

PROVINCIAL FISCAL COMPETITION

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I. INTRODUCTION

This survey is directed at a simple but important question: does fiscal competition among the provinces result in smaller government? For many provincial politicians and bureaucrats, this question is important to them in that it raises questions about how far one can decentralize the tax system.

For example, after several years of expenditure cuts and major debt reduction and a run up on oil and gas prices until recently, Alberta has found itself in a virtuous cycle – large surpluses can be used to increase expenditures on public services, reduce taxes or further reduce debt.¹ With such large surpluses, Alberta has pursued several objectives. It continues to reduce its debt. It has spent significant revenues improving infrastructure and professional salaries, especially in health and education, potentially bidding away service providers from other provinces. Also, Alberta has adopted a flat personal income tax with accompanied reductions in personal and corporate taxes.

The other provinces, particularly neighbouring Saskatchewan and British Columbia, are concerned about their ability to maintain their opportunities for growth in face of “competition” from Alberta. The Atlantic Provinces, Ontario and Quebec also need to finance growing expenditures in face of pressures to reduce taxes. Most provinces have undertaken personal and corporate tax cuts and have increased expenditures on education and health. All provinces are looking towards the federal government to provide additional resources for their expenditures.

A concern has been expressed about growing fiscal competition among the provinces over time. Is there a “race to the bottom” whereby taxes are bid away, compromising provincial fiscal capacity to spend on public services? Is increased fiscal competition resulting in bloated budgetary expenditures on services to attract mobile populations, thereby making less money available for other public programs such as social services?

This survey will provide both a review of the literature in relation to the question as to whether fiscal competition impacts on provincial government size. It begins with an

¹ The recent fall in oil and gas prices and a slowdown in the economy since the fall of 2001 with an increase of 24% in its program expenditures for 2001-2 has compromised Alberta’s fiscal situation.

elaboration of the meaning of fiscal competition. This is followed by an application to capital tax competition in a federal state. The final section concludes with a discussion of some specific issues in Canada that are relevant to fiscal competition.

II. THE MEANING OF FISCAL COMPETITION

The popular view of fiscal competition is centred on governments cutting taxes in order to attract a greater share of a tax base. Fiscal competition is therefore often defined as “tax competition” and tax competition is viewed as a process that leads to lower taxes being levied on mobile inputs. For example, Oates [1972, p. 143] describes the outcomes of tax competition as follows:

The result of tax competition may well be a tendency towards less than efficient levels of output of local services. In an attempt to keep taxes low to attract business investment, local officials may hold spending below those levels for which marginal benefits equal marginal costs....”

Similarly, Jay Wilson states in his survey of tax competition theories the following [1999, p. 269]:

A central message of the tax competition literature is that independent governments engage in wasteful competition for scarce capital through reductions in tax rates and expenditure levels.

Conceptually, however, fiscal competition is not appropriately defined in this manner. By confusing outcomes (lower tax rates and smaller government, for example), with the process of a game, one cannot eclipse all outcomes of games among governments in an appropriate way. Mintz and Tulkens [1990] emphasize the point that fiscal (or tax) competition is a process by which governments maximize some payoff by strategically choosing fiscal instruments that interact with the strategic choices of other governments. Most importantly, depending on the game, one cannot conclude that tax reduction is an outcome of a fiscal competition model.

In the discussion below, I begin with a formal presentation of a particular tax competition problem, knowing full well that some of the mathematics might hinder the

reader. However, it helps to provide a model in order to clarify some of the important principles that are involved.

Fiscal Competition without Distortions

Fiscal competition may actually lead to an efficient allocation of resources in an economy. The idea of efficient tax competition goes back to Tiebout [1956] who considered local governments that finance local public goods with lump sum transfers. People move to jurisdictions according to the preferences for the mix of public and private goods. Since taxes have no distortionary impacts on consumption and there are no spillover effects among public goods, no fiscal externality involved. Thus, governments achieve an efficient allocation of resources with some governments choosing higher levels of expenditures and taxes than other jurisdictions. Similar results are derived in more sophisticated models with people moving between jurisdictions to maximize their utility or labour moving to achieve the highest level of income. The Tiebout model has also been extended to mobile firms and the provision of public inputs (Richter and Wellisch [1996]). More interesting results of tax competition arise when taxes can be distortionary, thereby impacting on capital or labour decisions.

Fiscal Competition with Distortionary Taxes: An Example of Commodity Taxation

Fiscal competition becomes interesting when taxes have distortionary effects on the economy. To spell out what is involved with a fiscal competition model, I shall outline a simple commodity tax competition game going back to the original contribution of Mintz and Tulkens [1986]. To understand the mechanics of any game, I will specify the “market equilibrium”. This is followed by a specification of the optimal fiscal decisions of a government. The final part of the analysis is to determine the outcome of a game.

Market Equilibrium

Suppose there are identical consumers living in two regions ($i = \text{“a”}$ and “b”), who can purchase a commodity, Q , at home or in a foreign jurisdiction. The cost of

producing goods in each region is equal to 1. Each person in region i consumes a taxable product at home Q_{ii} , or in the other region, Q_{ij} . The per unit tax rate in each region is denoted as t_i (t_j for other region) so the consumer price at home is $(1+t_i)$ in each region. If a person purchases goods from the other region, a transport cost equal to $J(Q_{ij})$ is borne. The “effective” consumer price in the other region is $(1+t_j + J'(Q_{ij}))$ with $J'(Q_{ij})$ being the marginal transport cost (which I will assume that marginal transport costs are rising with imported purchases and $J'(0) = 0$).

A consumer also consumes a non-taxable good, L_i , which is traded for the taxable product imported from the other region j : (Q_{ij}). It is assumed that wage rate is also equal to one and the same in both regions.

Consumers not only derive utility from purchases of private goods but also from a public good, R_i . The consumer maximizes a well-defined utility function, separable and additive in utility: $U_i[Q_i] + G_i[R_i] - L_i$, given the fiscal decisions of governments with respect to tax rates and public goods. The fixity of public sector decisions in the consumer’s problem can be justified that each consumer’s decision has no discernible impact on government budget constraints (therefore the consumer behaves as a “Nash” player).

Each consumer’s budget constraint is defined as wage income equal to the expenditures on taxable goods purchased domestically or abroad:

$$L_i = (1+t_i) Q_{ii} + (1+t_j) Q_{ij} + J(Q_{ij}) \quad \text{for } i=a,b \quad (1)$$

The market equilibrium is defined as the optimal choices of Q_i , Q_{ij} and L_i , that maximizes utility, $U_i[Q_i] + G_i[R_i] - L_i$, subject to (1), which yields:

$$MU_i/M_{L_i} = 1 \text{ and } MU_i/M_{Q_i} = (1+t_i) \sim (1+t_j) + J'(Q_{ij}) \quad (2)$$

The first order conditions in expression (2) yield the familiar result that the marginal disutility of labour is equal to one (since both the wage rate and marginal cost of using labour are equal to 1). The marginal utility of consuming the taxable good, Q , is

equal to the effective consumer prices in both regions². Note for the consumer to import goods from the other region, it must be the case the $t_i > t_j$, (the commodity tax rate in the other region must be lower than in the other region). Thus, only one region can import taxable goods (to balance trade it must export leisure to purchase goods abroad).

From this problem, simple comparative static conditions can be derived, whereby demands for the taxable commodity are decreasing in tax rates and are independent of the public good level. These comparative static effects depend on whether the region is an importer ($Q_{ij} > 0$) or exporter ($Q_{ji} > 0$) of the taxable commodity. An important property in this model is that the tax rate of the other (jth) jurisdiction can impact on consumer demand in the ith jurisdiction:

Importing ($Q_{ij} > 0$):

- $\frac{\partial Q_i}{\partial t_i} = \frac{1}{U_i} < 0$ (the tax rate increase in the ith region causes aggregate demand for Q to fall);
- $\frac{\partial Q_{ij}}{\partial t_i} = \frac{1}{J_i} > 0$ (the tax rate increase in the ith region causes imported Q to rise);
- $\frac{\partial Q_{ij}}{\partial t_j} = \frac{1}{J_j} > 0$ (the tax rate increase in the jth region causes imported Q to rise);
- $\frac{\partial Q_{ii}}{\partial t_j} = \frac{\partial Q_i}{\partial t_j} - \frac{\partial Q_{ij}}{\partial t_j} = \frac{1}{U_i} - \frac{1}{J_j} < 0$ (the tax rate increase in the jth region causes domestic demand to fall); and
- $\frac{\partial Q_{ii}}{\partial t_i} = \frac{1}{J_i} > 0$ (the tax rate increase in the jth region cause domestic demand to rise).

Note that in this model with additivity, income effects on Q are absent.

A similar set of results can be found for the exporting of the taxable commodity ($Q_{ji} > 0$). If the ith government increases its own tax rate, it will cause fewer exports (less importation by consumers of the jth region). Further, for both the cases of imported and exported taxable commodities, local public goods consumed in the jth region have no direct impact on the welfare of consumers in the ith region. I leave to the reader to work out these conditions.

² The inequality notes that if the commodity tax rate in region i is less than the rate in j ($t_i < t_j$), then importations of the taxable commodity must be zero ($Q_{ji} = 0$)

Fiscal Decisions of Governments

Government decision-making can be characterized in a number of ways. A “normative” government would maximize the welfare of its own citizens, which in this model can be denoted as the indirect utility of identical consumers based on the maximized choices of private sector commodities:

$$V_i[t_i, R_i; t_j] = U_i^* \{Q_{ii}^*[B] + Q_{ij}^*[B]\} + G_i[R_i] - L_i^*[B] \quad (3)$$

Alternatively, governments could simply maximize the size of the public good (or tax revenues), R_i , which could be subsumed under a more general function. Edwards and Keen (1996) considers maximization of the size of government as consistent with the Leviathan argument that governments may wish to exert power over the economy’s resources. The formulation in (3) could include the Edwards-Keen formulation of an additive welfare function defined over utility of the consumer plus government revenues (see Mintz and Tulkens [1986] for some discussion of revenue maximization in terms of the equilibrium derived). More elaborate political economy models would include political voting equilibria (given all individuals within a region are the same in this simple model, there is little interest in considering a political equilibrium).

The optimal fiscal decisions of the government are derived by maximizing (3) by choosing the tax rate, t_i and public good R_i , subject to two constraints. The first constraint is that budget constraint for the government that public goods must equal revenues received by taxing domestic purchases and purchases imported by consumers of the other region (Q_{ji}):

$$R_i = t_i \{Q_{ii} + Q_{ji}\} \quad (4)$$

The second constraint, common to most fiscal competition models, is that one government views that the fiscal decisions made by the other region are best responses and therefore given (the well-known Nash strategy). Actually, in this model, only tax rates influence behaviour directly in the other region – local public goods do not have a

direct effect on welfare or consumer decisions of the other country (even if preferences are more general than additive). Thus, in this model, the competition game is essentially in tax rates, not expenditure decisions.

Note that budget balance can be invoked in each region as a tax rate is adjusted. Even if the other region keeps its own tax rate as fixed, the tax base in that region will change when the when the i th region raises or lowers its own tax rate. Thus, the other region could have a temporary deficit or surplus when the i th region changes its tax rate. This is somewhat unreasonable for rational governments to expect. Thus, implicitly the public good level of the j th region changes with adjustments in tax revenues. Since there are no feedback effects of public goods in the j th region on welfare of residents in the i th region, the model is “closed” in this sense.

The optimal fiscal choices of taxes and public goods can be derived by maximizing the welfare function in equation (3) with respect to the tax rate, t_i , and public good, R_i , subject to the budget constraint in expression (5). The public good choice will depend on preferences and available tax revenues. In turn, the optimal fiscal choice for the tax rate will depend on whether the region is imported or exporting the taxable commodity:

Importing

$$t_i^* = (1 - N_i) / E_{ii} \quad (5)$$

Exporting

$$t_i^* = (1 - N_i) / \{ v_i E_{ii} + (1 - v_i) E_{ji} \} \quad (6)$$

with $1 - N_i = 1 - 1/D_i > 0^3$ denoting the deadweight loss of raising tax revenue. In expressions (5) and (6), the optimal fiscal choices have been converted to include elasticities of demand since consumer prices rise by $1 + t_i$ or $(1 + t_j)$ (for Q_{ji}) so that $E_{ii} = - \{ M_{Q_{ii}} / M \} (1 + t_i) / Q_{ii}$ and so $E_{ji} = - \{ M_{Q_{ji}} / M \} (1 + t_i) / Q_{ji}$ and $v_i = Q_{ii} / (Q_{ii} + Q_{ji})$. Thus, the optimal tax rate is set lower with higher elasticities of demand. Note that the expressions depend on the tax rate of the j th jurisdiction, a point that I shall return to below.

³ The lagrange multiplier for equation (4) is D_i , the marginal utility of consuming the public good in region i . Note that this term is greater than marginal utility of income for the consumer (which is equal to one given quasi-linear preferences).

Equilibrium in the Fiscal Competition Game

Now we can describe in more detail the meaning of tax competition. If we assume that governments use Nash strategies, then they choose their best response given the best response of the other government:

$$t_i^* = f_i[t_j^*] \text{ and } t_j^* = f_j[t_i^*] \quad (7)$$

Naturally, one can think of the optimal fiscal decisions being dependent on the tax rates chosen by the other government. The equilibrium is obtained at the tax rates at which both equations in (7) hold simultaneously.

One way of thinking about “tax competition” is to see whether fiscal decisions are at least interdependent, which has been subject to recent empirical testing (see, for example, Besley, Griffith and Klemm [2001]). In other words, we try to determine the slope of the reaction function for problem such as the one just characterized. Mintz and Tulkens [1986] show, for the above problem, that there are two possibilities⁴ as shown in Graphs I(a) and I(b). The first case would be “strategic complements” where the slopes of the reaction functions are positive ($M_i^*/M_j^* > 0$). The second would be “strategic substitutes” whereby the slopes are negative ($M_i^*/M_j^* < 0$). Often, people believe that the case of strategic complements holds in tax competition games in that, if one jurisdiction cuts its tax rate, the other will follow. However, there are many games in which reaction functions can be downward sloping, rather than upward sloping. In the problem at hand, the reaction functions will be downward sloping if the demand for the public good is sufficiently inelastic. If one jurisdiction drops tax rate and attracts more exports, the other country, with a smaller tax base, will raise its tax rate. On the other hand, one can show with relatively elastic demand for the public good (as in the case that the marginal utility of public good consumption is constant), a jurisdiction, in face of a declining tax base, would cut its tax rate.

One other point to note is that, in some models as this one, reaction functions need not be continuous. In this model, in the presence of transport costs, the reaction function of each jurisdiction jumps from a high to a low tax rate precisely at the point

⁴ The terms strategic complements and substitutes was first provided in the industrial organization literature by Bulow, Geanakoplos and Klemplerer [1985]).

when a jurisdiction chooses to move from a net importing to net exporting position. At this point, a large discrete cut in the tax rate may be warranted since it could attract a much larger tax base.

Because of the lack of continuity in reaction functions, this model gives a peculiar result. First, unless the reaction functions are decreasing (strategic substitutes), a Nash equilibrium may not exist for “pure” strategies (only one tax rate can be chosen, not a mix of tax rates). Second, even if jurisdictions are absolutely identical in terms of tastes and endowments, the model will not provide a symmetric outcome whereby tax rates are identical. In this model, equal tax rates cannot occur because there is an incentive to cut or increase the tax rate to increase tax revenues.

So far we have established that a tax competition game can provide much more complicated results than what is often presumed by casual discussion of tax competition:

- governments do not necessarily follow what others do (e.g. cut tax rates when the other cuts its tax rates);
- it is not necessarily true that there is a race to the bottom with tax rates going to zero since governments do value having some public good consumption; and
- even if jurisdictions are identical, tax competition can result in non-identical outcomes.

Fiscal Externalities

Another important question that arises from tax competition models is whether governments are too small or large (or tax rates too low or too high) compared to a situation in which they can co-operate to establish tax policies to improve welfare.

In this model, a natural way of examining efficiency is to consider whether there are tax rates that would improve welfare in both regions. In other words, are there “pareto improving” tax rates that would raise welfare for both regions. The model is best considered by assuming that governments are constrained from making lump sum transfers amongst each other; in other words, their budgets must individually balance.

Formally, we can derive a “fiscal externality” which is the effect that one jurisdiction’s tax policy has on the welfare of the other jurisdictions. In the model above, this can be derived as by finding the impact of the tax rate of the j th region, t_j , on the

optimized level of welfare maximized by the government of the i th region (equation (3)) given the budget constraint (4)⁵. This yields the following expression:

$$\begin{aligned} FE &= \text{Tax Base Flight Externality } (>0) + \text{Tax Exportation Externality } (<0) \\ &= MR_i^*/M_j^* + MW_i^*/M_j^* \end{aligned} \quad (8)$$

The first term in equation (8) is the impact of j th tax rate on amount of public good (tax revenues) raised by country i . When the j th region raises its tax rate, its own residents (if importing) or its residents of the other jurisdiction (if exporting) will reduce their demand for production in region j . The tax base flees to the i th jurisdiction, allowing the j th region to have more tax revenues and public revenues. I call this the “tax base flight” externality. This fiscal externality is positive meaning that jurisdictions choose tax rates that are too low.

The second term is the impact of the j th region tax on private consumption by residents of the i th region. If consumers from the i th region were importing goods from the j th region, they would find that a higher tax rate makes them worse off. I call this the “tax exportation” fiscal externality. This externality is negative, implying that consumers of the i th region are worse off. Note that if the i th region is an exporter, this fiscal externality is zero in value since there no consumers in the i th region are importing taxable commodities from the j th region.

Graphs II(a) and II(b) illustrate the pareto-improving changes in tax rates that would make both regions better off in a Nash equilibrium. I show this by deriving the iso-welfare lines for each government of which their shapes depend on the fiscal externalities. Iso-revenue lines that are rising in values as tax rates increase are a result of the “tax base flight” externality dominating for both regions (Graph II(a)). The case when iso-revenue lines fall in value with higher tax rates can only apply to the importing jurisdiction when the tax exportation externality dominates the “tax base flight externality” (Graph II(b)). In Graph II(a), both regions would be better off if they agreed

⁵ The fiscal externality is derived by differentiating the i th region’s welfare problem: $V_i[t_i, R_i, t_j] = U_i^* \{Q_{ii}^*[B] + Q_{ij}^*[B]\} + G_i[R_i] - L_i^*[B] + D_i \{R_i - t_i \{Q_{ii} + Q_{ji}\}$, given that the i th region has already chosen its optimal fiscal decision.

to increase tax rates while in Graph II(b), the exporting region should lower its tax rate and importer raise its tax rate for an agreement.

This model illustrates a key point. It is well possible for jurisdictions to choose tax rates that are too high in a tax competition game, rather than too low as often believed. For example, if the tax exportation externality dominates, then a jurisdiction could choose too high of a tax rate in an open economy.

Vertical Externalities

Many tax competition games to be further discussed can be analyzed in terms of “horizontal” fiscal externalities as described above and I will give some examples of them below. However, in a federal system, there are other levels of government (e.g., federal and provincial) that could give rise to fiscal interdependencies. I will not formally model these problems as above but I would like to draw out some important points for reference below. These fiscal externalities are “vertical” in nature (Boadway and Keen [1996] and Dahlby [1996]) and can arise in a number of situations:

- Joint occupancy of tax fields: If the federal or provincial governments raise the tax rate on a jointly occupied field, the tax base of another jurisdiction shrinks. Joint occupancy of tax fields can result in higher taxes chosen by independent governments compared to an efficient solution.
- Complementary or substitute tax assignment externalities: One government raises a tax rate that causes another tax to shrink (complements) or rise (substitutes). For example, a fuel excise tax levied by a province could reduce automobile excise taxes levied at the federal level. This negative externality could mean that governments at a given Nash equilibrium choose tax rates that are too high. Alternatively, a tax on wine by a province could result in greater tax revenues for the federal government on beer. In this case, tax rates are chosen at levels that are too low.
- Expenditure/tax fiscal externalities: A tax by one level of government could increase or lower expenditures faced by the other level of government. A relevant example of this is the case of equalization grants made by the federal to provincial governments that will be discussed further below.

A Few Other Complications

The nature of fiscal externalities as discussed above can be affected by a number of other considerations. A few of these issues are briefly reviewed.

Government Payoffs: In the model above, the government's objective is to maximize identical resident consumer utility. However, government objectives may differ from the broader population's objectives. To fully understand these issues, a model analyzing political decisions is best to use (Marceau and Smart [2001] and Wildasin and Wilson [2001]) but a shorthand way of specifying government objectives can often be used to typify results. For example, governments controlled by politicians or bureaucrats may seek to improve their own welfare. This could result in economic inefficiency if society's and public official interests differ. For example, in the Edwards and Keen [1996], the Leviathan government is interested in maximizing a weighted average of tax revenues and the resident's welfare while economic efficiency is solely based on the residents' welfare. A Leviathan government chooses tax rates that are too high relative to a benevolent government interested in economic welfare. Thus, tax competition acts as a constraint on Leviathan governments. Co-operation could result in an outcome that is even less desirable from the point of view of the residents.

Redistribution: The model presented above abstracts from equity objectives. A simple view often held is that tax competition leads to smaller governments and, thus, less expenditure on social services. However, as clear from the above discussion, no presumption can be made that tax competition results in smaller government. In fact, the opposite could hold such that tax competition could result in too much expenditure on social services relative to a co-operative solution. An interesting set of research has also been directed at the impact of tax competition on the progressivity of the income tax. For example, jurisdictions might bid for high-income workers by cutting tax rates on high income workers but increasing taxes on low income workers. Thus, the role of governments in insuring risks can be limited by fiscal competition. On the other hand,

Wildasin [2000] suggests that labour mobility could reverse this result. Since labour moves in response to shocks to the economy, earnings become less variable and, therefore, less risky to workers, reducing the need for social policies. Further, Feldstein and Wrobel [1998] suggest that redistributive policies of regional governments could be undone if market wages adjust to reflect differences in tax rates across regions.

Strategies: The above model assumes that governments pursue Nash strategies in tax rates. Governments could follow alternative strategies, especially when they are of different size. For example, some models have examined tax competition assuming one of the governments operates as a leader, maximizing its payoff subject to the constraint that the other government follows a Nash strategy. Tax rates are still chosen inefficiently. Further, multi-period games could result in co-operative behaviour if governments pursue tit-for-tat strategies (actually any equilibrium is possible).

III. AN APPLICATION: CAPITAL TAX COMPETITION

In this section, I will briefly review some of the specific considerations that are relevant to capital tax competition models to draw out the nature of fiscal externalities.

The most typical presentation of tax competition involves “tax base flight” externalities. The best example is the taxation of shipping. If a jurisdiction tries to tax a ship, the ship can then easily move to another jurisdiction that levies little or no tax. Governments then compete away taxes on shipping in a Nash equilibrium. On the other hand, in a co-operative equilibrium, the tax on shipping could well be positive. If the ship is fixed in supply, there is no deadweight loss in taxing shipping so a high shipping tax would be imposed if governments co-ordinated their actions.

Zodrow and Mieszkowski [1986] and Wilson [1986] originally proposed the idea that capital (property) tax competition leads to lower tax revenues and smaller governments. In their model, the “tax base flight” externality dominates in that capital flees to other jurisdictions. However, there are some types of capital that are not necessarily very mobile (property affixed to land). Thus, capital goods may not be

perfectly mobile. However, corporate profits are highly mobile. Without moving capital or people, businesses can shift income easily from a high jurisdiction to another through financial and transfer pricing arrangements. Haufler and Schjelderup [2000] have shown that governments may cut corporate income tax rates and reduce tax and broaden tax bases in the presence of income shifting. Mintz and Smart [2001] have shown in a model with multinational financial arbitrage that a government could increase its tax rate to capture more rents in face of a lower tax rate in another jurisdiction, which receives non-rent income shifted to it through financial transactions.

Many models have followed this line of research. But, there are arguments that would suggest that capital taxes may be too high due to various types of “tax exportation” externalities:

- *Large Economies*: The cost of capital can be affected by capital taxes levied by capital importing and exporting jurisdictions. In the presence of tax competition, a large capital exporter would like to subsidize capital to increase returns on capital lent to other jurisdictions while a large capital importer would like to tax capital to lower the cost of capital in the jurisdiction (Gordon and Varian [1989]).
- *Trade*: A tax on capital (or production) can force up prices on exported goods, thereby increasing welfare of the taxing jurisdiction (Wilson [1987]). Similar tax exportation incentives apply to intermediate goods, including intrafirm trade (Elitzur and Mintz [1996]).
- *Foreign-owned Capital*: If non-residents own capital in a region, there is an incentive for a government to tax the capital (especially if rent-based taxation is not available as an instrument – Mintz and Tulkens [1996]).
- *Expenditure Fiscal Externalities*: Capital taxation in a jurisdiction may result in greater expenditures by other jurisdictions to service capital. Keen and Marchand [1997] suggest that governments will spend more on public inputs in order to attract capital in the face of tax competition.
- *Vertical Fiscal Externalities*: If federal and regional governments share the field of capital taxation, capital taxes may be chosen too high as a result of the loss of revenue experienced by the other level of government. Similarly, if other taxes are deductible from the corporate income tax base, this could erode the revenues received by the

other level of government (Dahlby, Mintz and Wilson [2000]). Similarly, taxes on capital could drive down labour taxes received by other levels of government if capital and labour are substitutes in production. Another form of externality is related to the grants received from the central government. If capital taxes in a region reduce investment and other revenues, the loss in revenues can be partly made up by additional grants received from the federal government. Smart (1998) shows that the Canadian equalization program encourages recipient provinces to maintain taxes. Given the equalization formula, an increase in capital taxes causes the tax base to shrink for a province. However, the province will receive more equalization payments based on the national tax rate times the difference between the provincial per capita tax base and the standard per capita tax base (neither the national tax rate nor standard per capita tax base is influenced by a small province's tax rate).

- *Allocation Methods:* A further complication is related to the use of allocation methods for capital income taxation in federal systems like Canada (see Mintz [1999] for a detailed discussion). With formula allocation, a jurisdiction may agree to share the tax base but it will be in accordance to a rule for determining the shares. The tax revenues received by the jurisdiction will be based on its own tax rate times the allocation of profits its jurisdiction. Generally, rules are based on sales, labour or property held by a firm in jurisdiction. If a jurisdiction increases its tax rate, it causes two types of fiscal externalities. First, a higher tax rate will reduce capital demand in its own jurisdiction and less profit for all jurisdictions (a negative externality). Second, a tax increase will also potentially reduce (or increase) capital investment in other jurisdiction (and thereby affect total profits). Further, if non-profit related taxes (e.g. capital taxes) are deductible from corporate taxable income prior to allocating profits, a jurisdiction could raise the level of the deductible tax and reduce income allocated to other provinces (also a negative externality effect).

In summary, theory does not suggest that capital taxation is necessarily too low in a federal state. It is largely an empirical question to resolve. If the above methodology were applied to labour and other taxes, a similar conclusion would be reached.

IV. EMPIRICAL EVIDENCE: FISCAL COMPETITION IN CANADA

What type of fiscal competition has there been in Canada in the past number of years? Have provinces followed each other, raising or reducing tax rates when others do the same action (implying strategic complements)? Or have tax rates moved in different directions (implying strategic substitutes)?

The three significant taxes levied by provincial governments in Canada include personal income taxes, corporate taxes (corporate income and capital taxes) and sales and excise taxes. Other taxes include payroll and, at the local level, property taxes.

Without doubt, there is significant variation in tax rates among provinces. Personal tax rates vary significantly among provinces – top rates are lowest in Alberta and highest in Quebec (Table 1). Such variations have lasted for a significant number of years.

Similarly, the general corporate income tax rates have varied across provinces substantially (Table 2) although differences in tax bases are not significant. Quebec has had the lowest tax rate on non-financial income since the early 1980s, almost 10 points below other provinces. Bird and Mintz [2000] have shown that the corporate taxable income as percentage of assets is substantially higher in Quebec than in other provinces.

Sales taxes and structures have also varied considerably across provinces. Three provinces – Newfoundland, New Brunswick and Nova Scotia – have agreed to harmonize their tax bases with the federal value-added tax (GST) at 8% (with the federal GST at 7% the total sales tax rate is 15%). Quebec has its own value-added tax at a rate of 7.5% applied to prices inclusive of the federal GST, with the base similar but not identical to the federal base. Ontario, Manitoba, Saskatchewan and British Columbia have retail sales taxes at 7% to 8%. Alberta has no sales tax.

Alberta certainly differs from other provinces because of its ability to obtain resource revenue from Crown property. However, even excluding Alberta, there is considerable variation in tax rates and structures among the other provinces. One reason for these differences is that some provinces (Quebec, the Atlantic, Manitoba and Saskatchewan) receive greater support in per capita terms in the form of equalization

grants. The differential impact of intergovernmental transfers, especially equalization payments, provides substantial revenues to Quebec but especially the smaller provinces of Canada. However, it is striking that there are quite different tax structures, especially in Quebec compared to other provinces.

Given these types of data, how would one want to determine the interdependencies of fiscal policies among provinces? A first point to note is that it is important to determine exactly how such interaction takes place. One form of interaction is that taxes might cause factors – labour and capital – to move. Another form of interaction is that the tax base might move even though no real factors actually shift. This latter point is important for corporate tax competition since businesses can easily shift taxable profits and capital through financial and leasing transactions or transfer pricing without shifting real inputs. Mintz and Smart [2001] find that the elasticity of corporate taxable income with respect to provincial statutory tax rate for multi-jurisdictional companies that do not have to allocate their income across provinces is in the order of 4.3, far greater than 1.6 for other corporations. The rather high elasticity for the corporate income tax base is likely most due to income shifting, rather than capital moving between jurisdiction. But, given this high elasticity, one would have expected provinces to react more with each other with respect to differences in statutory corporate tax rates.

A typical approach used in the literature to test interdependencies is to estimate the reaction function for tax rates chosen by jurisdictions. One approach is regress a jurisdiction's tax rate on a weighted average of other jurisdictional tax rates (the weights themselves may be difficult to determine since some jurisdictions are closer to each other than others).

Data are difficult to obtain in many studies as illustrated by the use of “average tax rates” – taxes divided by some measure of income or GDP, which do not correlate with the true base used for tax purposes. For example Besley, Griffith and Klemm [2001]) use taxes as a percentage of GDP for OECD countries. The problem with the use of this approach is the following. A typical average tax rate is measured as taxes divided by some aggregate measure, Y (e.g. profits for corporate taxes, labour income for personal taxes, consumption for sales taxes). This tax rate can be decomposed as follows:

$$T = \text{Tax}/Y = (\text{Tax}/\text{Base}) \times ((\text{Base}/Y))$$

Since the base cannot be observed, the tax rate will vary for two reasons. The first is that the tax paid relative to the base might change either due to policy reasons or other factors that affect both the base and tax paid (such as shifts in technology or organizational structures that affect the amount of tax paid relative to the base). The second is that the base might change relative to some aggregate measure due to economic factors such as economic growth or inflation.

The second type of variation is quite problematic for understanding policy reactions. The base could change relative to the aggregate measure for all jurisdictions at the same time. The econometric work might be estimating upward sloping reaction functions but this only reflects other factors, such as the state of the economy that has a similar impact on the base relative to the aggregate measure.

The above problem has come up in the context of estimated reaction functions for corporate tax rates. Corporate tax rates measured as taxes divided by profits mask the relation between the corporate tax base and profitability. A boom in the economy often results in lower tax rates since profits rise more quickly than taxes since companies might be investing in assets with fast writeoffs or using up prior years' losses. Similarly, a decline in the economy might result in the base rising relative to profit levels. Estimated reaction functions would be upward sloping but not for policy reasons. Instead, there could simply be a common factor influencing the base relative to aggregate measure affecting tax rates in the same way (as in the case of Hayashi and Boadway [2000]).

Devereux, Griffith and Klemm [2001] attempt to avoid the problems involved by using tax rates that would not be influenced by other factors besides policy. The tax rates could include statutory tax rates, marginal effective tax rates, prospective tax rates (based on assumed rate of return on capital that is higher than the cost of capital). Their analysis suggests that there is competition among statutory corporate tax rates (most important for income shifting) and the prospective tax rates.

Given that provincial corporate income tax bases do not vary much among provinces in Canada, one would think that a reaction function could be estimated for statutory tax rates as the policy variable. As of yet, I have not seen a study that has estimated reaction functions of this sort.

Similar attempts could be undertaken to look at the impact of fiscal competition on sales and personal tax rates. Personal tax competition would need to look at the mobility of households. However, in this case, mobility will depend on all taxes and other factors that influence mobility.

V. CONCLUSIONS

The argument that fiscal competition results in lower taxes and smaller governments is not borne out by theory. Tax exportation and vertical externalities can result in higher taxes being levied, rather than lower ones. One might suspect that that tax competition leads to smaller government but there been insufficient empirical testing to confirm that such fiscal competition prevails. In fact, governments have grown over time relative to GDP and it is difficult to make the case that fiscal competition has seriously constrained the growth of government.

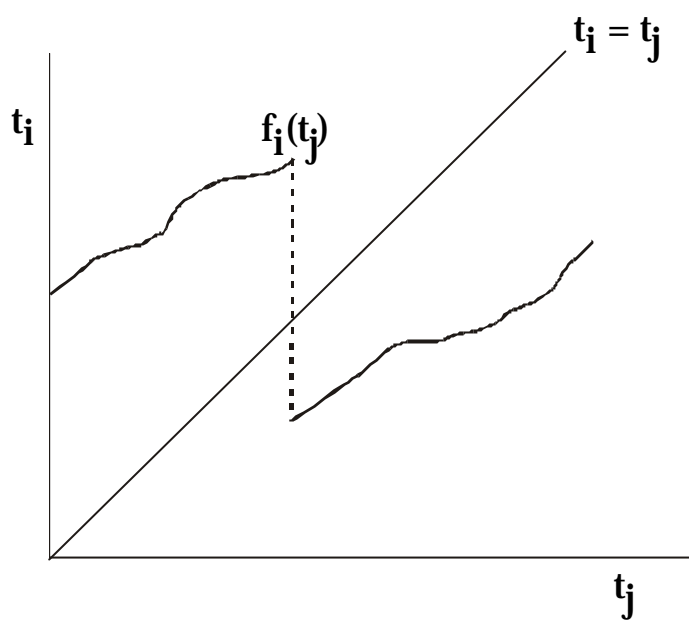
Even if there is fiscal competition that results in lower taxes and smaller government, theoretically, competition could improve efficiency rather than worsen it. Fiscal competition can reduce the power of Leviathan governments and political rents. A theme that I did not explore above is that competition could encourage experimentation with fiscal policies that could result in significant improvements in the conduct of tax policy over time. This is a consideration, however, that would require greater discussion that would go beyond this review.

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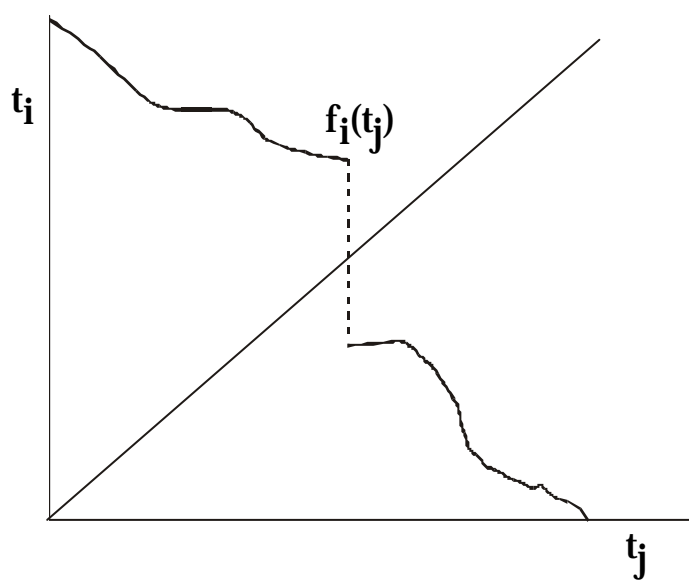
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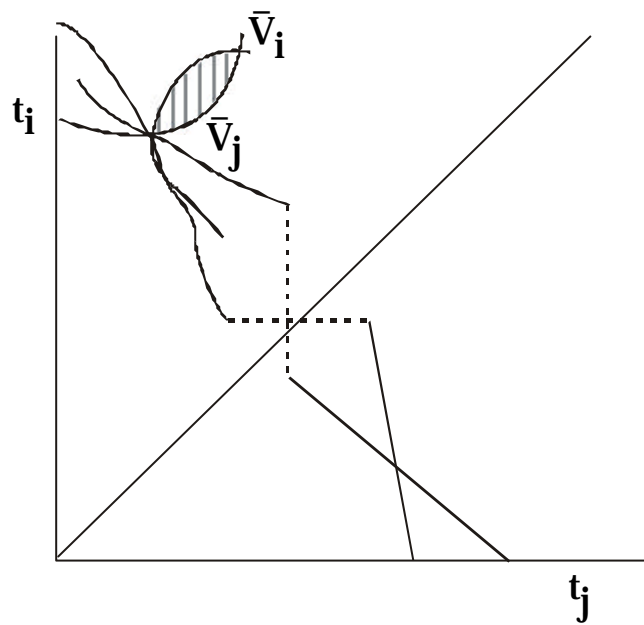
Graph 1(a) Strategic Complements



Graph 1(b) Strategic Substitutes



Graph 2(a) Pareto-Improving Tax Rates: One Falls



Graph 2(b) Pareto-Improving Tax Rates: Both Rise

