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THE INCENTIVE EFFECTS OF FISCAL EQUALIZATION GRANTS

BEV DAHLBY

Equalization: Welfare Trap or Helping Hand? (PAPER #4)

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Bev Dahlby is a Professor of Economics at the University of Alberta. He was born at Beechy, and grew up on a farm near Star City, Saskatchewan. He attended the University of Saskatchewan, Queen's University, and the London School of Economics. He has published extensively on tax policy and fiscal federalism. His research has appeared in the *Journal of Political Economy, Journal of Public Economics, International Tax and Public Finance, Canadian Journal of Economics,* among others. Dr. Dahlby was a member of the Technical Committee on Business Taxation (the Mintz Committee) which issued its report on reforming business taxation in April 1998. He has also served as a policy advisor to the Alberta government, worked on tax reform projects at the Thailand Development Research Institute in Bangkok, and served as a technical advisor on an International Monetary Fund mission to Malawi. He has served as an Associate editor of *Canadian Public Policy* and the editorial board of the *Canadian Tax Journal.* In 1998-99, he held a McCalla Research Professorship at the University of Alberta.

Abstract

Fiscal equalization grants may distort the fiscal policies of recipient governments because their taxes and expenditures can affect the parameters of the grant formula, thereby affecting the size of their grant. Fiscal equalization grants will tend to reduce a recipient government's marginal cost of public funds, leading to higher tax rates, excessive spending on consumptive public services, and a biased tax mix in favour of those taxes where its tax base is below the standard tax base. With regard to expenditure policy, the recipient government will tend to under-provide tax base-enhancing expenditures such as education and infrastructure.

SECTION 1
INTRODUCTION

One of the key features of the Canadian federation is the system of grants from the federal government to the provincial and territorial governments. Over the years, concern has been expressed that the fiscal equalization grants system may affect the fiscal decisions of the recipient governments. This paper provides a framework for analyzing the effects of a generic equalization grant formula on the tax and expenditure choices of a recipient government.[1] The grant formulas that are the subject of this paper compensate the recipient government when its per capita tax base, B, is below a standard per capita tax base, B_S. If the recipient government levies a tax rate equal to the "standard" tax rate, t_S, it will have access to revenues equal to $t_S B_S$. Such grant formulas can alter the fiscal incentives of a recipient government because the recipient government's tax and expenditure policies can directly or indirectly affect the parameters of the grant formula—t_S, B_S, and B—and therefore affect the size of its grant. Our analysis indicates that these types of intergovernmental grants can distort the fiscal decisions of the recipient governments in complex, and sometimes offsetting, ways.

In order to predict the effects that a grant system has on the behaviour of the recipient government, one must have a theory or framework explaining a government's fiscal choices. In this paper, it is assumed that governments select their tax and expenditure policies to maximize the well-being of the residents of the jurisdiction. This framework is briefly described in Section 2. In Section 3, we describe the potential bias that can occur to tax policy decisions. In particular, we extend the model developed by Smart (1998) which predicts that the marginal cost of public funds for the recipient government will be downward biased. This means that the government will have an incentive to over-spend on publicly-provided goods and services that are purely consumptive. In Section 4, we analyze the distortion to expenditure decisions, focusing on a model where the recipient government provides a productivity-enhancing public input. We show that the provision of productivity-enhancing goods may also be biased. The recipient government will tend to under-provide *factor-augmenting* public inputs, such as education and training. The recipient government may under- or over-provide *firm-augmenting* public inputs, such as transportation systems that enable firms to develop natural resources. The under-or over-provision of firm-augmenting public inputs will depend on the parameters in the private sector's production function, the standard tax rates in the grant formula, and the recipient government's tax rate on economic profit. Section 5 contains our conclusions.

[1] See Courchene and Beavis (1973) for an early analysis of the incentive effects of the equalization program. For more recent discussion of these issues see Smart (1998) and Boadway (1998, pp.66-70).

Section 2
A Model of Fiscal Decision-Making

In this section, we outline the model of fiscal decision-making that we will use to analyze the incentive effects of a grant scheme. We assume that politicians choose tax rates and expenditure levels to maximize the well-being of voters in their jurisdiction. One might think of this strategy as maximizing the probability of re-election for an incumbent government. To keep the model simple, we will assume that all voters have identical political preferences. One of the key concepts in this analysis is the marginal cost of public funds (MCF). The marginal cost of public funds measures the burden imposed on the private sector when the government raises an additional dollar of tax revenue. Suppose a government imposes the tax rate t on the tax base B, measured in dollars per capita. A small increase in the tax rate, Δt, will impose a burden of $B\Delta t$ and the additional tax revenue generated will be equal to $\Delta R = (dR/dt)\Delta t$. Therefore, the MCF will be equal to:[2]

$$(1) \qquad MCF = \frac{B}{\frac{dR}{dt}} = \frac{1}{\frac{1}{B}\frac{dR}{dt}} = \frac{1}{\frac{t}{R}\frac{dR}{dt}} = \frac{1}{\rho}$$

where ρ is the elasticity of tax revenue with respect to the tax rate. Another useful way of portraying the MCF is the following formula:

$$(2) \qquad MCF = \frac{B}{\frac{dR}{dt}} = \frac{B}{B + t\frac{dB}{dt}}$$

The cost of raising an additional dollar of revenue is the inverse of the elasticity of tax revenue with respect to the tax rate. If the tax base declines when the tax rate increases because it creates an incentive for taxpayers to alter their behaviour in order to avoid paying the tax, ρ will often be less than one, and the MCF will be greater than one. If the tax base is completely unresponsive to a tax rate increase, then the MCF will be equal to one. On the other hand, if the tax base is very sensitive to tax rate changes, an increase in the tax rate may reduce tax revenues, ($\rho < 0$), and the government will be operating on

[2] See Dahlby (forthcoming) for a survey of the concept of the marginal cost of public funds.

the downward-sloping part of its Laffer curve. In this case, the MCF will be said to be infinitely high, and a government should reduce the tax rate on this tax base.

Governments can usually levy taxes on a variety of tax bases, and they have to determine the tax mix, i.e. the amount of tax revenue obtained from each tax source. Three points should be made regarding the optimal tax mix. First, the optimal tax mix will occur when the MCFs are the same for all of the tax sources available to the government. If, for example, the MCF for the sales tax was 1.20 and the MCF for the personal income tax (PIT) was 1.40, then the government could reduce the total burden of collecting a given amount of tax revenue if it engaged in a revenue neutral tax reform, reducing the personal income tax rate and increasing the sales tax rate. A dollar of PIT revenue replaced by a dollar of sales tax revenues would yield a net social gain of $0.20. Second, tax bases are usually interrelated. For example, an increase in the income tax rate, by reducing disposable income, will tend to reduce consumption expenditures, and therefore sales tax revenues will decline. In measuring the MCF for a particular tax, it is necessary to take into account how a tax rate increase affects total tax revenues, and not just tax revenues from that tax source. Third, different taxes will have different distributional impacts and represent different degrees of progressivity or regressivity. Therefore, the distributional characteristics of the tax will affect its MCF. If a society places a higher value on a dollar received by a poor person than on a dollar received by a rich person, a tax that imposes a relatively heavy burden on the poor will be viewed as a "high cost" tax, and its MCF will be correspondingly high. In this paper, the distributional impact of taxes is ignored in order to simplify the models and focus on the incentive effects created by the grant systems. The distributional aspects of tax and expenditure policies do not play a key role in determining these incentive effects.

A government's optimal expenditure policy will be determined by balancing the marginal benefit that residents receive from providing an additional unit of a public service against the cost of raising the tax revenues to finance the expenditures. Let G be the number of units of a publicly-provided good or service, and let MC be the marginal production cost for this good or service. The optimal provision of the good or service will be determined by the following equation, which is known as the Atkinson-Stern condition:

$$(3) \qquad MB = MCF\left[MC - \frac{dR}{dG}\right]$$

where MB is the marginal benefit that directly accrues to residents from an additional unit of G. The dR/dG term, which is equal to t(dB/dG), is the revenue effect of the increase in G. It indicates how an additional unit of the G affects the government's total revenues through its effect on the government's tax base. Productivity-enhancing public expenditures, such as spending on education and infrastructure, tend to increase the government's tax base by making the private sector more productive. In these cases,

the dR/dG term is positive, and this reduces the net cost of providing an additional unit of this public service. If the provision of the public good is purely consumptive (such as a fireworks display), then dR/dG will be zero, and the optimal expenditure on the public good will be determined by condition, MB = MCF x MC. In some instances, the dR/dG term may be negative if the provision of the public good discourages activities that generate tax revenue. For example, public spending on recreation activity might reduce work effort and thereby reduce tax revenues.

SECTION 3
DISTORTIONS TO TAX POLICIES

As noted in the introduction, if a recipient government's tax policies directly or indirectly affect the parameters of the formula that determine the size of its grant, the grant system will tend to distort the recipient government's level of taxation and the tax mix. The potential for manipulating the Canadian equalization program through tax policy choices was analyzed by Courchene and Beavis (1973) over 25 years ago, and it has continued to receive attention from public finance economist. See for example Smart (1998) and Boothe and Hermanutz (1999).

To illustrate the potential for distorting the level of taxation, we use a simple model in which the recipient government has only one tax source under its control. Its total per capita revenues are equal to:

$$R = tB + E \tag{4}$$

where t is the tax rate chosen by the recipient government, B is its per capita tax base, and E is the per capita equalization grant that it receives. The equalization grant compensates the recipient government for a tax base deficiency and is calculated as follows:

$$E = t_s \left(B_s - B\right) \tag{5}$$

where t_s is the "standard" tax rate, B_s is the "standard" per capita tax base, and B is the recipient government's per capita tax base, with $B < B_s$. The Representative National Average Standard (RNAS) and the five-province standard, which is currently used for computing equalization payments to the Canadian provinces, are special cases of the above grant formula. Substituting the grant formula in (5) into (4), the recipient government's revenue constraint can be written as:

$$R = t_s B_s + \left(t - t_s\right)B \tag{6}$$

This way of expressing the recipient government's revenue constraint shows that the Equalization Program is equivalent to giving the recipient government a block (or lump-sum) grant equal to t_sB_s, and then reducing this grant by t_s for each dollar of tax base that the recipient government has at its disposal. If favourable economic conditions cause an exogenous increase in its tax base of ΔB, the

change in the recipient government's tax revenues is equal the difference between its tax rate and the standard tax rate times the size of the tax base change or $(t - t_S)\Delta B$. Under these conditions, an exogenous increase in the tax base may have very little impact on the recipient government's total revenues if its tax rate is close to the standard tax rate. Indeed, its revenues would decline if its tax rate were below the standard rate.[3]

The equalization grant may alter the recipient government's tax policy decisions because its tax rate may directly or indirectly affected the three parameters of the formula—t_S, B_S, and B. The recipient government's tax policy will be affected if its MCF is affected. The dR/dt expression in the denominator of the formula for the MCF will, in general, include the effect of a tax rate change on these three parameters and have the following general form:

$$(7) \qquad MCF = \frac{B}{B + (B_s - B)\frac{dt_s}{dt} + t_s \frac{dB_s}{dt} + (t - t_s)\frac{dB}{dt}}$$

We will examine each of the parameter distortions separately.

The second term in the denominator of (7) represents the effect of an increase in t on t_S. The exact effect will depend on how t_S is determined. Under the RNAS formula or the equalization formula that is currently used in Canada, t_S is a weighted average of all of the provinces' tax rates. Therefore, when a recipient government increases its tax rate, t_S will increase, thereby increasing the recipient government's grant. The dt_S/dt will be approximately equal to b, recipient government's share of the national tax base, and therefore this term will be approximately equal to $b(B_S - B)$.[4] This will give the recipient government's MCF a downward bias, which will be more severe the larger the recipient government's share of the national tax base.

The third term in the denominator of (7) represents the effect of an increase in t on B_S. The effect will depend on how B_S is determined. Under the RNAS formula, B_S is average per capita tax base in all provinces. Under the "five-province" standard that is used to compute equalization grants in Canada, B_S is the average per capita base in a subset of the provinces. Under the systems where B_S is a weighted average of some or all of the provinces, $t_S dB_S/dt$ will equal $pt_S dB/dt$ where p is the province's share of the population of the provinces used to compute the standard base. (If the province is excluded from the group that is used to determine the base, p is zero). This term is negative because any decline in the recipient

[3] The Premier Hamm of Nova Scotia recently stated his concern about the "inequity" of the current equalization formula because Nova Scotia will see relatively little net revenue gain from the increase in offshore natural gas revenues.

[4] This derivation is based on the approximation $\frac{dt_s}{dt} = b + b(1-b)\frac{t}{B}\frac{dB}{dt} \approx b$

government's tax base, caused by the increase in its tax rate, will cause B_s and its equalization grant to decline. This will produce an upward bias in the recipient government's MCF, which will be more severe the larger the recipient government's share of the population used to compute the standard base.

The fourth term in the denominator of (7) represents the effect of an increase in t on B, the recipient government's own tax base. This effect causes the recipient government to underestimate its MCF because its grant increases when its tax base declines. Therefore, the recipient government does not take into account the full distortionary cost of raising tax revenue, leading to a downward bias in its perceived MCF.[5] The recipient government's MCF is biased downward because the grant offsets the reduction in the tax base at the rate of t_s.

Consequently, if t_s and B_s are determined under a RNAS system, the MCF for the recipient government will be equal to:

$$(8) \qquad MCF = \frac{B}{B + \left[b(B_s - B) + p t_s \frac{dB}{dt} \right] + (t - t_s)\frac{dB}{dt}}$$

For a small province, b = p ≈ 0, and the recipient government's MCF is equal to $B/(B + (t - t_s)dB/dt)$ which is the formula for the MCF of a recipient government that was derived by Smart (1998). Thus if a small recipient government sets its tax rate equal to the standard tax rate, its perceived marginal cost of public funds is equal to one, even if the tax is highly distortionary. In general, Smart (1998) has shown that the downward bias in the MCF will induce for a small recipient government to spend excessively on purely consumptive goods and services. Whether the bias in the MCF for a large recipient government (such as Quebec) is larger or smaller than the bias for a small recipient government depends on whether the term in square brackets in the denominator of (8) is positive or negative. Note however that as the recipient government's share of the tax base and population becomes larger and b and p approach one and B approaches B_s, the bias in the MCF disappears.

Before going on to the next section, we will briefly consider the case where there are multiple tax bases. The MCF for a tax will have the same general form as (7), except that the formula will now include the effect that a tax rate increase has on all of the recipient government's tax bases. If the recipient government has some tax bases, which exceed the standard tax base, then the $b(B_s - B)$ term will be negative for these tax bases. This will tend to increase the MCF for those tax sources. The recipient government will respond by lowering its tax rates on those tax bases where $B > B_s$. Thus, the recipient government will increase its reliance on those tax sources where its tax base is below the standard base and reducing its reliance on those tax bases (if any) where it is relatively well-endowed.

[5] This source of bias for the MCF was first pointed out by Smart (1998).

SECTION 4
EXPENDITURE DISTORTIONS

While these tax policy distortions are well-known and have been studied by public finance economists for a number of years, the potential for expenditure distortions is only rarely discussed and has received no formal analysis.[6] In this section, we deal with these expenditure distortions.

The equalization grant system can distort expenditure decisions by changing the dR/dG term in the Atkinson-Stern condition for public expenditure determination because the recipient government's expenditures may change its own tax base, B, and the standard tax base, B_S.[7] Consequently, the revenue effect of an increase in the provision of some publicly-provided good or service is:

$$(9) \qquad \frac{dR}{dG} = t_s \frac{dB_s}{dG} + (t - t_s)\frac{dB}{dG}$$

As in the case of a tax rate change, the effect of a change in G on B_S will depend on how the standard base is determined. If B_S is based on the average tax base of a subset of provinces, then dB_S/dG will be equal to pdB/dG where p is the recipient government's share of the population of the provinces included in the standard. In this case, the revenue effect of the increase in expenditures becomes:

$$(10) \qquad \frac{dR}{dG} = [t - (1 - p)t_s]\frac{dB}{dG}$$

In equation (10), the dB/dG factor is multiplied by $(t - (1 - p)t_S)$ instead of t as it should be for optimal expenditure provision. Just as the equalization grant offsets the reduction in the tax base from a tax increase, so it reduces the revenue-generating effects of any tax base-enhancing expenditures, thereby reducing the recipient government's incentive to undertake such expenditures. Thus, equalization grants create a disincentive to spend on tax base-enhancing activities, $dB/dG > 0$, because the recipient government loses equalization payments when its tax base expands. The magnitude of this bias is larg-

[6] Boothe and Hermanutz (1999, p.5) note that "high taxback rates may discourage a province from investing in the development of economic activity associated with particular tax bases."

[7] It is very unlikely that a recipient government's expenditures would change the standard tax rate, t_S, in the equalization grant formula.

er when p is smaller. In particular, if $t < (1 - p)t_s$, the equalization system can convert a tax base-enhancing expenditure into a revenue-draining expenditure.

A. A Model with Productivity-Enhancing Public Expenditures

In order to explore the expenditure distortion in more detail, we will analyze a model where the recipient government provides a good or service that makes the private sector's labour and capital more productive.[8] Private sector output, X, is a function of the labour, L, and capital, K, employed by the private sector and a public input, G, according to the following production function:

$$X = F(L, K, G) \tag{11}$$

If this production function exhibits constant returns to scale in L and K, then production activity does not generate excess or pure profits, and the public input is said to be *factor-augmenting*. That is, the productivity of the public sector input is completely reflected in increased payments to labour and capital. (An example of a factor-augmenting public input is publicly-provided education and training.) Alternatively, if the production function is homogeneous of degree one (or less than one) in L, K and G, production activity generates pure or excess profits. In this case, the public input is said to be *firm-augmenting.* An example of a firm-augmenting activity is a public transportation project that allows the private sector to develop natural resource deposit that generates an economic rent.

The recipient government's expenditure on the public input is financed in part by a tax on the wage income earned by its residents. This wage tax could take the form of a payroll tax, an income tax or a broad sales tax. In addition, the recipient government imposes a tax on the pure profits earned in the private sector or receives a share of the economic rent from resource extraction projects. It is assumed that the firms' owners reside outside of the jurisdiction and that net profits accrue to non-residents. The labour market is assumed to be perfectly competitive, and wage rates adjust to equate the demand and supply of labour. In order to simplify the presentation of the model and to focus on the expenditure distortion, it will be assumed that the supply of labour is fixed. (It can be shown that the assumption of a fixed labour supply does not affect the results that are derived below).

[8] The model similar to one developed by Dahlby and Wilson (forthcoming) in their analysis of the vertical fiscal externalities from sub-national governments' provision of productivity-enhancing activities.

The government's per capita revenues are equal to:

$$R = t_w B_w + t_\pi B_\pi + E \tag{12}$$

where t_w is the tax rate on the per capita wage tax base, B_w, t_π is the tax rate on the per capita profit tax base, B_π, and E is the per capita equalization grant determined by the formula:

$$E = t_{ws}(B_{ws} - B_w) + t_{\pi s}(B_{\pi s} - B_\pi) \tag{13}$$

The standard tax rates for wages and profits are t_{ws} and $t_{\pi s}$, and the standard per capita wage and profit tax bases are B_{ws} and $B_{\pi s}$. It will also be assumed that the recipient government's share of the population is small so that $p \approx 0$ and the recipient government's expenditures have no impact on the standard tax bases.

Given the assumption of a fixed labour supply, the MCF is equal to one and the Atkinson-Stern condition for the optimal provision of G becomes:

$$MB = MC - (t_w - t_{ws})\frac{dB_w}{dG} - (t_\pi - t_{\pi s})\frac{dB_\pi}{dG} \tag{14}$$

In this model the direct marginal benefit from an extra unit of the public input is the increase in the net wage income that accrues to the residents or:

$$MB = (1 - t_w) L \frac{dw}{dG} \tag{15}$$

where L is the amount of labour supplied and w is the wage rate. G affects the wage rate paid to workers by raising the marginal product of labour, and therefore it indirectly affects the profits that are earned by firms. It can be shown that these effects are equal to:

$$L \frac{dw}{dG} = \phi F_G \tag{16}$$

$$(17) \qquad \frac{d\Pi}{dG} = (1-\phi)F_G$$

where F_G is the marginal product of the public input, and ϕ is the elasticity of the marginal product of G with respect to labour input. The parameter ϕ measures the extent to which an increase in G raises the wage rate by increasing the productivity of labour. If the public input is factor-augmenting (say publicly-provided education and training), then ϕ is equal to one, and labour income increases by the marginal product of G. If the public input is firm-augmenting, then ϕ is a positive number which can be greater than or less than one. When $\phi > 1$, labour income increases by more than F_G when G increases, and total profits will decline. If $0 < \phi < 1$, wage income will increase by less than F_G when G increases, and total profits will increase.

Consequently, the Atkinson-Stern condition can be written as:

$$(18) \qquad (1-t_w)\phi F_G = MC - (t_w - t_{ws})\phi F_G - (t_\pi - t_{\pi s})(1-\phi)F_G$$

This equation can be simplified to yield the following condition for the provision of the public input G:

$$(19) \qquad [(1-t_{ws})\phi + (t_\pi - t_{\pi s})(1-\phi)]\ F_G = MC$$

The left-hand side is the total direct and indirect benefit to the recipient government and its residents from a small increase in G and the right-hand side is the marginal cost of G. Efficient provision of a public input occurs when the marginal product of the public input equals its marginal production cost, $F_G = MC$. Equation (19) shows that the efficient level of G will be provided if the government did not face the distorted incentives created by the equalization grant formula (i.e. if $t_{ws} = t_{\pi s} = 0$) and the economic profits were fully taxed by the recipient government (i.e. if $t_\pi = 1$). Let G* denote the efficient provision of the public input that occur when $F_G = MC$. If the recipient government faces a distortionary equalization scheme, then under-provision ($G < G^*$) or over-provision ($G > G^*$) will occur as:

$$(20) \qquad G \underset{<}{\overset{>}{-}} G^* \qquad as \qquad \phi \underset{<}{\overset{>}{-}} \frac{1 + (t_{\pi s} - t_\pi)}{1 + (t_{\pi s} - t_\pi) - t_{ws}} > 1$$

A sufficient condition for under-provision is that the public input is factor-augmenting and therefore $\phi = 1$. In this case, the recipient government will under-provide the public input because the condition for optimal provision becomes $(1 - t_{ws})F_G = MC$. The intuition behind this condition is that when $\phi = 1$, the increase in payments to labour equal the increase in private sector output, F_G. The net benefit from the increase in G to the residents of the recipient government is only $(1 - t_{ws})F_G$ because a fraction t_{ws} of the benefit is taxed away by the central government through reduced equalization payments. Under-provision occurs because the recipient government equates its net benefit from provision of the public input, $(1 - t_{ws})F_G$, with its marginal production cost.

This analysis also reveals that there is a potential for over-provision of public inputs if $\phi > 1$ arises because, in this case, the public input increases the recipient government's wage tax base, but reduces its profit tax base. A necessary condition for over-provision is $\phi > 1$, i.e. the elasticity of the marginal product of the public input with respect to labour input must be greater than one. Over-provision is more likely to occur when the gap between $t_{\pi s}$ and t_{π} is large and t_{ws} is small. Over-provision can only occur when ϕ is sufficiently large that the increase in total wages paid to workers plus the increase in equalization payments due to the decline in the profit tax base exceeds the loss of profit tax revenue plus the decline in equalization payments due to the increase in the wage tax base.

To correct the expenditure distortion caused by the equalization formula, the federal government could provide a matching grant, which would reduce the net marginal cost of the public good to (1-m)MC. The matching grant rate that would induce the recipient government to provide the efficient level of the public good is:

$$(21) \qquad m = \phi\, t_{ws} + (1 - \phi)(1 + t_{\pi s} - t_{\pi})$$

In the case of a factor-augmenting input ($\phi = 1$), the matching rate would simply be equal to standard tax rate on wage income. The matching grant in this case would offset the tax back effect of the equalization grant. In the case where the recipient government would otherwise over-provide the public good, m would be negative and represent a tax on provision of the public input.

Section 5
Conclusion

This paper has identified some potential sources of bias in the fiscal decisions of governments that receive fiscal equalization grants. The equalization grant formulas that are examined in this paper have the common characteristic that they supplement a government's revenues, at a standard tax rate, according to the difference its per capita tax base and a standard per capita tax base. Such grant formulas create an incentive for a recipient government to modify its tax and fiscal policies in ways that allow it to collect larger equalization grants, or that prevent it from losing as much equalization as it otherwise would. The potential bias in fiscal decisions occurs when the recipient government's fiscal policies directly, or indirectly, affect the standard tax rate, the standard tax base, or its own tax base.

The incentive effects of fiscal equalization grants are predicted to:

- reduce the recipient government's marginal cost of public funds, which may lead to higher tax rates and excessive expenditures on purely consumptive public expenditures;
- bias the recipient government's tax mix in favour of taxes sources where its tax bases are below the standard tax bases;
- reduce the recipient government's expenditures on tax base-enhancing activities, such as education and infrastructure.

A few caveats should be mentioned with regard to this assessment of the incentive effects. First, although we have identified the incentive effects and the potential for bias in a recipient government's fiscal decisions, it is not clear how significant these biases actually are and to what extent they actually alter the fiscal decisions of recipient governments. Second, there are other factors that introduce biases in the fiscal decisions of the recipient governments. For example, there are horizontal fiscal externalities involving other provincial and territorial governments —such as tax competition— and vertical fiscal externalities involving the federal government—such as the deductibility of provincial and territorial governments' taxes from federal tax bases—which may bias decisions in other (possibly off-setting) ways.

References

Boadway, R.W. (1998) "The Economics of Equalization: An Overview" in R.W. Boadway and P. Hobson (eds.) *Equalization: Its Contribution to Canada's Economic and Fiscal Progress,* John Deutsch Institute, Queen's University, Kingston, Ontario.

Boothe, P. and D. Hermanutz (1999) *Simply Sharing: An Interprovincial Equalization Scheme for Canada,* C.D. Howe Institute Commentary, C.D. Howe Institute, Toronto.

Courchene, T.J. and D. A. Beavis (1973) "Federal-provincial tax equalization: An Evaluation" *Canadian Journal of Economics* 6, 483-502.

Dahlby, B.G. (forthcoming) "Using the Marginal Cost of Public Funds to Evaluate Public Expenditure Programs", in A. Shah (ed.) *Public Expenditure Evaluation – A Toolkit for Evaluators and Policy Makers,* a joint publication of the World Bank and the Swiss Development Cooperation Agency.

Dahlby, B.G. and L.S. Wilson (forthcoming) "Vertical Fiscal Externalities in a Federation" *Journal of Public Economics.*

Smart, M. (1998) "Taxation and Deadweight Loss in a System of Intergovernmental Transfers" *Canadian Journal of Economics* 31, 189-206.