

Some notes on Equalization reform*

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1 Introduction

Canada's Equalization program has a reputation as too arcane and complex to be understood by mere mortals. This reputation is largely undeserved. At the level of principle, the program is entirely straightforward: in a "have-not" province with lower-than-average levels of economic activity, transfers are required to permit the government to finance the national average level of public services per resident without imposing higher-than-average tax rates. The key mandates of Equalization therefore are: (i) to redistribute revenue-raising capacity (not personal incomes) from have to have-not provinces; (ii) to do so in a way that does not undermine provincial governments' incentives to set their own tax rates in the best interests of Canadian taxpayers; and (iii) to provide stabilization or "insurance" for short-run swings in provincial revenues.

Of course, the devil remains in the details. That has always been true for Equalization, since implementing the principle requires some way of measuring each province's capacity to raise revenue from its own tax bases, and some way of comparing levels of taxation between provinces. It is even more true in the current environment of the 2004 "New Framework" for Equalization. Increasingly, there is a danger that the guiding principles of equalization may be undermined by the way in which the details of the formula have been negotiated and implemented.

In this paper, I therefore spend quite a bit of time on the details—with the aim of checking whether the fundamental principles that motivate the program are being observed. I argue that the New Framework, by introducing a fixed pool of funds available for Equalization, has the potential to undermine all of the three key principles of equalization enumerated above. Since the fixed-pool approach appears to be a given for the next ten years at least, the question therefore becomes how funds should be allocated under a new formula to minimize departures from the key principles.

The plan of the paper is as follows. In Section 2, I review the key problems that arose with the previous RFPS approach to equalization, with a focus on how it affected the incentives of provincial governments in setting their tax policies and how it contributed (or detracted from) stability in provincial finances. In Section 3, I consider the changes introduced by the 2004 New Framework, and I analyze alternative ways of allocating the fixed pool of funds that is now available for Equalization. Section 4 addresses the treatment of non-renewable resource revenues under the formula—a key area of controversy in the past, which has largely driven the most recent round of reforms. Section 5 concludes with some specific policy recommendations.

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2 RTS equalization: A review of the issues

This section provides an assessment of the current approach to Equalization. First, I describe the mechanics of the RTS formula, and then I review the “tax-back” effect and the incentives it creates for provinces in setting tax rates and fostering economic development. (For a more detailed treatment, see Boadway and Hobson (1993).) Finally, I provide an assessment of the role of RFPS equalization in stabilizing provincial revenue capacities, based on historical data for the period since 1982.

2.1 How it works

The RTS system is designed to allow provinces to obtain the same fiscal resources (“comparable” is the Constitutional term) when they levy the same tax rates, despite differences in the sizes of their tax bases. It pays provinces an amount in respect of each measured tax base equal to the deficiency, relative to the standard level, in the revenues it could collect from each measured base, if it levied the average of all provinces’ tax rates. At present, this calculation is done for 33 separate revenue sources, and the standard tax base is set equal to the population-weighted average of tax bases in the five standard provinces. (This Representative Five Province Standard (RFPS) was introduced in 1982, replacing the similar—but more comprehensible—Representative National Average Standard (RNAS). Under both formulas entitlements are calculated on the basis of a so-called Representative Tax System (RTS).) Equalization entitlements are then summed over the 33 categories (with some adjustments for the “generic solution” to tax-back, discussed below) and, if the total is positive, the province is paid its entitlement, subject to provisions that are intended to smooth changes in payouts for both federal and provincial governments.

The mechanics of the basic formula are most easily understood by judicious use of algebra: Consider a single tax base, for which each province p has a measured tax base X_p and collects revenues subject to equalization G_p . Let N_p be the population of each province, and let $G = \sum G_p$, $X = \sum X_p$, and $N = \sum N_p$ be the corresponding national aggregates of provincial revenues, tax bases, and population. The RTS system calculates the national average effective tax rate $\bar{t} = G/X$ and determines the standard per capita tax base X_s/N_s .¹ The entitlement of each province i in respect of the tax base is then

$$E_p = \bar{t} \left(\frac{X_s}{N_s} - \frac{X_p}{N_p} \right) N_p$$

That is, each province’s entitlement equals its deficiency in per capita tax base, multiplied by the national average tax rate and by its population. Thus if all receiving provinces do levy the national average tax rates, then their revenues after equalization will indeed be equal.

But even this extended summary of the system hides important complexities in the determinants of actual transfers. Most important of these is measurement of actual tax bases X_p . Since in the absence of tax collection agreements for most bases provinces can and often do define their own bases quite differently, there is apt to be little agreement on the measurement of deficiencies (Boadway, 1998, 2004). Furthermore, for many revenue sources there is no natural definition of the base (lottery revenues, municipal property taxation, and the sale of rights to oil on Crown lands are a few that have caused difficulties), so that proxy measures must be agreed upon and adopted. Most importantly, the same economic notion of tax base (e.g. “oil royalties”) may have very different potential to raise revenue in different provinces, so that comparative deficiencies of provinces are hard to calculate.

¹Under the RNAS, $X_s/N_s = X/N$, while under the current RFPS the summations are over only the five standard provinces—which exclude Alberta and the Atlantic provinces.

This consideration lies behind the proliferation of revenue sources incorporated separately in the formula, up from just three at the inception of the program in 1957 to the current 33. The profusion of bases—and, in particular, separate calculations of entitlements for a number of closely related bases—may be perplexing to outside observers. When an existing category is separated in two, entitlements of a receiving province increase if it has a smaller measured deficiency on the new category with the lower average tax rate; entitlements decrease if the opposite is true. What principles determine how narrowly categories should be defined? Loosely, if it is feasible and appropriate to tax two categories in similar ways and at similar rates, then the two are comparable sources of fiscal capacity and should be combined in the calculation. When the two are non-comparable—for example, when efficiency considerations dictate that one category be taxed at a substantially lower rate—then separate calculation may be called for. One suspects, however, that actual decisions about categories often depend on implications for the “bottom line” of Equalization, as much as on such abstract principles. The issue is important, because separate calculation for component bases that exist in only a few provinces (such as the offshore oil categories) exacerbate the incentive problems associated with tax-back. I return to this below.

Doubtless, the complexity of the formula has contributed to the view that Equalization is “non-transparent” and therefore less subject to democratic accountability than other government policies. It is sometimes suggested that non-transparency is desirable, in that it sublimates political conflict and negotiation over the size of intergovernmental transfers. To an outsider, this argument is unconvincing. Interested parties may easily calculate the effect of changes in program parameters on entitlements, and the complexity of the formula gives scope for unlimited conflict over transfers disguised as debate over technical changes. Thus a significant advantage of an aggregative approach to calculating entitlements is that it focuses debate on a small number of parameters, the representing the extent to which broad categories of economic activity are to be compensated through transfers.

2.2 The tax-back problem

Since RTS equalization is designed to transfer revenue capacity to have-not provinces, it is not at all surprising that increases in a receiving province’s own-source revenues tend to decrease its equalization entitlements. But this “tax-back” phenomenon has struck many in the governments of receiving provinces as excessively punitive. And it has led others to worry that the program distorts fiscal policy incentives for receiving governments, just as a redistributive income tax might be held to create work disincentives for individual taxpayers. There are two aspects of the problem, called “rate tax-back” and “base tax-back,” which I describe in turn.

Rate tax-back. Because RTS equalization is calculated on the basis of deficiencies in *tax bases* multiplied by national average tax rates, the program creates no direct incentive for provinces to reduce their tax rates, as would a system that directly equalized own-source revenues, such as Germany’s *Finanzausgleich* (see Barette, Huber, and Lichtblau, 2000). But such a “tax effort” disincentive does arise for individual revenue categories in which most or all of the tax base is in a single receiving province.² In these cases, the national average tax rate changes nearly proportionately to changes in the province’s own tax rate (in the limit the two are equal), so that increases in own-source revenues cause dollar-for-dollar decreases in equalization entitlements. If the province is not in the standard (the obvious example is the offshore oil categories), the problem is extreme:

²Courchene (1984) explains these considerations at length. Since even a province with a small share of the national base can exert some influence on the national average rate, these incentives exist throughout the system, but they are probably small enough in most cases to be ignored—perhaps even for Quebec. Thus I focus on the extreme case.

since the standard base is equal to zero, the province will receive zero net revenue from the base, regardless of what tax rate it levies. Certainly, this creates incentives for changes in provincial tax mix—with higher tax rates on categories in which the province records a base deficiency, or in which the province's share of the base is small, compensated by lower tax rates where the rate tax-back effect is in operation.³

While cases of this are rare, they do occur, especially given the tendency to establish new revenue categories in the formula for bases which receiving provinces tend to tax at rates below the national average. (The alternative of folding the bases into broader categories would substantially reduce the rate tax-back problem but, as discussed above, would have a very negative effect on the entitlements of affected provinces.) Since 1993, the federal government has adopted the “generic solution” to the problem, which applies when 70 per cent of any base accrues in a single province. In such cases, only 70 per cent of revenues in the category are subject to equalization. In effect, the tax-back rate is thus reduced from 100 to 70 per cent.

Base tax-back. While the rate tax-back problem is rare, the base tax-back problem is pervasive, and it has the potential to create much more serious harms in provincial taxation decisions. Courchene (1994) pointed out that, since RTS equalization pays provinces for the deficiency in tax bases, multiplied by national average rates, an increase in the tax base of a receiving province is also taxed back through the formula. If the province levies the national average rate on its own base, the effective rate of tax-back as a percentage of revenues is exactly 100 per cent. If the provincial rate is below the national average, however, then tax-back even exceeds 100 per cent. Thus, Courchene argued, the RTS formula deters governments in receiving provinces from attracting new investment and developing new revenue sources. As such, the program may create a “cycle of dependency” for receiving governments. He proposed that the generic solution of partial equalization be extended to all bases to deal with the disincentive problem. It is worth noting however that the extent of base tax-back is likely to change substantially as an unintended consequence of the 2004 New Framework; see the discussion in Section 3 below.

Smart (1998) argues that the adverse incentive effects of Equalization are even more extensive and potentially harmful: under an RTS formula, receiving provinces have a financial incentive to drive local tax rates higher than is desirable from a national point of view. Importantly, unlike the usual tax-back problems, this incentive applies even when a province is small and has a small share of national revenues for a base. The reason is that measured tax bases will generally decrease as tax rates rise—for instance as higher taxes are capitalized in property values and as economic activity moves to other jurisdictions, or to more lightly taxed transactions. Consequently, local governments that raise their tax rates will see their tax bases depressed and their transfers rise in consequence. (Since one way governments may attract new investment is by offering tax cuts and other financial incentives, this argument is really just a concrete example of how Courchene's disincentive effect might operate.) This effect is clearest when considering a receiving province with a tax rate equal to the national average for the base: At this point, as Smart (1998) shows, further increases in the rate will generate increases in transfers that exactly compensate for the dollar value of “deadweight” economic losses resulting from higher tax rates. Thus Equalization tends to drive tax rates in receiving provinces above the national average. As well, Equalization creates incentives to change the *tax mix*: provinces can increase federal transfers by relying more on tax bases that are very elastic or which have high national average tax rates, and less on other bases.

³Recent statements by Premier Williams of Newfoundland suggest that rate tax-back has indeed lowered the royalty rates levied on Newfoundland's offshore energy projects. See “Oil patch irked at Newfoundland,” *National Post*, June 6, 2005, p. FP1.

Of course, federal transfer policies that induce higher levels of tax effort by local governments need not always be welfare-decreasing for the nation—if equilibrium local tax rates are lower than the rates that would be chosen by a welfare-maximizing central planner for the nation. Köthenbürger (2002) and Bucovetsky and Smart (2005) consider an environment in which competition among local governments for a mobile tax base tends to drive local tax rates lower than a unitary decision-maker would choose: A tax cut by a single region causes an inflow of the tax base to the region, which mitigates the revenue loss of the tax cut, but at the expense of government revenues in other regions; this fiscal externality creates an inefficiency in the supply of public goods to the nation. An RTS capacity equalization grant, by changing the fiscal consequences of a tax cut in the way just described, can be shown to have a remarkable effect in limiting this type of harmful tax competition. In the presence of equalization, the increase in the local tax base caused by a tax cut also reduces the deviating government's entitlement under the grant formula. This offsets the impact of the tax cut on own-source revenue, and so tends to increase equilibrium tax rates of all regions.

An emerging empirical literature provides some evidence of the tax-raising effects of capacity equalization. Boadway and Hayashi (2004) report that provinces in Canada that receive equalization are more inclined than others to raise business tax rates when the national average rate goes up, as the theory predicts. This is consistent with the notion that Equalization insulates receiving provinces from the pressures of tax competition and so allows them to set higher rates. Esteller and Sole (2002) finds a similar effect for personal tax rates in Canada too. Dahlby and Warren (2003) report that equalization grants induce higher levels of taxation by state governments in Australia, and Buettner (2005) finds the same for the municipal business taxes that are equalized in many German states.

Less formally, there is anecdotal but convincing evidence that, in a small number of cases, Equalization considerations have largely determined some provincial policy decisions. The protracted negotiations over development of the Voisey's Bay nickel deposit in Newfoundland is an apposite case. It seems plausible to think that there is some effective tax rate on royalties from the project at which both Inco and the Government of Newfoundland and Labrador would prefer to see the project undertaken. But the current formula drives a wedge between the rate that is paid by Inco and the rate received by Newfoundland—the difference being the national average rate for the base that is effectively paid to the federal government through the tax-back effect.

The existence of these distorted incentives for provincial tax policy create a *prima facie* case for an Equalization formula with a relatively small number of categories. While an aggregative approach entails some loss in fairness in the interprovincial distribution of transfers, it also reduces the incentive to distort the provincial tax mix to exploit the Equalization formula.

2.3 Predictability and stability

More recently, critics in provincial governments and academic circles have also argued that Equalization payments are unnecessarily volatile, inhibiting stabilization of revenues and making fiscal planning more difficult for provincial governments. This objection gained particular currency following the sharp decline in Equalization entitlements in the 2004-05 fiscal year. While that change may prove to be transitory, it raised broader issues of the design of the Equalization formula and its implications for risk sharing among governments in Canada.

Detailed analysis of provincial data by Boothe (2002), Boadway and Hayashi (2004), and Smart (2004), among others, shows that Equalization has indeed tended to increase year-to-year volatility of provincial finances. Table 1, adapted from Smart (2004), summarizes the evidence. In the table, I measure volatility by the standard deviation of year-over-year changes in provincial revenues,

Table 1: Equalization and volatility, 1982-98

	Standard deviation of annual change in:			
	Actual revenues		Fixed-rate yield	
	Own-source revenues	Equalized revenues	Own-source revenues	Equalized revenues
	(1)	(2)	(3)	(4)
- 1999 dollars per capita -				
Newfoundland	119.97	181.51	82.97	141.73
Prince Edward Island	122.14	192.34	96.78	133.74
Nova Scotia	121.49	175.50	74.06	119.66
New Brunswick	173.93	249.37	116.44	132.12
Quebec	128.44	156.77	76.94	112.32
Manitoba	202.44	269.21	101.58	115.20
Saskatchewan	356.28	410.21	122.51	121.92
All receiving provinces	187.79	241.14	96.04	123.39

before and after Equalization transfers.

In all provinces, the volatility of equalized revenues is in fact greater than the volatility of own-source revenues. For the seven receiving provinces taken together, the standard deviation of per capita equalized revenue changes is 241.1, about 28 per cent higher than the 187.8 standard deviation of own-source revenue changes. But the effect is especially pronounced in the Atlantic provinces, where volatility of equalized revenue changes exceeds that of own-source revenue by about 50 per cent. On this basis, then, one may conclude that Equalization has a destabilizing effect on provincial finances.

Figure 1 gives an indication of one source of volatility: the fiscal situation of the province of Ontario. The figure graphs the fiscal capacity of various provinces over the 1982-2004 period. Fiscal capacity is here defined in the same way it is for the purposes of Equalization: as the per capita revenues a province would have if it applied the national average tax rates to its own bases. The figure shows the average yield of the Equalization-receiving provinces together with the yield of the five-province standard (RFPS); the difference between this is the average per capita Equalization entitlement. The figure also shows the per capita yields of the non-receiving provinces, Ontario and Alberta. Notice that the RFPS yield moves closely with Ontario's yield—as expected, given the large share of Ontario in the population of the five standard provinces. In contrast, the standard is unaffected by the far more volatile capacity of Alberta, which has been excluded from the standard since 1982.

The figure shows the extent to which changes in Equalization entitlements reflect changes in Ontario's fiscal capacity (and through it the standard), rather than changes in capacity of the receiving provinces themselves. This effect has been especially pronounced during the the economic downturns of 1981-82, 1991-92, and 2002-03.⁴ Naturally, such changes appear capricious to of-

⁴The aggregate capacity data cannot indicate, however, to what extent the recent decline in RFPS entitlements reflects a decline in Ontario's tax bases, rather than a decline in Ontario's tax effort – since Ontario likewise has a large share in the national average tax rates that are the basis for the yield calculations. More detailed data suggest, however, that is

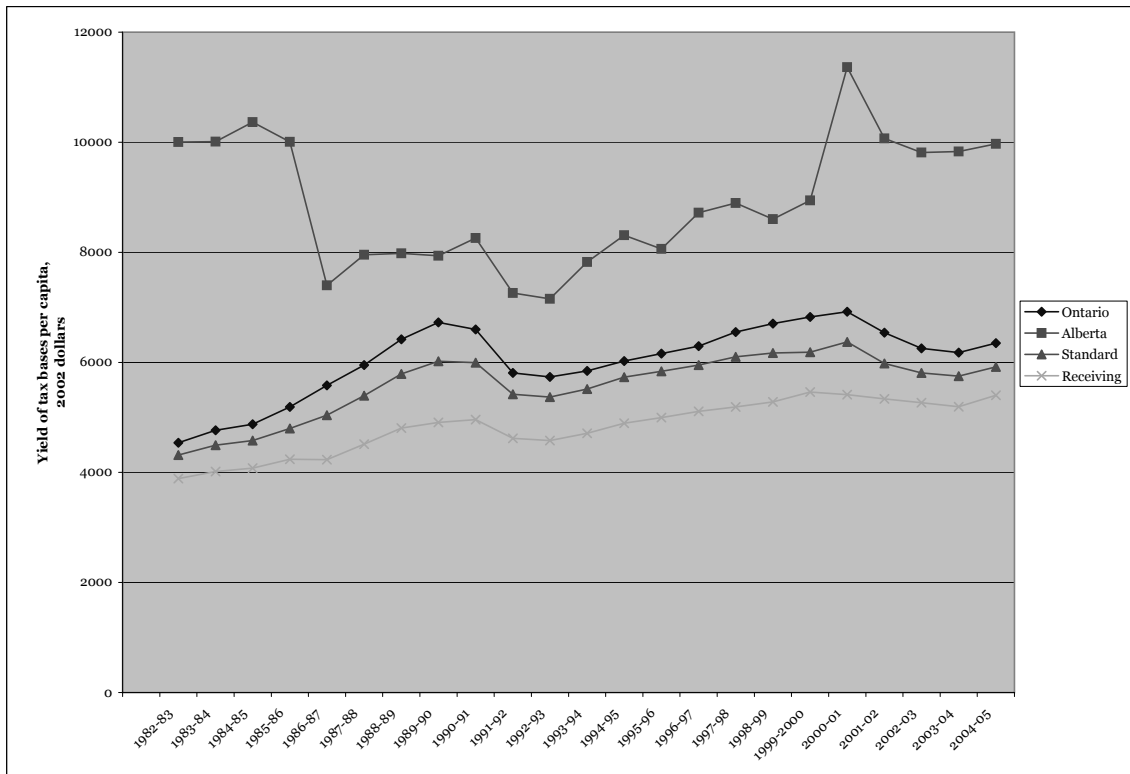


Figure 1: Provincial fiscal capacities, 1982-2004

ficials in the receiving provinces, whose own fiscal needs are scarcely reduced when Ontario’s fortunes decline. But could a different scheme do better? Any equalization arrangement that is defined on the basis of provincial revenues and tax bases has the potential to “insure” governments against idiosyncratic risks of shortfalls in their own revenues, but it can do nothing to eliminate the risk of changes in the aggregate of revenues for all provinces.

Applying the theory of optimal risk sharing, Smart (2004) argues that the best such schemes should expose all provinces to nation-wide fiscal risks in exactly the same measure. Put simply, the dependence of transfers on the measured tax bases of non-recipient standard provinces like Ontario is not only unavoidable, it is efficient. Variation in national average revenues represents non-diversifiable risk for the provinces, which should be shared by all. The Equalization program in this perspective must be judged by its ability to insure provinces against idiosyncratic risks to their revenues, rather than nation-wide risks. This perspective leads to a rather different assessment of the current system. Controlling for aggregate risks, I find that Equalization insured receiving provinces for about 58 per cent of the idiosyncratic shocks to tax capacity that they faced in the 1982-98 period.⁵

At first glance, the move to a fixed pool of equalization funds under the 2004 New Framework appears likely to improve stability. But this view rests on a fundamental misconception: the goal should be stability in receiving provinces’ *net revenues* and not in Equalization transfers themselves. The goal should therefore be transfers that are highly responsive to changes in a receiving province’s own fiscal capacity, but not to extraneous events. Whether the New Framework will improve

has been base declines rather than rate declines that are behind the fall in Ontario’s yield.

⁵This is consistent with the variance decompositions in Boadway and Hayashi (2004), who find that much of the volatility in equalized revenue can be attributed to the volatility of standard tax capacity.

stability is therefore in doubt. I return to this issue below.

3 The 2004 New Framework: Conceptual issues

In October 2004, the federal government announced a “New Framework” for Equalization, which specifies a fixed pool of funds to be allocated to the program. Total transfers for the 2005-06 fiscal year are to be \$10.9 billion (compared to estimated entitlements of \$8.9 billion for 2004-05 under the old RFPS formula), and the pool is to grow by 3.5 per cent annually through 2014.

This change in the program, while seemingly straightforward, represents a major departure from the principles that have driven the program since its inception in the 1950s, and it has the potential to change much of what we think we know about how the program works. In this section, I take the fixed-pool approach as a given, and I ask how the distribution of funds will differ, and what are the implications for provincial incentives and economic allocations more generally.

The answers to these questions evidently depend on how the formula is perturbed to make total entitlements equal to the fixed pool to be allocated. Thus far, balancing the equalization pool has been achieved by scaling up each province’s entitlement by an equal percentage amount. Many commentators (and some provinces) have criticized this approach, arguing that it is more appropriate to use the extra funds to increase the notional yield of the representative tax system—in effect paying the supplementary funds to receiving provinces as equal per capita lump-sum amounts. For example, in 2004-05, (old) RFPS entitlements totalled \$8.9 billion while the pool of funds was set at \$10 billion, or 12 per cent higher. Instead of increasing payments to each province by 12 per cent, as has been done, under the alternative per capita approach, equalization payments to each of the eight receiving provinces could have been increased by about \$68 per capita. I consider the two approaches in turn.

Scaling RFPS entitlements. Evidently, the percentage scaling approach currently in use makes no sense from an RTS perspective, since it in effect raises the poorest provinces to higher equalized fiscal capacities than the better-off receiving provinces—the scaling approach “over-equalizes” capacity differentials. As well as creating inequities among receiving provinces, the scaling approach may exacerbate the existing incentive problems under the RFPS formula. By increasing entitlements in each revenue category proportionately, the scaling approach increases by the same percentage the rates at which tax-rate increases and base increases are “taxed back” from provinces through the Equalization formula. To gauge the magnitude of this effect, suppose that the fixed-pool approach will increase entitlements by about 20 per cent on average over RTS levels in future years. Currently, the “generic solution,” meant to deal with the rate tax-back problem, applies when a receiving province has more than 70 per cent of the national base in some category. With 20 per cent scaling of equalization, the generic solution should therefore henceforth be applied when a province has at least 58 per cent ($= 70\%/120\%$) of a category. A detailed look at the Equalization data shows that, with this threshold, the generic solution should also have applied in 2004-05 to Forestry Revenues in British Columbia and to Water Power Rentals in Quebec.

Scaling the standard. Under the alternative approach, the per capita standard capacity would simply be increased until the entitlements of the receiving provinces exhaust the fixed pool of available funds. This approach seems most consistent with the RTS approach, since it continues to measure fiscal need in the same way, and merely changes the level to which fiscal capacity is

equalized.⁶ But scaling the standard too would have substantial effects on the mechanics of the formula, on interprovincial equity and, perhaps, on the incentives faced by receiving governments.

To see this, it is helpful to fix ideas with some judicious use of algebra. Extending our earlier notation to the more realistic case of multiple revenue categories, let X_p^k denote the measures capacity (tax base) of province p in revenue category k , and G_p^k its corresponding tax revenue. Likewise, let $\bar{t}^k = G^k/X^k$ be the national average effective tax rate on base k , the rate at which capacity differences are equalized under the RTS. Let S be the set of provinces in the five-province standard and R be the set of provinces that receive equalization. Variables subscripted by R represent aggregated over the set of receiving provinces and, as before, variables subscripted by S are aggregates over the set of standard provinces.

With this notation, the total entitlement of receiving province p under the (old) RFPS formula can be written

$$E_p = \sum_k \bar{t}^k \left(\frac{X_S^k}{N_S} - \frac{X_p^k}{N_p} \right) N_p \quad (1)$$

Under fixed-pool equalization, an aggregate pool \bar{E} is to be divided among the receiving provinces. As suggested above, suppose that the fixed pool is to be allocated by calculating each province's entitlement under the old RTS formula, and then increasing per capita entitlements of all recipients equally until the pool is exhausted. (This is equivalent to increasing the standard fiscal capacity.) Each province's transfer under such a formula can therefore be written

$$E'_p = E_p + \frac{N_p}{N_R} (\bar{E} - \sum_{j \in R} E_j) \quad (2)$$

In the appendix, I show that equations (1)–(2) imply that each province's transfers under the fixed pool formula are:

$$E'_p = \frac{N_p}{N_R} \bar{E} + \sum_k \bar{t}^k \left(\frac{X_R^k}{N_R} - \frac{X_p^k}{N_p} \right) N_p \quad (3)$$

Comparing this expression to (1), it is apparent that Equation (3) shows **each province's fixed-pool entitlement is equivalent to an equal per capita lump-sum grant, plus an RTS equalization transfer on a net basis, where the receiving provinces themselves comprise the standard.**

This has a number of implications for Equalization, including:

1. *The irrelevance of standards:* Equation (3) implies that RTS standard capacity X_S/N_S becomes *irrelevant to the determination of fixed-pool entitlements*. For example, a switch from the current five-province standard back to the ten-province or national-average standard, while raising equalized fiscal capacity by about \$300 per capita, would decrease all provinces' supplementary entitlements to the fixed pool by an equal amount, and hence would be neutral overall. Thus the move to a fixed pool has put to rest a long-standing and perennial controversy of the Equalization program.
2. *Rate tax-back disincentives:* These may in principle be different under the fixed-pool approach. Under the old RFPS approach, rate tax-back tends to be strongest when a large share of the national base accrues to a receiving province that is not itself in the standard. In the extreme case where 100 per cent of the base accrues to a non-standard receiving province (offshore oil), RFPS equalization is equivalent to a pure revenue pooling scheme, with very weak incentives for increasing tax rates. Under the fixed-pool approach, the effective standard is the

⁶Indeed, it might be argued that such an approach was implicitly adopted in 1982, when the five-province standard was adopted in place of the more logical (and higher) national-average standard.

Table 2: Rate tax-back percentages, selected categories, 2004-05

Revenue category	Province	Fixed pool system	RFPS system
Heavy Third-tier Revenues	Sask.	86	88
Heavy Oil Revenues	Sask.	42	44
Forestry Revenues	B.C.	36	43
Mineral Resources	Sask.	34	34
Water Power Rentals	Que.	18	32
Third-Tier Oil Revenues	Sask.	31	32
Heavy Third-tier Revenues	B.C.	-24	-15
Forestry Revenues	Que.	-20	-8

Notes: The left-hand column of numbers shows simulated rate tax-back percentages for selected revenue categories in 2004-05, if the fixed-pool approach had been implemented by raising the standard, rather than scaling entitlements proportionately. The right-hand column shows tax-back percentages under the old RFPS system for purposes of comparison.

Source: Equalization tables and author's calculations.

average of receiving provinces, so that the extreme cases are eliminated and the “generic” tax-back problem is mitigated. In general, the move from RFPS to the fixed pool approach will cause rate tax-back disincentives to fall where the per capita average tax base in receiving provinces is less than the per capita tax base in the standard provinces, and to increase where the converse is true.⁷

Since by definition receiving provinces have average capacity lower than the five-province standard level, rate tax-back must decline on average, although there may be a few cases in which it will rise. In practice, however, tax-back rates are currently very similar under RFPS and fixed-pool equalization. Table 2 reports the revenue categories and provinces for which tax-back is most important—using data for the 2004-05 fiscal year, but calculating tax-back rates for the old RFPS system, and for the simulated system in which the fixed pool of funds is allocated by scaling the standard, rather than scaling entitlements. Calculated tax-back rates are generally quite similar under the two approaches, though somewhat smaller under the fixed-pool approach. Indeed, fixed-pool equalization for the first time creates significant incentives for provinces to *increase* their tax rates in some categories—notably Forestry Revenues in Quebec.⁸

3. *Base tax-back disincentives*: Potentially more significant are the implications of the fixed pool approach for base tax-back disincentives. Under the RFPS, base tax-back for the non-standard (Atlantic) receiving provinces was extreme: each dollar in additional own-source revenues gained through expanded tax bases led to a one-dollar decline in the province's Equalization

⁷Recall that the rate tax-back percentage is defined as the amount by which a province's Equalization entitlement falls in cents, given a tax rate increase that causes own-source revenues to rise by one dollar. I define the tax-back rate algebraically in the Appendix.

⁸This occurs because Quebec's capacity exceeds the standard, and the RFPS yield exceed the average yield among receiving provinces.

entitlement.⁹ Since all receiving provinces effectively would become part of the standard under the fixed pool approach, tax-back percentages for these provinces must fall, although trivially so, given their small populations. For Quebec, however, the effect is more dramatic. Under RFPS, Quebec faced a tax-back rate of roughly 70 cents for each dollar increase in revenues through base enhancements—given that Quebec formed part of the standard and comprised about 30 per cent of the standard population. Under the fixed-pool approach, the extent of base tax-back will depend on which provinces receive Equalization. If only six provinces are recipients (i.e. excluding Saskatchewan and British Columbia), then Quebec’s share of the standard population rises to 68 per cent, and its base tax-back rate correspondingly drops to 32 cents on the dollar.

A reduction in base tax-back may not be an unmitigated blessing to the nation if, as argued earlier, Equalization plays a role in discouraging harmful tax competition among the provinces (Bucovetsky and Smart, 2005). For example, governments in Quebec have traditionally undercut Ontario’s corporate tax rates, in an apparent attempt to attract business investment to the province. While the tax differential has declined in recent years, Quebec governments may choose to revisit the option in future, given that an expanded corporate tax base would no longer be “taxed” to the same extent through the Equalization program. And, while policies designed to attract business investment from abroad may well be desirable, policies that serve to divert activity from one province to another most assuredly are not.

4. *Economic and political risks:* The fixed-pool approach has implications for the fiscal risks faced by receiving provinces too. Recall that, under the RFPS approach, a point of contention was the dependence of the equalization standard on Ontario’s tax base yield, and the resulting unpredictability of entitlements. Under the fixed pool approach, Ontario’s place as the driver of the standard would be taken by Quebec, and volatility of an individual province’s entitlements might rise or fall, depending on whether its tax bases vary more closely with Ontario’s bases or with Quebec’s. More generally, the move to a fixed pool certainly reduces the federal government’s fiscal risks, but it introduces a new set of interdependencies among the receiving provinces that may prove to be destabilizing over all.

With these interdependencies comes a new set of “political” risks of future reforms to the system, that may overshadow the underlying economic risks that exist with the current formula. The New Framework agreement might be seen as the next logical step in a long-term federal strategy to convert major transfers to the provinces into block grants, which began with the elimination of the matching grants of Established Programs Financing in 1977 and of the “capping” of the Canada Assistance Plan in 1990, and has continued with the move to equal per capita grants for health and social services of the Canada Health and Social Transfer (CHST) during the late 1990s. Block grants appear to have the virtue of stability and predictability for both federal and provincial governments. In fact, as argued in Smart (2005), actual experience with the CHST shows there has been very little predictability, as the federal government has proved unable to commit to previously announced funding levels, and transfers rise in response to provincial spending and the bargaining stances of the premiers. There is the potential for the same experience with the New Framework, as the level of Equalization transfers no longer responds automatically to changes in fiscal need of receiving provinces. As a consequence, the federal government may be more prone to accept further changes to the formula, or to negotiate further bilateral “side deals” with individual provinces, than if the pool of funds available for equalization changed automatically, as in the RTS system.

⁹Throughout this section, for simplicity, I discuss base tax-back calculations for a province with effective tax rates equal to the national averages.

One alternative, much used in other countries, is to link equalization and other transfers to the yield of major federal tax bases. For example, a certain share of federal income or value-added revenues might be earmarked for transfers to the provinces. This has the advantage of making federal spending commitments responsive to changes in its own revenues, and might strengthen the federal government's capacity to commit to a particular set of fiscal arrangements for the long term. Its implications for the stability of overall provincial finances are another matter, which is however beyond the scope of this paper.

4 The taxing problem of natural resource revenues

Since its inception, much of the controversy about the Equalization program has concerned the treatment of non-renewable natural resources under the formula. In this section, I consider two possible reforms to the current treatment: (i) partial equalization of differences in resource fiscal capacities, and (ii) equalization of resource revenues on the basis of a single, aggregate measure of fiscal capacity in place of the current 14 separate categories.

4.1 Partial inclusion

Recently, some commentators have called for a reduction in the fraction of non-renewable resource revenues that are subject to Equalization—a return to a system experimented with in the 1970s but abandoned with the introduction of the RFPS in 1982. The basis for Equalization has long been the representative tax system approach, which holds that differences in fiscal capacities between provinces are most appropriately valued at the average of provincial tax rates for each category.¹⁰ In this perspective, partial inclusion of resource bases makes sense only to the extent that it is felt that actual provincial resource taxes are higher than optimal, so that differences in capacity will be compensated “as if” rates were reduced. In fact, resource tax rates in Canada are low compared to other industries and other countries (Department of Finance, 2003), so that partial inclusion is extremely difficult to justify within the context of the RTS. Moreover, as argued by Boadway and Flatters (1982), the case of equalization payments to preserve efficient functioning of national labour markets is stronger for source-based taxes like resource rents than for residence-based taxes like personal income and consumption taxes.

Nevertheless, a number of arguments have been adduced in favour of partial equalization of resources, including:

1. Compensation for depletion of resource stocks: In this view, associated with Boessenkool (2001), equalization of resources is inappropriate because revenues represent depletion of a stock rather than a pure income flow. But endowments of resource assets should be equalized, either (implausibly) on a once-and-for-all accrual basis, or on a cash-flow basis, when revenues are realized. The argument cannot be used to justify a complete exemption of resources.
2. Solving incentive problems: Courchene (2004) and others have argued forcefully that the current treatment creates pernicious incentive problems in a number of resource categories and suggested partial inclusion as a way of reducing tax-back rates. Perhaps, but tax-back rates tend to be higher for resource categories than for others simply because these categories have been defined extremely narrowly—the introduction of province-specific offshore

¹⁰Indeed this approach has some justification in the theory of optimal taxation; cf. Dahlby and Wilson (1994).

oil categories is just the logical limit of the proliferation of resource bases that has been taking place since the 1970s. The alternative is to look for one or more aggregative measures of resource tax capacity that would treat all provinces fairly and which would insure that no province faced confiscatory tax-back rates in any particular category. I address this alternative further below.

3. Costs of developing resource bases: Courchene has also argued that tax-back has deterred provinces from undertaking investments (in roads and other infrastructure) to develop resource revenues. While that is likely the case, the same argument might be applied more broadly—to argue, say, in favour of deductibility of expenditures on public education from personal income tax revenues for Equalization purposes.¹¹ To the extent the problem arises particularly for resource bases, it could be addressed through better measurement of resource value-added, in the context of the current RTS approach to equalization, while preserving full inclusion of revenues.
4. Fiscal costs of full equalization: Full equalization of resource capacity differences was under the old RNAS approach extremely expensive for the federal government—a pragmatic consideration that has no doubt increased the allure of partial inclusion over the years.¹² The issue would not arise if Equalization were, as in other jurisdictions, implemented on a “net” basis, with above-average provinces paying horizontal transfers directly to below-average provinces. But Canada’s gross-basis system equalizes only up to the standard level, with transfers financed through federal (non-resource) taxes. The result is that Alberta’s energy revenues drive Equalization entitlements higher,¹³ which in turn raise federal tax burdens, which are borne disproportionately by Ontario taxpayers. The effect is large: rough calculations for the 2004-05 fiscal year suggest that, if Equalization transfers are held to be financed through increases in basic federal tax, then Ontario taxpayers contributed about \$4.5 billion to financing the program, an Alberta taxpayers about \$1.2 billion. If these provinces’ contribution were proportional to the excess of their fiscal capacities over the average, as in a net system, however, these figures would be virtually reversed. In effect, then, Canada’s system transfers about \$3 billion from Ontario to Alberta, relative to a net equalization system. Thus Canada’s gross-basis system exacerbates fiscal inequities between the “have” provinces even as it reduces them among have-nots.

Implications of a fixed equalization pool. As noted above, under the fixed pool of funds of the New Framework, Equalization reform is now (nearly) a zero-sum game, which necessarily produces losers as well as winners among the receiving provinces, relative to the status quo. It is therefore useful to ask how partial equalization would affect the distribution of entitlements among provinces—since this calculus will inevitably affect the negotiating stances of the provinces and the likelihood of implementing such a reform.

Based on 2004-05 data, and any reasonable projections for the future, partial inclusion must necessarily reduce transfers to five of the eight potential receiving provinces, which currently have positive entitlements in respect of non-renewable resources. For resource-rich Saskatchewan and

¹¹I thank Tracy Snoddon for pointing this out.

¹²Some clarification is in order. In years when resource-rich Saskatchewan and British Columbia have received Equalization, inclusion of resource bases in the formula has in fact *decreased* aggregate payouts under the formula. But when resource revenues rise sufficiently to make these provinces non-recipients, further increases raise the entitlements of all receiving provinces but Newfoundland, and hence increase aggregate payouts substantially.

¹³Although Alberta is excluded from the five-province measure of tax capacity, its revenues affect entitlements by influencing the calculated national-average tax rates.

British Columbia, a move to partial inclusion is unambiguously desirable, since it increases the probability that these provinces qualify for Equalization payments, and increases the expected payment in the event that they do. The strategic situation for Newfoundland is more complicated. As a resource-rich province relative to other recipients, Newfoundland currently has a negative entitlement for non-renewable resources and would benefit directly under the fixed-pool system from partial inclusion. On the other hand, a move to partial inclusion would increase the probability that the fixed pool would be “shared” with Saskatchewan or British Columbia, reducing Newfoundland’s entitlement indirectly. Could this effect ever dominate, leading Newfoundland to prefer full inclusion? The answer is almost certainly no: since the western provinces also have higher fiscal capacity for non-resource bases than average for receiving provinces, the diversion of Equalization payments to these provinces would be small, even if resource revenues were excluded from the formula entirely. This suggests that partial inclusion must generate three winners and five losers—perhaps a near-run thing in federal-provincial negotiations.

Analysis of all these options is complicated by the terms of 2005 Offshore Accords and they way they interact with the New Framework of Equalization. Under the terms of its Accord, Newfoundland received an up-front payment of \$2 billion dollars to offset the first eight years of clawbacks of equalization transfers in respect of offshore oil. However, if cumulative clawbacks in the first eight years are less than \$2 billion, the difference is non-refundable. In other words, Newfoundland’s offshore revenues may prove to be subject to Equalization or not, depending on whether clawbacks are low or high. Ironically, then, reducing the inclusion rate for offshore revenues under the Equalization formula has the real potential to *worsen* revenue collection incentives for Newfoundland, if doing so reduces the cumulative clawbacks over the first eight years to less than \$2 billion.

For the federal government, the implicit gamble of the Accords is different: If the inclusion rate were reduced, then (assuming the \$2 billion threshold is exceeded) smaller offset payments would be required, as Newfoundland would benefit at the expense of the other receiving provinces. Suppose on the other hand that a single aggregate resource category were equalized under the formula, with no “generic solution” treatment of offshore oil. Then, as shown below, tax-back of Newfoundland’s offshore revenues would rise, necessitating higher federal offset payments under the Accord that would effectively be paid to the *other* receiving provinces in the form of higher Equalization entitlements!

4.2 Aggregate resource equalization

An alternative approach to the resource question is to retain full inclusion of provincial revenues, but to equalize them on the basis of a single (or a small number of) aggregate measures of resource capacity, in place of the 14 categories currently used. The chief advantage of aggregate resource equalization lies in the incentives the formula creates for provincial taxation decisions. Under the current approach, much of the capacity in many resource categories accrues to a single province, leading the “rate tax-back” incentives to lower effective tax rates, described in Section 2. As well, in other cases, the proliferation of bases exacerbates the incentives to *increase* tax rates pointed out by Smart (1998), since it affords more opportunities for provinces to distort their tax mix, increasing rates on some bases while decreasing them on others to exploit the Equalization formula. Under the aggregate approach, these incentives would be mitigated: no province would have a predominant share of the base, and no province could gain by changing relative tax rates on resource sub-categories.

The aggregate approach might also help reduce negotiation costs for future renewals of the formula. Under the current approach, provinces have much to gain and lose from “below the line” changes in the way resource capacity is aggregated and measured. The difficulties in negotiating

such changes are apt to increase in the zero-sum world of the New Framework, where technical changes that benefit one province must harm another. A move to aggregate resource equalization is in this context akin to a “tax-simplifying reform” of personal or corporate income tax systems, which purge excessive complexity and special deals from the system and return closer to first principles.

One key question is whether an aggregate formula can come close to replicating entitlements of the current RTS system, since status quo entitlements will influence negotiating stances and the likelihood of a successful reform. To shed light on this, I perform some illustrative calculations of aggregate equalization entitlements. I use actual revenue data for the 2004-05 fiscal year and, as the aggregate measure of fiscal capacity, I use gross output of each province’s Mining and Oil and Gas Extraction industry in the provincial Input-Output Tables for 2001, the most recent year available. I then compute simulated entitlements in respect of non-renewable resource revenues using a fixed pool system, assuming that the fixed pool is allocated by scaling the standard, as discussed in the preceding Section.¹⁴ I then compare the resulting entitlements to the total simulated entitlements obtained by computing each province’s entitlement for each of the 14 actual non-renewable resource categories separately and summing them.

Results of the exercise are presented in Table 3. As noted in Section 3, under fixed-pool equalization, the effective standard capacity is defined by the average capacity of the receiving provinces themselves. Therefore changes from year to year in the set of provinces receiving Equalization may have a dramatic effect on entitlements in respect of resources or any other subset of revenue categories. To deal with this, I report entitlements for two scenarios. In the first, there are eight receiving provinces, the traditional six recipients plus Saskatchewan and British Columbia—all of which did in fact receive equalization in 2004-05. In the second scenario, only the six traditional recipients are in the standard—as is likely to be the case in the next few years at least.

In the first, eight-province scenario, resource entitlements for most provinces are quite similar under both formulas. The exceptions are Newfoundland and British Columbia—whose Equalization payments would fall with aggregate equalization, as their measured surplus capacity for resources would grow—and Nova Scotia, where a current small deficiency in resources would be erased under the aggregate approach.¹⁵ The reason is that these provinces’ resource surpluses are concentrated in categories for which effective tax rates are low, relative to the average of receiving provinces. Aggregate equalization therefore “over-values” their surpluses, relative to the current disaggregated approach. Note however that the resource equalization entitlements of all receiving provinces sum to zero in either case; this is another consequence of the fixed-pool approach which equalizes the receiving provinces on a net rather than gross basis.

With only six receiving provinces, the numbers change substantially. With the exclusion of resource-rich Saskatchewan and British Columbia, the standard resource capacity falls dramatically under either formula and, with it, the entitlements of all six receiving provinces. As a result, the differences in allocation between aggregated and disaggregated approaches generally fall as well. The exception is Quebec, where entitlements would now rise by about \$200 million with aggregate resource equalization. The correct inference again is that Quebec’s deficiencies are concentrated in bases with below-average effective tax rates, relative to the other five traditional recipient

¹⁴That is, the simulated aggregate resource entitlement of province p is given by the formula

$$E'_p = (G/X)(X_R/N_R - X_p/N_p)N_p$$

where G and X are the national aggregate of resource revenues and mining gross outputs, respectively, and X_R and X_p are the corresponding mining gross outputs of the aggregate of receiving provinces and of province p , respectively.

¹⁵The simulated entitlements for the current approach do not incorporate the effects of the generic solution where it currently applies, since the generic solution would be superfluous with aggregate equalization. This renders the two sets of numbers comparable.

Table 3: Aggregate resource equalization and entitlements

	<u>8 receiving provinces</u>		<u>6 receiving provinces</u>	
	<u>current categories</u>	<u>single category</u>	<u>current categories</u>	<u>single category</u>
	- thousands of dollars -			
Newfoundland	-155,761	-284,902	-231,209	-343,183
P.E.I.	24,222	29,524	4,112	13,989
Nova Scotia	102,779	-2,601	-33,898	-108,180
New Brunswick	123,959	77,131	14,361	-7,530
Quebec	1,333,631	1,287,558	234,115	438,216
Manitoba	183,083	138,444	12,519	6,689
Saskatchewan	-868,127	-999,038	---	---
British Columbia	-743,786	-246,116	---	---
Total	0	0	0	0

provinces.

In either case, the analysis shows that the provinces with the most to lose in per capita terms from aggregate equalization are Newfoundland and Nova Scotia—those with substantial surpluses in the low-tax offshore oil categories. Of course, under the terms of the Offshore Accords, both these provinces would entirely insulated from the effects of the change (as long as the clawback thresholds are met, as discussed above), at the direct expense of the federal government. This suggests that the reform would be as close to “Pareto improving” for the six provinces as feasible in the New Framework world, creating no substantial losses in entitlements, while improving incentives and reducing complexity in the formula.

A more refined approach would attempt to measure resource rents more accurately, using value-added based measures of output, and perhaps adjusting for the cost of capital used in resource production. But the preliminary analysis above suggests that these measurement issues would be fairly minor in a world with six receiving provinces. On the other hand, no aggregative approach is likely to do very well in matching current entitlements of all eight potential recipients, because of the large differences in effective resource tax rates between eastern and western provinces.

Revenues as the base: A caveat. One simple and perhaps enticing alternative is to use actual provincial resource revenues as an aggregate measure of resource tax capacity in the formula. While this approach would guarantee a close approximation to RTS entitlements, the associated incentive problems render the approach impracticable. When actual revenues are used as the base in the calculation of entitlements under the fixed-pool approach of the New Framework, the result is a revenue-pooling formula, in which each province in effect receives an equal per capita share of aggregate resource revenue collected by the receiving provinces. (See the Appendix for an algebraic demonstration.) As a result, less populous receiving provinces would have virtually no incentive to levy resource tax rates above zero. This would be the case even if resource royalties were implemented as idealized lump-sum taxes on Ricardian rents. Even in this case, a provincial government would surely prefer to leave resource rents untaxed in the hands of provincial residents, rather than

taxing rents and transferring the revenues to other provinces. It is worth noting that, while many countries operate revenue-pooling systems of intergovernmental transfers, the approach appears never to be used to redistribute when tax rate decisions are delegated to subnational governments, as in Canada.¹⁶

5 Conclusion and policy recommendations

I conclude with a review of the specific implications of the analysis for current policy reform and in particular for the deliberations of the Expert Panel of Equalization and Territorial Formula Financing.

1. Allocating funds under the New Framework: The New Framework specifies a fixed pool of federal funding for Equalization, which seems likely to exceed the aggregate of provincial RFPS Equalization entitlements in the years to come. The initially adopted practice of increasing entitlements proportionately until the pool is exhausted makes no sense given the principles of RTS equalization that underlie Canada's Equalization program. More sensible is to increase the standard against which all province's revenue capacities are compared in calculating transfers. This is entirely consistent with the the principles of RTS equalization, since the old five-province standard was itself a departure from the previous and more logical national-average standard. Increasing the standard is equivalent to paying the additional funds to receiving provinces in equal per capita amounts, which may in any case be regarded as more equitable than scaling entitlements.
2. Incentive issues under the New Framework: Nevertheless, increasing the standard implies substantial changes in the working of the formula and in the incentives it creates for provincial governments—since as I show the receiving provinces themselves will become the new standard from which each one's entitlement is calculated. One implication of this is that tax-back rates may change substantially in the future, particularly for Quebec. In the absence of other changes to the formula, it should be insured at least that the working of the “generic solution” be adapted to the new environment. In some cases, tax-back rates may be expected to fall with the evolution of the formula—possibly with some salutary effects on provincial incentives. Nevertheless, some caution is warranted. The new formula may exacerbate incentives for receiving provinces, especially Quebec, to undercut each other's tax rates to attract tax bases across provincial boundaries.
3. Equalization of resource revenues: In the context of RTS equalization, no strong arguments on the basis of principle exist for equalizing less than 100 per cent of provincial resource revenues. The pragmatic case for partial inclusion is moreover considerably weaker than before, given the implications of the New Framework and the bilateral Offshore Accords. A better case can be made for full equalization of resource revenues on the basis of a single-category measure of provincial capacities. This would improve provincial tax policy incentives and simplify the system, while leading to only small changes in actual entitlements.
4. Macro equalization more generally: Likewise, a case can be made for computing total equalization entitlements on the basis of a small number of proxies for fiscal capacity, in place of the 33 revenue categories currently in use. Various commentators, including Courchene

¹⁶See however Barette et al. (2001) and Bird and Smart (2002) for discussion of how revenue sharing has in practice reduced the incentives for subnational government to *collect* taxes that are levied by national governments.

(1984), Boothe and Hermanutz (1999), and Smart (2002), have shown that equalization on the basis of a single measure of provincial per capita income would have come close to replicating actual provincial entitlements under the RFPS. Closer still would be an alternative formula that used a small number of proxy measures, including perhaps personal income or consumption, corporate income, and a measure of resource revenue capacity. Whatever measures adopted, however, it should be recognized that the objective is to find proxies to implement the objective of equalizing fiscal capacity—and not to convert the program into a means of equalizing personal incomes of provincial residents per se (Boadway, 2004).

A Appendix: The mechanics of fixed pool equalization

Implications of the New Framework for allocation. In Section 3, I claim that, if the fixed pool of funds under the New Framework is to be allocated by increasing the per capita standard until funds are exhausted, then the formula becomes equivalent to one in which each receiving province receives an equal per capita block transfer, and Equalization is on a net basis (with above-average provinces implicitly paying into the system) with the standard being defined by the average fiscal capacity of the receiving provinces themselves.

To see this, let X_p^k denote the measures capacity (tax base) of province p in revenue category k , and G_p^k its corresponding tax revenue. Let S be the set of provinces in the RTS standard and R be the set of provinces that receive equalization. I denote the aggregate of any variable over the standard provinces with subscript S , the aggregate over receiving provinces with subscript R , and the aggregate over all provinces as the same variable without subscript. Thus for example $X_S^k = \sum_{i \in S} X_i^k$, $X_R^k = \sum_{i \in R} X_i^k$ and $X^k = \sum_i X_i^k$ are the aggregate bases in standard provinces, receiving provinces, and the nation, respectively. Finally, let $\bar{t}^k = G^k / X^k$ be the national average effective tax rate on base k , the rate at which capacity differences are to be equalized.

With this notation, the total entitlement of receiving province p under the (old) RTS formula can be written

$$\begin{aligned} E_p &= \sum_k \bar{t}^k \left(\frac{X_S^k}{N_S} - \frac{X_p^k}{N_p} \right) N_p \\ &= \sum_k G^k \left(\frac{N_p}{N_S} \frac{X_S^k}{X^k} - \frac{X_p^k}{X^k} \right) \end{aligned} \tag{A1}$$

where the second equality follows from the definitions of the national average tax rates $\bar{t}^k = G^k / X^k$. This version of the equalization formula, while less familiar than the first, will prove useful for comparison to fixed-pool equalization. It can be interpreted as saying that each province is paid a transfer equal to aggregate provincial revenues in each revenue category, multiplied by the difference between its share of the national population (weighted by the ratio of the per capita standard tax base and the per capita national tax base) and its share of the national base.

Under fixed-pool equalization, let there be an aggregate pool \bar{E} to be divided among the receiving provinces. As suggested above, suppose that the fixed pool is to be allocated by calculating each province's entitlement under the old RTS formula, and then increasing per capita entitlements of all recipients equally until the pool is exhausted. Each province's transfer under such a formula can therefore be written

$$E'_p = E_p + \frac{N_p}{N_R} (\bar{E} - \sum_{j \in R} E_j) \tag{A2}$$

Substituting (A1) into (A2) gives an expression for each province's transfers under the fixed-pool formula:

$$\begin{aligned}
E'_p &= \frac{N_p}{N_R} \bar{E} + \sum_k G^k \left[\frac{N_p}{N_S} \frac{X_S^k}{X^k} - \frac{X_p^k}{X^k} - \frac{N_p}{N_R} \left(\frac{N_R}{N_S} \frac{X_S^k}{X^k} - \frac{X_R^k}{X^k} \right) \right] \\
&= \frac{N_p}{N_R} \bar{E} + \sum_k G^k \left(\frac{N_p}{N_R} \frac{X_R^k}{X^k} - \frac{X_p^k}{X^k} \right) \\
&= \frac{N_p}{N_R} \bar{E} + \sum_k \bar{t}^k \left(\frac{X_R^k}{N_R} - \frac{X_p^k}{N_p} \right) N_p
\end{aligned} \tag{A3}$$

Comparing this expression to (A1), it is apparent that Equation (A3) shows each province's fixed-pool entitlement is equivalent to an equal per capita lump-sum grant, plus an RTS equalization transfer on a net basis, where the receiving provinces themselves comprise the standard.

Implications for rate tax-back. Under the old RFPS approach, rate tax-back tends to be strongest when a large share of the national base accrues to a receiving province that is not itself in the standard. In the extreme case where 100 per cent of the base accrues to a non-standard receiving province (offshore oil), RFPS equalization is equivalent to a pure revenue pooling scheme, with very weak incentives for increasing tax rates. Under the fixed-pool approach, the effective standard is the average of receiving provinces, so that the extreme cases are eliminated and the "generic" tax-back problem is mitigated. On the other hand, tax-back rates are actually higher under the fixed-pool approach than under the RFPS when the per capita average tax base in receiving provinces is less than the per capita tax base in the standard provinces. This may be seen by noting that the tax-back rate, defined as (minus) the change in equalization entitlement given a one-dollar increase in own-source revenues, can be calculated as

$$\text{Rate Tax-back}_p^k = - \left. \frac{\Delta E_p^k}{\Delta G_p^k} \right|_{X_p^k \text{ fixed}} = \frac{N_p}{X^k} \left(\frac{X_R^k}{N_R} - \frac{X_p^k}{N_p} \right)$$

The corresponding tax-back percentage under the RFPS is analogous, with the standard yield X_S^k/N_S replacing the average yield of receiving provinces X_R^k/N_R . Therefore the tax-back percentage falls (or becomes more negative) if and only if $X_S^k/N_S > X_R^k/N_R$. See the main text for a discussion.

The problem with actual revenues as a proxy for tax capacity. In Section 4, I observe that actual resource revenues of receiving provinces are an inappropriate proxy for aggregate resource fiscal capacity, because using revenues as the base implicitly converts an RTS equalization formula into a system of pooling revenues of receiving provinces and paying them out on an equal per capita basis. To see this, simply compute the fixed pool Equalization formula of equation (A3), with $X_p^k = G_p^k$ (bases defined to be revenues) for all provinces p , and with national-average tax rates therefore identically equal to one: $\bar{t}^k = \sum_p G_p^k / \sum_p X_p^k = 1$. Equalization entitlements in respect of the resource bases (ignoring the other bases and the lump-sum component of the New Framework transfer) are then given by (A3) as

$$E'_p = \sum_k \left(\frac{N_p}{N_R} G_R^k - G_p^k \right)$$

In other words, each receiving province implicitly “donates” all its own-source revenues to the pool, and receives its population-weighted share of the aggregate. Such a revenue-pooling formula may result in an equitable distribution of revenues among receiving provinces, but the tax effort incentives are risible. Given its population, Newfoundland, for example, would keep for its own use only five to ten per cent of taxes levied on its own tax bases. In such an environment, it seems likely all provinces (except perhaps Quebec) would prefer extremely low rates of taxation on resource bases.

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