formulas - for the representative tax system in equations (1) and for the macro system in equation (2) above - seem to yield unpalatable results.

(i) The representative tax system would seem to be defective in two respects. On the one hand, if some provinces have oil revenues while others do not, the equalization formula would seem to take back most of the province's benefit from the oil revenue as explained in the discussion surrounding equation (6) above. On the other hand, since oil royalties accrue directly to the provincial government, rather than through the intermediary of people, the revenue and the tax base on oil revenue are one and the same, yielding an implicit provincial tax rate of 100%. The Canadian constitution awards control of natural resources to the provinces. Strictly interpreted, equalization in accordance with the representative tax system would draw back virtually all of the benefit from authority over natural resources in the recipient provinces. That is clearly intolerable. To deal with this problem, the Canadian system of equalization payments is adjusted by the generic formula, reducing the tax base on tax bases unique to one province to 70% of their actual values, and by special Federal-provincial agreements to ignore oil revenues altogether in the calculation of equalization payments for some provinces. Unfortunately, sense that oil revenues are overweighted in the Canadian equalization formula has given way to arbitrary adjustments in the formula reducing the equalization program to little more than a great scramble among the provinces for Federal largesse.

(ii) Strictly interpreted, the macro formula in equation (2) ignores oil revenues altogether, but there is a way around this difficulty that seems reasonably in conformity with the spirit of 36(2). The "fix" is to treat all provincial revenue accruing directly to a provincial government rather than though the intermediary of personal income as though it were redistributed to people, counted as part of their incomes and then taxed back at whatever rates apply to personal income. On this principle, the appropriate tax base, Y_i, for the determination of equalization payments in accordance with the macro formula in equation (2) is not just personal income. It is personal income augmented by oil revenue per person.

$$Y_i = Y_i^P + O_i \qquad (8)$$

where Y_i^P is personal pre-tax income per head in province i, and where the imputed provincial tax rate is the ratio total public revenue to total income per head, the sum of personal incom,e and oil revenue per head. A province with a personal income of $20,000 per head, with a provincial tax rate of 10% on personal income, and with oil royalties, accruing directly to the provincial government, of $5,000 per head would be treated under the adjusted macro formula *as though* a) personal income were $25,000 per head and b) the provincial tax rate on income were 28% [(2,000 + 5000)/25,000]. I would argue that the adjustment is a natural interpretation of 36(2) because people in this province are about as well off as they would be in another province without any oil royalties, but with personal income of $25,000 per head, with a provincial tax

rate of 28% and with whatever publically-supplied goods and services could be purchased out of the revenue from that tax. I would go so far as to say that, based on 36(2), the adjusted macro formula is right and the representative tax system is wrong in this case.

(iii) An additional correction to the macro formula *might* be warranted. If the provincial government is to spend $7,000 per person regardless, a person might be better off in a province with a personal income of $20,000 per head and $5,000 per head of oil revenues accruing directly to the provincial government than he would be in a province with a personal income of $25,000 per head and no oil royalties. The reason is that in the former province, the provincial income tax rate would be 10%, while in the latter province it must be 28%. The difference in tax rates would be of no consequence if, as is implicit in the presentation of this example, peoples' gross, pre-tax incomes were impervious to the tax rate, in other words, if there were no deadweight loss to taxation. Deadweight loss arises when people alter their behaviour to lessen their tax bills, working less for pay, taking more leisure, increasing do-it-yourself activities, investing less or using up resources in the attempt to hide income from the tax collector. The consequence of such manoeuvres is that the cost, all things considered, to the tax payer of getting a dollar into the hands of the government is actually greater than 1. The name of this cost is "the marginal cost of public funds", the ratio of the full cost to the taxpayer per dollar acquired by the government. The marginal cost of public funds has proved difficult to determine, estimates varying from a low of 1 up to well over two. Suppose we knew the correct number to be 1.5. We might then redefine the imputed income in equation (6) as

$$Y_i = Y_i^P + 1.5O_i \qquad (9)$$

the new value of Y_i being the income one would need in a province with no oil revenues to be as well off as one would be in a province with actual personal income of Y_i^P per head and oil revenues of O_i per head. There is some question in my mind as to whether one would want to make this correction. There is a certain logic to it, but the choice of the marginal cost of public funds is rather arbitrary. One is confronted here with a difficult trade-off between simplicity and conformity with the spirit of 36(2).

(iv) The "incomization" of oil revenues under the macro formula leaves well over half of any additional oil revenue in the hands of the recipient provincial government. Suppose the imputed provincial tax rate in equation (2) is 25%. With income, Y_i, measured as in equation (8), an increase of $1 in a province's oil revenue leads to an increase in income of $1 and a reduction in entitlement to equalization payments of 25¢, so that its net income rises by 75¢. With income, Y_i, as measured in equation (9) and with an estimated marginal cost of public funds of 1.5, an increase of $1 in a province's oil revenue leads to an increase of $1.50 in its imputed income and a reduction in its entitlement to equalization payments of 37.5¢, so that its net income rises by 62.5¢. The province's incentive to acquire oil revenue may be reduced somewhat, but not eliminated altogether as is almost the case with the representative tax system.

(v) I can see no merit in the argument that oil revenue should be exempted from the

equalization formula because oil wells will eventually run dry. There is nothing special about oil in that respect. Capital depreciates. People become old and no longer productive. The Canadian system of equalization payments is intended to benefit provinces when they are poor, not when they are rich. Alberta was a recipient of equalization payments in the days before it was flush with oil, but payments stopped when oil began to flow. Alberta may one day receive equalization payments once again if and when the oil runs out. That is how the system is supposed to work, and there is no case for providing equalization payments today because a province might be poor tomorrow. Otherwise, a province can be infinitely wealthy - with all public expenditure financed by oil revenues, with innumerable services, such as free food for everybody, provided by the provincial government and with virtually no private income because nobody bothers to work - and still be a recipient of equalization payments.

(vi) A case can be made for the incomization of all provincial revenue not acquired through the intermediary of people's incomes. In particular, revenue from the corporation income tax might be incomized, exactly as though it were oil revenue. Dividends accruing to residents of the province and realized capital gains would automatically show up as part of personal income. The corporate income tax would not. There might also be a case for an imputation for residents entitlement to unrealized capital gains, but that would be statistically messy. It is not now accounted for in the Canadian equalization formula. [Revenue from sales taxes could be looked upon as though they were acquired as part of the revenue from the income tax at the imputed rate as explained above.]

(vii) There is, however, another way of thinking about how to account for oil revenues in the equalization formula. In a federal system of government, resource revenues may be assigned to the provinces, as in Canada, or the central government, as in the United States. A fairly strong argument can be made for the latter. Assigned to the central government, resource revenues become the common property of everybody in the nation, and, as such, have no impact on the distribution of population among provinces, for you are in effect entitled to your share of the resource revenues wherever within the country you happen to live. Assigned to the provinces, resource revenues become the common property of the people in the province where the resources are found, and a large inefficiency is created as people move to resource-bearing provinces to acquire a share of the spoils. That inefficiency is inevitable as long as provincial jurisdiction is taken seriously. The inefficiency is diminished somewhat under a macro formula, especially if it is equalization down as well as up because the system of equalization is the logical equivalent of federal taxation of people's common property in resource revenues at the average provincial tax rate. By contrast, the inefficiency is eliminated altogether under the representative tax system which is, in effect, a roundabout way of redirecting all resource revenues back from the provinces where the constitution says it belongs to the central government where, at least on an efficiency criterion, it really ought to be.

Under an up-as-well-as-down representative tax system (without the qualifications and adjustments in the Canadian system to ensure that this is not so), a province's resource revenue is treated as a tax base, the implicit tax rate is 100%, and a province's entitlement to equalization

payments is reduced dollar for dollar for dollar by its resource revenue, just as though the central government appropriated all resource revenue and then returned it to the provinces not where it originated but in equal amounts per person. The representative tax system is in effect a devious way of reassigning jurisdiction over resource revenues from the provinces to the federal government. That is the great virtue of the representative tax system, and there is much to be said for it if Canadians are really and truly prepared to live with those consequences. That virtue disintegrates disintegrated completely if we insist on ad hoc adjustments to the representative tax system to keep resource revenue in the hands of the provinces. Implicit taxation at the average provincial tax rate may be the best we can hope for.

C) A Head Tax

To imagine that all provincial tax revenue is raised by a head tax is to draw the sharpest possible contrast between the implications of the macro system and the representative tax system. The comparison is an ideal instrument for deciding how one believes 36(2) ought to be translated into an equalization formula.

Imagine a great neo-conservative triumph leading to the adoption of the head tax as the one and only source of public revenue in all of the provinces, as Margaret Thatcher once proposed for local taxation in England. The interesting feature of the head tax for our purposes is that it stops *all* equalization payments under the representative tax system. With only a head tax, there is only one tax base for each province i, the value of that tax base (B_{i1} in equation (1) for each province i), is automatically equal to 1, and the value of the Canadian average tax base, B_{C1}, must be equal to 1 as well. When the tax base is numbers of people, the tax base per head must be 1, for there can never be more (or less) than one person per person. That being so, the value of each and every equalization payment, E_i^* in equation (1), cannot be other than 0. One province may be rich. Another province may be poor. All equalization payments vanish regardless.

That is not so under the macro formula which looks upon provincial revenue as though it were acquired by a personal income tax. Consider two provinces with equal populations, a rich province S and a poor province N. In province S, income per head is $50,000, and the provincial tax rate is 10%, so that public revenue is $5,000 per head. In province N, income per head is $20,000 and the provincial tax rate is 20%, so that public revenue is $4,000 per head . Since the average provincial tax rate is 12.9 % [(4,000 + 5,000)/(50,000 + 20,000) and the average provincial income is $35,000, the equalization to the province N when equalization is up-but-not-down must be $1,929 per person in province N [(.129)(35,000 - 20,000)], allowing province N to acquire the average provincial revenue per head, $4,500, with the average provincial tax rate of 12.9%.

The choice between the representative tax system and the macro system is a choice in this instance between equalization payments to province N of $1,929 per head or nothing. The question is which outcome corresponds to how one would like to see 36(2) interpreted or what

might have been in the minds of the framers of the Canadian constitution when this clause was included. Much depends on how one would like to interpret the phrase "at comparable levels of taxation". Should the phrase be interpreted as denying equalization payments to province N despite the fact that it is the unambiguously poorer province and that it would be entitled to equalization payments had the very same revenue been collected in both provinces under a different tax system? In my opinion, the answer is obvious. Equalization payments are designed to supply revenue to poor provinces. The phrase "comparable levels of taxation" should be interpreted as comparable sacrifice to taxpayers in supplying a given revenue per head. It is hard to see how else the notion of comparable sacrifice can be interpreted except as the rate of tax that would be required if public revenue were raised by an income tax. How public revenue is actually acquired would then seem to be a detail with little or no bearing on the central meaning of 36(2). The superiority of the macro system over the representative tax system in this case seems overwhelming.

D) A Polar Bear Tax and the Concept of Fiscal Capacity

It is sometimes said that the object of equalization payments is to equalize something called "fiscal capacity" among the provinces, where a province's fiscal capacity is a measure of its capacity to bear tax. In practice, a province's fiscal capacity is interpreted as the amount of money that it can raise when national average provincial tax rates are applied to its mix of provincial tax bases. The larger a province's tax bases, the greater its fiscal capacity must be. Fiscal capacity boils down to income when all provincial revenue is acquired by means of an income tax. The question at hand is whether the concept makes sense for a diverse mix of taxes such as the 33 taxes accounted for in the Canadian equalization formula.

The meaning of fiscal capacity is clear enough for the provinces of the Roman Empire where the Emperor does not care much about the welfare of the peasants over whom he rules and where the task of every provincial governor is to squeeze as much revenue as he can from the people in his jurisdiction. Then, the fiscal capacity of a province becomes the largest amount of revenue the governor can extract, regardless of what taxes he chooses to levy for that purpose. The term is well-defined in that context. It is much less well-defined with reference to the provinces of Canada where, as we all know, the sole object of taxation is to provide the socially-optimal balance between private and public goods in circumstances where taxes could be much higher than they actually are and certainly would be if the object of public finance were to maximize tax revenue. The question is what becomes of the notion of fiscal capacity when taxes are deliberately set far lower than they might otherwise be. Once again, the only conceivable meaning of fiscal capacity is with reference to tax payers' sacrifice in providing a given tax revenue per head, and it is hard to see what might be meant by sacrifice and how it might be measured other than by the tax rate that would have to be imposed if all public revenue were raised by an income tax.

Suppose, once again, that there are two provinces, a rich province S with an income of $50,000 per head and a poor province N with an income of $20,000. Suppose that both provinces

levy income taxes, but that, since people's incomes in the province N are difficult for the tax collector to identify, there is also levied a tax on polar bears. Each person is taxed in accordance with the number of polar bears in his vicinity, in the belief that prosperity and proximity to polar bears are reasonably well correlated. There are plenty of polar bears in province N, but none in province S. Thus, province S has one tax base, income, and province N has two, income and polar bears. A polar bear tax becomes like a surrogate income tax in province N where polar bears are to be found. Though by no means necessary, it is certainly conceivable that the tax on polar bears is high enough in province N is high enough that province N counts as the "have" province and province S counts as the "have not" province under the Canadian equalization formula, and that province S that is the recipient of equalization payments in accordance with the representative tax system in equation (1).

Once again, it may be asked whether this outcome of the representative tax system is in accordance with one's sense of 36(2), and, once again, the answer would seem to be that it is not. The fiscal capacity, as usually interpreted, may be larger for province N than for province S, but the equalization of fiscal capacity so defined is not in this case a reasonable objective of public policy. A province's equalization-worthiness should depend on the underlying circumstances in the province, regardless of whether the province chooses to tax this rather than that. Income is relevant, the precise mix of taxed is not. The choice between income and polar bears as a tax base should have nothing to do with the matter.

Under a macro formula, the polar bear tax is, of course irrelevant, except that the revenue from the polar bear tax is added to the revenue from the income tax in computing total revenue as the numerator of the ratio of revenue to income that serves as the province's tax rate in equation (2).

The general principle in this example is that, for the purposes of 36(2), the inclusion of a multiplicity of tax bases in the equalization formula may be redundant or mischievous: redundant because relevant information conveyed by some tax bases may already be conveyed by other tax bases, and mischievous because redundant tax bases may differ from one province to another for reasons having nothing to do with tax payers' burdens in supplying a given provincial revenue per head. The polar bear tax is ridiculous not so much because no such tax would ever be imposed, but because the number of polar bears per person has no independent bearing on the comparison among provinces of the tax payers' sacrifice or burden per dollar of provincial revenue acquired.

The same is true to, but to a lesser extent, of many of the 33 bases in the Canadian equalization formula. Once "personal income taxes" (item #1) are accounted for, there is almost no additional information about people's sacrifice or burden associated with a province's tax revenue acquired by the provincial government inherent in the tax bases of "tobacco taxes" (item #5), "gasoline taxes (item #6), "diesel fuel taxes"(item #7), "non-commercial vehicle license fees" (item #8), "revenues from the sale of alcoholic beverages" (item #10), "race track taxes" (item #12), "payroll taxes" (item #26) and possibly "provincial and local property tax revenues"

(item #27). These are all polar bear taxes, surrogates for personal income but conveying no additional information about people's tax burden per dollar acquired by their provincial governments. One way or another, taxes on these items are really taxes on income. No useful information is acquired by treating these items separately. Separate treatment is mischievous, for it allows each recipient province to increase its entitlement to equalization payments by imposing high taxes on small bases and low taxes on large bases. Similarly, another collection of taxes can be can be amalgamated with oil revenues into one large base of provincial revenue accruing independently of provincial income.

Perhaps the attractiveness of the concept of fiscal capacity can in part be explained as an attempt to capture and take account of the excess burden of taxation as discussed above in connection with equation (9). I doubt, however, that there is more than a very tenuous connection between excess burden and the multiplicity of tax bases in the equalization formula. In so far as people's income and expenditure are about the same, it should make little difference to the aggregate excess burden of taxation in a province whether that province levies a 5% income tax coupled with a 5% sales tax or a 10% tax on income (or sales) alone.

The attractiveness in many quarters of the notion of fiscal capacity and of the representative tax system for computing equalization payments may be due in part to an unstated analogy between a government acquiring public revenue through several taxes and a person acquiring income by working at several jobs. The base of each tax corresponds to hours worked at each job. The rate of each tax corresponds to the wage rate at each job. There would be something to the analogy if the different tax bases were really like hours worked at different jobs, if a province could not introduce one base without reducing or eliminating another (just as you cannot work more at one job without working less in an eight hour work day at another) and if tax rates (like wages at different jobs) were largely beyond the control of the government of the province. The analogy breaks down because these requirements are not met at all. Provincial governments can add one base without reducing another, and each base can be taxed heavily or lightly in accordance with the preferences of the government.

E) The Definitions of Income in the Macro Formula.

Generalizing our definition of provincial income in the presence of oil revenue, the appropriate measure of provincial income for inclusion in the macro formula of in equation (2) may be defined as the sum of 1) pre-tax personal income and 2) "extra" income per head, where "extra" income accrues to the government of the province directly rather than through taxation of personal income. The principle in augmenting personal income by "extra" income is to identify personal income as it would be if income accruing directly to the government were immediately redistributed to residents of the province, and the augmented personal income were then taxed at whatever rate is necessary to acquire the actual revenue from all sources of the provincial government. The most important component of "extra" income is oil revenue, but revenue from a corporation income tax would also be included because that revenue does not flow to the government through the intermediary of private income. By contrast, revenue from an excise tax

or from license fees paid by people would not count as "extra" income for the purposed of the formula because they are paid out of residents' income already. Provincial revenue from these taxes would be treated as though they had been levied through the personal income tax. In effect, income for the purpose of the macro formula would be measured in accordance with Y_i in equation (8), except that where the term O_i in the equation would be expanded to encompass all "extra" income. All resource revenues would be included in extra income as would income from the corporation income tax.

"Tax exporting" would be accounted for as an influence upon or ingredient of "extra" income. Eor example, revenue from excise taxes might be divided into two parts, one deemed to be paid by residents of the province, and the other deemed to be paid by residents out of province. The former would be ignored in the construction of Y_i^P because it is already accounted for in personal income. The latter (just the tax) would be added to O_i because it is are for all practical purposed like oil revenue accruing to the government of the province without passing first through the income of residents. In addition, deadweight loss in taxation could be taken into account, as explained above, by measuring Y_i in accordance with equation (9) rather than with equation (8). Whether or not to account for these qualifications is a trade-off between completeness of the measure and arbitrariness in the estimating procedure. These measurement problems complicate the macro formula, but there is no escape from these complications by adopting the representative tax system instead.

In principle, income should also include what might be called "unrealized personal income" comprising unappropriated capital gains on houses, firms' resource revenues that are neither taxed away nor transferred to the firms' owners as dividends, and other retained earnings not set against depreciation of capital stock. All this boils down to measuring income for the purpose of the macro formula as something like "net provincial income per head " as that entity might be measured in the national accounts.

F) Miscellaneous Considerations:

(i) Needs: It has often been proposed to modify the equalization formula to account for differences among the provinces in their needs for public services. All I have to say about this here is that the imputation for needs is neither more nor less difficult under a macro formula than under the representative tax system. The macro formula (2) can be rewritten as requiring equalization payments E_i such that

$$P_i\, t_C Y_i + E_i = P_i\, t_C Y_C \qquad (10)$$

where all of these terms are defined above in connection with equations (1) and (2). In particular, $P_i\, t_C Y_C$ is the tax revenue of province i as it would be if province i were as it would be if its income per head equaled the Canadian average and if it imposed the imputed average Canadian provincial tax rate. To introduce needs, replace the expression on the right-hand side of the equation with a measure of needs, $P_i\, G_i$, where G_i is the cost per person of supplying the

Canadian average level of public services in province i. The appropriate equalization payment to province i would then be identified by the equation

$$P_i\, t_C Y_i + E_i = P_i\, G_i \qquad (11)$$

For example, if the only function of provincial governments were to provide elementary schooling, the value of G_i would be the product of i) the Canada-wide cost of elementary schooling per child and ii) the number of school-age children in province i as a proportion of the population of the province. There is a comparable adjustment for the representative tax system.

(ii) Provincial price levels

Both the macro formula and the representative tax system can be adjusted for differences among provinces in the cost of living. Let I_i be the cost of living index for the province i as a multiple or fraction of the cost of living in Canada as a whole so that, by construction, $I_C = 1$. To take account of the cost of living, is to set E_i, the equalization payment for the province i, in accordance with the equation

$$P_i\, t_C Y_i + E_i = P_i\, t_C Y_C\, I_i \qquad (12)$$

where Y_i and Y_C are measured in current rather than inflation-corrected dollars. Equation (12) is just equation (10) with the right hand side (the cost at national average prices of providing province i with the national average provincial revenue) augmented by the cost of living in province i. There is a comparable extension of equation (11) as well.

There is some question about whether and to what extent differences in price levels among recipient provinces ought to be taken into account. Equalization payments are in the end a transfer from people in rich provinces to people in poor provinces, either directly in the down-as-well-as-up equalization formula or via federal taxation in the up-but-not-down equalization formula. Either way and regardless of whether needs are taken into account, it costs people in rich provinces more to provide a real transfer to people in poor provinces where the cost of living is high than to provide the same real transfer to people in equally poor provinces where the cost of living is low. If a given standard of medical care costs $2,000 per head in one province and $1,000 per head in another and if people in both provinces are equally well off and equally "deserving" of assistance with medical care, then provision to the former province places twice the burden upon the donor provinces as provision to the latter. To account for price level differences in the equalization formula is to provide equal real revenues or equal real services to the recipient provinces. Not to do so is to impose equal burdens per recipient on people in the donor provinces. A national social welfare function would be required to sort this matter out. Once again, the problem is not unique to the macro formula.

(iii) Gaming the System: It should be mentioned in passing that the macro formula

presents recipient provinces with fewer opportunities than the representative tax system for influencing their entitlements to equalization payments in ways that are beneficial to the recipient province but harmful to Canada as a whole. The trick is to impose high taxes on low bases and low taxes on high bases.[2] The macro formula is less open to manipulation because there is only one large tax base.

(iv) Efficiency, Equality and Equity: Economists are accustomed to evaluate policy under these three headings. Efficiency in this context is usually interpreted as conducive to the maximization of national income. Equality is usually interpreted with reference to the dispersion of the income distribution. Equity is sometimes employed as a fancy, and in my opinion entirely superfluous, synonym for equality, but it is more appropriately interpreted as "horizontal equity", the principle in public finance that people with equal incomes should be taxed equally.

As already discussed, the subsidization of poor provinces in a system of equalization payments could lead to a narrowing of the distribution of income in the nation as a whole, but there is no guarantee that this will turn out to be so. Much depends on whether and to what extent recipient provinces use equalization payments to reduce the provincial tax burden or increase the public serves for the poor.

Efficiency might be influenced by equalization payments in several ways: Most importantly, equalization payments may compensate for the inefficiency in provincial jurisdiction over natural resources. As discussed above, a crude down-as-well-as-up equalization formula in accordance with the representative tax system would be the most efficient in this context - more so than the macro formula which amounts, in effect, to a partial nationalization of resource revenues by taxing them at the imputed average provincial tax rate, Most of that potential efficiency is lost on passing to the up-but-not-down formula such as we have today, but I doubt whether Canadians would tolerate the reversal of ownership that full efficiency of would require. Efficiency might also be influenced by equalization payments through the induced migration of labour. Equalization payments induce labour and capital to remain in recipient provinces. Contributing to the efficiency of the economy as a whole if and only if it is national income augmenting for them to doer so. For equalization payments to promote efficiency in this way, it must be the case that without equalization payments there would be too few workers and too little capital in Nova Scotia and too many workers and too much capital in Alberta. I see no significant difference between the representative tax system and the macro a representative tax system to increase its entitlement to equalization payments formula on this account. On the other hand, a province's maneuvers under a representative tax system to increase its entitlement to equalization payments by altering its tax structure is likely to be inefficient. Finally under both systems of equalization, the marginal cost of public funds may give rise to two opposite influences upon the efficiency of the economy. On the one hand, by compensating for any tax-induced contraction in the provincial tax base, equalization payments supply provincial

---

[2]The locus classicus on this phenomenon is Tom Courchene and David Beavis, "Federal-Provincial Tax Equalization: An Evaluation", *Canadian Journal of Economics*, 1973, 583-502.

governments with an incentive to over spend because, in effect, equalization, redirects deadweight loss to the federal government. On the other hand, equalization payments can reduce nation-wide deadweight loss by reducing taxation by poor provinces where deadweight loss might be expected to be high and increasing taxation by the federal government where the deadweight loss might be expected to be relatively low.

Unlike equality and efficiency, equity in the sense of horizontal equity is irrelevant. Horizontal equity is a political virtue. It is important that people with equal incomes be taxed equally to avoid a nasty and potentially dangerous scramble among citizens, each seeking to persuade the government to tax somebody else instead. The reason why equity is irrelevant for the evaluation of equalization payments is that it is a virtue within jurisdictions but not among them. It makes a great deal of difference if two Englishmen with the same incomes are taxed differently. It makes no difference is an Englishman with a given income is taxed more heavily by the government of England than a Frenchman with the exact same income is taxed by the government of France. There is no relevant inequity because no conflict is generated among equally-prosperous Englishmen as long as their taxes are the same. Similarly, our concerns about horizontal equity should not extend across provinces. A resident of Ontario cannot lobby the government of Manitoba to lower his taxes in Ontario if it turns out that a person with the same income as he is taxed less in Manitoba than in Ontario. Different tax rates among provinces may have consequences for the efficiency of the Canadian economy and for the nation-wide distribution of income, but such inequity as there may be is on no concern, for the adverse consequences of inequity within jurisdictions have no counterpart in the effects of equalization payments.

In the end, I suspect the real justification for equalization payments boils down not to these complicated calculations about efficiency and equality, and certainly not to considerations of equity, but to something half way between efficiency and equality: a sense that public services in poor provinces are especially beneficial and worthy of national support.

G) Concluding Observation:

Section 36(2) refers to "sufficient revenues to provide reasonably comparable levels of public services at reasonably comparable levels of taxation". I have argued in this paper that the macro formula comes closer to than the representative tax system to what section 36(2) would seem to require. The key phrase in 36(2) is "comparable levels of taxation". It cannot mean "equal dollars' worth of tax" because, if it did, all equalization payments would automatically be equal to zero. It cannot mean "equal rates of tax on whatever the tax base happens to be" because, if it did, all equalization payments would once again be zero in the event that provinces levied head taxes. If the phrase means anything at all, "comparable levels of taxation" must imply equal *sacrifice* or equal *burden* to the tax payer in providing equal revenues per head or equal public services as the case may be. That, in turn, points nowhere else than to taxes paid as a proportion of one's income or to the income tax rate that would be required to enable the provincial government to acquire a certain tax revenue per head. The macro formula conforms to

the spirit of 36(2) while the representative tax system, in so far as it differs from the macro formula, does not.