

# Vertical imbalance in the fiscal systems of federal states

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*Abstract.* A theory of vertical fiscal imbalance in federal states (VFI) is developed which distinguishes between long-run and short-run imbalances and between normative and positive interpretations of the concept. The analysis is carried out in the context of a simple three-sector model where the allocation of national output among sectors results from interaction of a public choice process with an overall resource constraint. The paper proposes welfare-theoretic definitions of long-run and short-run VFI. In addition, it uses the concept as part of a positive analysis in order to reassess broad trends in Canadian fiscal history.

*Déséquilibre vertical dans les systèmes fiscaux des états fédéraux.* Les auteurs développent une théorie du déséquilibre fiscal vertical dans les états fédéraux qui distingue entre les déséquilibres à court et à long terme et entre les interprétations positive et normative du concept. L'analyse se fait dans le contexte d'un modèle simple à trois secteurs où l'allocation du produit national entre secteurs est la résultante de l'interaction entre un processus de choix publics et une contrainte globale sur les ressources. On propose des définitions en termes de théorie du bien-être du déséquilibre fiscal vertical à court et à long terme. Le concept est aussi utilisé à l'intérieur d'une analyse positive qui ré-examine les grandes tendances de l'histoire fiscale canadienne.

## INTRODUCTION

The concept of vertical fiscal imbalance (VFI) has been used for several decades to justify policy proposals and to comment on the fiscal history of federations.

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However, despite its widespread acceptance, the concept has not been defined in a clear manner, nor does the literature contain any theoretical analysis from which a logically consistent definition could be derived. It is not surprising therefore that various writers and policy makers have used the notion of vertical imbalance to reach different and often opposing conclusions.<sup>1</sup>

This paper develops a theoretical framework for the discussion of vFI and proposes formal definitions of the concept. The analysis distinguishes between normative and positive interpretations and between vFI in the long run and in the short run. The starting point is a simple model showing how majority voting interacts with a national resource constraint to determine the allocation of output among federal, provincial, and private sectors. The paper first examines how the resulting allocation compares to a division of output which is economically efficient. This leads to a welfare-theoretic definition of vFI in the long run and to a definition of disequilibrium or short-run vFI. The normative analysis is followed by a positive interpretation of the model as applied to recent Canadian fiscal history. It is argued that intergovernmental arrangements, including federal grants, can be understood in large part as responses to several exogenous shocks that forced a change in intersectoral allocation of national output. The paper ends with a section commenting on the problems of measuring vFI and a brief conclusion.

#### A SIMPLIFIED THREE-SECTOR MODEL OF PUBLIC CHOICE IN A FEDERAL STATE

vFI focuses attention on the relative size of federal and provincial output levels. More generally, it deals with the relationship of federal, provincial, and private sectors. A model suitable for discussing vFI must therefore include the following features:

1. Three sectors or goods. In the following analysis,  $F$  will stand for federal goods;  $NF = (NF_1, \dots, NF_J)$  will represent provincial goods, with  $J$  being equal to the number of provincial jurisdictions; and  $P = (p_1, \dots, p_N)$  will stand for the private goods being consumed by a national population of size  $N$ . It will be assumed that  $F$  and  $NF_j$  are pure public goods at the national and the provincial levels, respectively, being produced efficiently at constant cost.
2. A common production possibility frontier linking these goods together:

$$T(F, NF, P) = 0. \quad (1)$$

3. A public-choice submodel describing how a point on the production frontier is chosen.

<sup>1</sup> The Canadian minister of finance has argued that federal deficits are too large because of vFI and that federal grants should be reduced to remedy the situation (Special Committee Minutes, 1981, 2A:7). His position conflicts with the conclusions of the Economic Council of Canada which disputes the existence of vFI (EEC, 1982, 118). In the 1950s and 1960s it was widely argued that vFI required increased federal grants (Break, 1980; Hunter 1977).

To capture the essential nature of federalism, the public choice analysis must take account of differences in the cost of mobility or 'exit' for voters and resources at the federal and the provincial levels. Ideally, the model would also make the constitutional assignment of expenditure responsibilities and tax sources across jurisdictions an endogenous outcome. However, this would require that the public choice process encompass constitutional matters and would force consideration of the optimality of federalism as a social institution. In the model of vFI constructed below, we adopt a more limited approach, taking the 'federal assignment' as given. It is assumed that jurisdictions may alter the level of the services that they provide or change the level of taxes that they levy, but that they are effectively constrained by the constitution regarding the type of services and taxes available to them. We shall also assume that federal grants to the provinces may be altered without constitutional revisions.<sup>2</sup>

The actual public choice process in a federal state is complex. The same citizens vote in elections at both provincial and federal levels, and there may be strategic interaction between voters and governments of different jurisdictions. No one has yet suggested a model capable of capturing all relevant aspects of public choice in a federal state. It is possible, however, to use a version of the median voter model to define and analyse vFI, provided that the limitations of the model are kept in mind. Assume that a decisive voter from a representative province chooses, in *federal* elections, the quantity of a federal public good jointly with the quantity of a composite good consisting of provincial public output and his private consumption. His budget restraint is

$$y = a_F \cdot F + a_{NF} \cdot c, \quad (2)$$

where

$$c = NF/J + (a_p^*/a_{NF}) \cdot P/N. \quad (3)$$

In (2) and (3) above,  $y$  is the representative voter's fixed income;  $NF = \sum_{j=1}^J NF_j$  is total (i.e., national) consumption of non-federal goods;  $P = \sum_{i=1}^N Pi$  is total private consumption;  $a_F$  and  $a_{NF}$  are the tax prices of federal and provincial goods; and  $a_p^*$  is the marginal social cost of private goods.

The budget restraint (2) is shown in figure 1a by the line  $t't'$ . The corresponding majority rule equilibrium is at point  $M$ , implying consumption of  $F_M$  of federal goods and  $c_m$  of the composite good. The implications of

<sup>2</sup> The assumption that the federal assignment is given and that grants can be altered at will corresponds roughly to the Canadian experience since 1945. The exceptions are family allowance and old age pensions, responsibility for which was transferred to the federal level in 1945 and 1952, respectively.

The Price Effect Of Federalism With Majority Rule

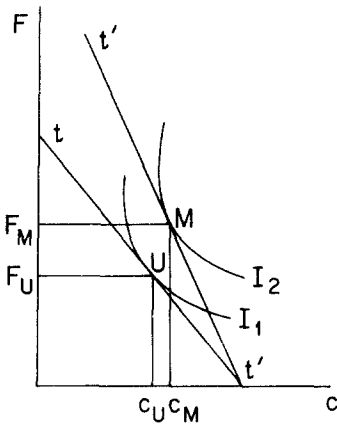


Fig. 1a

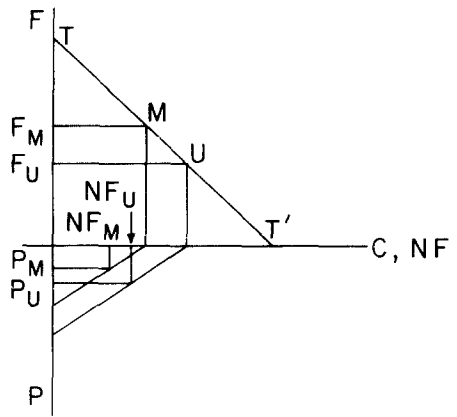


Fig. 1b

FIGURE 1 The price effect of federalism with majority rule

majority rule for the economy as a whole are shown in figure 1b, at point  $M$  on  $TT'$ , where line  $TT'$  represents the linearized production possibility frontier for the economy as a whole:

$$Y = a_F^* \cdot F + a_{NF}^* \cdot C. \tag{1a}$$

In equation (1a),  $Y$  is national income,  $a_F^*$  and  $a_{NF}^*$  are the marginal social costs of  $F$  and  $NF$  goods, and  $C$  is the aggregated level of the composite good.

The ability to map the median voter's equilibrium point in figure 1a onto a point on the production possibility frontier in figure 1b without explicitly considering aggregation across provinces results from the assumption embedded in (3) that the median voter's consumption of non-federal and private goods is always a fixed proportion of the total consumption of these goods. This effectively rules out consideration of tax-shifting across provinces or other forms of strategic interaction among different provinces, as well as consideration of differences in preferences. However, it turns out that much of the debate about VFI can be understood by analysing situations in which arguments in voters' budget restraints in each province change in more or less the same way, or in which preferences are altered in a similar manner. Thus a model in which interprovincial differences in voters' budget restraints or in preferences do not play an essential role can still be used effectively to discuss VFI.<sup>3</sup>

3 It should be noted that reactions of rational individuals to changes in relative tax prices and real incomes follow the same general principles in the public sector as in the private econo-

Another aspect of the model that must be kept in mind concerns the role of political agents such as politicians and bureaucrats. While the behaviour of these agents will be of interest in the analysis of vFI, the model contains no formal reference to them. In particular, the source of their power to influence the equilibrium allocation of resources is not considered. However, the model is consistent with the existence of such power, provided that one considers only the effect of those activities of political agents which alter the budget constraint and therefore the equilibrium of the decisive voter. In later parts of the paper we shall refer repeatedly to changes in tax-prices perceived by the decisive voter that are initiated by political agents at the federal and provincial levels.

The three-sector model developed above can serve as a basis for positive and normative analysis of vFI. Used as part of a positive or descriptive approach, it provides a new and simpler way of interpreting intergovernmental fiscal history. If it is incorporated into a normative analysis, it helps to clarify the basis of value or policy judgments concerning vFI. While we shall use the model in both of these ways, we shall start for expositional convenience with the development of a normative framework.

#### NORMATIVE ANALYSIS

##### *Vertical fiscal imbalance in long-run equilibrium*

In developing a welfare-theoretic basis for vFI, it proves useful to distinguish imbalance in long-run equilibrium from an imbalance that reflects incomplete adjustment to exogenous forces pushing the federation toward a new equilibrium. In this section we use the voting model outlined above to construct a welfare-theoretic measure of long-run vFI.

vFI refers to a state of imbalance in the relative size of federal and provincial public sectors. This raises the question of what a balanced situation would be like. Relative to what standard is there a problem in long-run equilibrium?

All normative analysis faces the problem of defining an ideal standard. Welfare economics of the private sector uses allocation of resources with competitive markets as the reference situation. Normative analysis of the public economy which takes account of collective choice requires allocation under an ideal voting rule or collective choice process as the standard of reference. Lindahl equilibrium which is achieved with unanimity over the country as a whole is widely accepted in the literature to serve this purpose. To define a Lindahl equilibrium, all possible expenditure proposals regarding federal and non-federal goods (or goods that would be so labelled if a federal assignment existed) are combined with all possible tax sharing formulas and

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my and do not depend on the specific formulation of the collective choice model. Therefore, to the extent that the analysis of vFI in this paper depends primarily on voter reactions to changes in relative prices and real incomes, it should apply for a variety of collective choice processes.

put up for a country-wide decision. Under the assumption of constant costs the Lindahl equilibrium is the Pareto-efficient combination of public services and tax-prices that receives unanimous consent.<sup>4</sup>

It is sometimes argued that Lindahl equilibrium is inconsistent with the existence of distinct provincial public sectors and therefore cannot provide a standard of reference appropriate to the welfare economics of federal systems, since interprovincial variation is the very *raison d'être* of federalism. It is not correct, however, to assume that Lindahl equilibrium implies interregional uniformity of public output in a situation with significant spatial differences in preferences or resource constraints. On the contrary, unanimous voting over the country as a whole will preserve spatial variation in public services as long as such variation derives from differences in tastes and constraints, not merely from attempts at interregional tax shifting.<sup>5</sup>

Since federalism decentralizes the public choice process, one may want to ask whether such decentralization should also be part of any normative standard against which the operation of the federal system is judged. Comparison with traditional welfare analysis of the private sector indicates that this is not a logical necessity. Presumably, decentralization of decision making is a response to various imperfections, such as transactions costs, imperfect information, and strategic behaviour. These same factors also affect the functioning of the private economy; yet neither they, nor the institutional responses to them, are part of the competitive standard against which the efficiency of private-market outcomes is assessed in welfare analysis.<sup>6</sup>

Given the Lindahl allocation as a standard of reference, we can ask whether there are aspects of federal systems leading to systematic departures from this efficient allocation. Two factors can be identified. First, the impact of mobility costs on political choices differs across levels of government in a federation. In addition, federal systems make use of voting rules that depart from unanimity. The interaction of these factors causes a shift in intersectoral balance and

4 See Mueller (1979, chap. 3) for a further discussion of unanimous voting and Lindahl equilibrium. If marginal costs are not constant, the Lindahl equilibrium depends on the disposition of the budget surplus or deficit.

5 See Brennan (1981, 126) for a further discussion of this point.

6 One referee has argued that Lindahl equilibrium is an inappropriate standard since people in Prince Edward Island do not and should not care about what people in Saskatchewan think about how much they spend on roads. We would argue that if they do not care and do not behave strategically, they will have no influence on Lindahl outcomes. A more important question is whether they should not care. Such a statement is clearly based on a normative judgment and one must inquire into the reasons behind it. We can see that it may be desirable to decentralize certain public choices spatially – that is, adopt a federal system – as a way of responding to imperfections such as costly information, transactions costs, and strategic actions. As argued above, this does not mean, however, that the ideal standard must include this response or be defined with regard to it. It should be emphasized that choice of a standard cannot be avoided if normative analysis of political institutions such as federalism is to proceed. We believe that Lindahl equilibrium is the best available standard and that its use in the present analysis is fully consistent with the traditions of welfare economics. Since such analysis of federalism is still in its infancy, it is, of course, possible that further work in this area will amend or change what now appears as the best approach.

therefore a departure from the efficient ratio of federal to provincial output. We shall call the welfare implications of induced changes in this ratio long-run VFI.

Wagner (1971) was the first to discuss the implications of differential mobility costs on sectoral balance, although he did not use a welfare-theoretic context. In a federal system governments at the national and the provincial levels operate under different constraints even though social choice rules may be the same for both. Assume that decisions at both levels are governed by simple majority rule. Such a rule permits some voters to coerce others into paying a tax-price greater than their marginal evaluation of public goods. However, public choices at the provincial level are constrained further by mobility of voters. In a world where the cost of 'voting with one's feet' is not prohibitive, competition among provinces will drive the majority solution at the provincial level closer to the non-coercive solution. This Tiebout-like process (see, for example, Tiebout, 1956 and Brennan and Buchanan 1980, chap. 9) affects national governments to a much smaller degree than it does provinces, since interprovincial migration tends to be much less costly than international migration.

The consequences of the interaction of majority rule by jurisdiction with differential mobility cost for the relative size of federal and provincial sectors are shown in figure 1a. In a situation in which voting decisions are made unanimously over the country as a whole, the budget restraint facing the median voter can be written as

$$y = a_F^u \cdot F + a_{NF}^u \cdot c, \quad (2a)$$

where  $a_F^u$  and  $a_{NF}^u$  represent Lindahl tax prices.<sup>7</sup> In figure 1a, this restraint is given by  $tt'$ , and the equilibrium is at  $U$ , with  $F_U$  and  $c_u$  of federal and composite goods, respectively. Under majority rule by jurisdiction, however, the median voter's restraint becomes steeper, tilting upwards to  $t't'$ . This occurs because the median voter will assume that the marginal tax cost of federal public services can, to some extent, be shifted to others in society, thereby reducing  $a_F$  in (2) below  $a_F^u$ , while at the provincial level such tax-shifting is not possible (i.e.,  $a_{NF} = a_{NF}^u$ ). As shown in figure 1a, the resulting fall in the relative tax price of federal public services induces an increase in the median voter's desired ratio of federal to composite goods.<sup>8</sup>

7 Lindahl tax-prices can be defined by the following conditions: (1) for each voter, the Lindahl tax-price is equal to his marginal evaluation of the public goods he is consuming, and (2) the sum of tax-prices across voters is equal to the marginal social cost of producing public goods; that is,  $a_i^u = a_i^*$ ,  $i = F, NF$ . These conditions together imply that the corresponding level of public goods is Pareto-efficient, and that when costs of public good production are constant, the public budget is balanced.

8 Wagner (1971, 18) ignores income effects on the assumption that the income gains from tax shifting that accrue from membership in majority coalitions are exactly offset by income losses from membership in minority coalitions. Figure 1a generalizes Wagner's analysis in this respect. Wagner uses a further, rather different argument as part of his discussion of imbalance in a static framework. He maintains that rational voters will obtain more informa-

The implications for the economy as a whole are shown in figure 1b. As long as  $F$  is not a Giffen good, the result is more federal goods in the aggregate and therefore less of the composite good  $C$ , compared with Lindahl equilibrium at point  $U$ . This is so regardless of the size of  $c_M$  relative to  $c_U$  in figure 1a, because the production possibility frontier (equation 1a) requires  $C$  to fall when  $F$  increases. The lower quadrant in figure 1b is used to indicate the equilibrium for the aggregate level of non-federal and private goods. As shown,  $M$  is associated with a lower level of both  $NF$  and  $P$ . Because the use of a composite good requires the price of non-federal goods relative to that of private goods to be fixed, a higher level of federal output must result in lower aggregate levels of both other goods.

The price effect of federalism with majority rule illustrated in figures 1a and 1b has two consequences: the federal budget is too large relative to the Lindahl equilibrium, and the mix of federal and non-federal goods (as well as private goods) is distorted. Both of these consequences are reflected in the following definition of  $vFI$ : We shall define long run vertical imbalance  $vFI^*$  to be the welfare loss associated with equilibrium at point  $M$  rather than at point  $U$  in figure 1b. That is,

$$vFI(U, M; S)^* = W(U; S) - W(M; S), \quad (4)$$

where  $W$  represents a social welfare index that ranks efficient allocations more highly than inefficient ones.<sup>9</sup> In (4),  $S$  refers to a vector of state variables, such as voters' preferences, the technology of producing public goods, real incomes, and the constitutional assignment, which in this section are all assumed to be exogenously fixed.<sup>10</sup>

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tion concerning fiscal decisions at the national level than concerning such decisions of comparable magnitude at the provincial level. The reason again is mobility; investment in information relevant to a particular political jurisdiction loses its value when the voter leaves the jurisdiction. As long as there is a positive probability of leaving a province, the expected value of fiscal information at the provincial level is lower than it would be at the national level. In Wagner's eyes, this effect tends to lower efficiency at the lower level of government. One should point out, however, that no conclusion can be drawn from the argument regarding the size of budgets at the provincial level. Since voters will possess less information relating both to tax costs and to public benefits, it is not clear whether the result is a lower or higher level of expenditure at either level of government (West and Winer, 1980). Thus, it is difficult to relate Wagner's argument to the concept of imbalance in the ratio of federal to non-federal goods.

- 9 Wagner does not put forward any welfare index that could be called  $vFI$ . Our index follows the usual practice of preferring points on the Pareto utility frontier to any point inside it on the assumption that for any movement onto the frontier, gainers could always more than compensate losers.  $vFI^*$  will always be positive, since  $U$  is on the Pareto utility frontier while  $M$  is not, except under very implausible conditions. For discussion of these conditions see Bergstrom (1979).
- 10 A quite different definition of long-run vertical fiscal imbalance from that presented here has been suggested by Hartle (1971, 103). While he does not examine the theoretical basis of his concept, Hartle implies that fiscal imbalance exists if the mix of non-federal and federal goods that is observed diverges from the mix that would result if the expenditure and taxing decisions of all jurisdictions were made by majority rule over all voters in the country as a whole.



The analysis and definition of vertical imbalance presented here have important implications for any choice of remedies. Fiscal imbalance in the long-run is a structural problem that cannot be solved by budgetary policies at one level of government. What is required is either a change in political constraints on tax-shifting at the federal level or a constitutionally enforced compensating adjustment in the budgets at both levels.<sup>11</sup> In the absence of such remedies, any democratic federal system inherently contains a long-run bias towards centralization of the public sector.

#### *VFI in the short-run*

Most discussions of VFI in the policy-oriented literature are not concerned with imbalance in the long run. They focus rather on the need for adjustment in the public economy in response to exogenous shocks. This section extends the analysis by considering the meaning of VFI in an economy adjusting to changes in selected components of the vector  $S$  in (4), assuming that the initial situation can be characterized as a long-run equilibrium reached through majority voting by jurisdiction as described in the previous section.

Consider first a shift in tastes away from federal goods and towards provincial goods, as occurred after the Second World War, when the need for national defence fell off rapidly, while the demand for provincial services such as urban services, transportation, and education expanded. Concern with adjustment to this shock lies behind most writing on VFI in Canada and the United States in the late 1940s and in the 1950s.

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Hartle recognizes correctly that a definition of VFI requires the selection of a standard of reference. But the problem with his formulation is that it does not permit an unambiguous welfare statement. With majority rule in the country as a whole as the standard instead of unanimity, VFI\* could be positive or negative depending on the relative strengths of special interest groups and the nature of voters' preferences. This is because majority rule (over the country as a whole or by jurisdiction) does not generally result in a Pareto-efficient outcome, so that we must compare two points both of which are inside the utility possibility frontier. If we ignore the intensity of voters' preferences, it is possible to make an unambiguous welfare statement. In this case, as argued by Pennock (1959), majority rule over the country as a whole must *reduce* social welfare relative to majority rule by jurisdiction, because federalism will increase the number of voters in the majority coalition in any jurisdiction. In contrast, use of Lindahl equilibrium as a standard must yield a positive VFI\*, because the corresponding allocation will lie on the utility possibility frontier.

- 11 Restrictions on the power of the national majority would serve the first purpose. A requirement to make decisions not by simple majority, but by pluralities larger than 50 per cent, may move fiscal outcomes closer to those achieved under unanimity and reduce VFI\*. On the other hand, there is the possibility of reducing vertical imbalance in the long run by introducing constitutionally mandated grants from the federal to the provincial level. Transfers of this type would result in a decrease in federal goods and an increase in non-federal goods. It should be noted that the constitutional nature of such payments is important. Grants may also arise for quite different reasons, reflecting the operation of special interest politics at the federal level. They may, for example, represent an attempt by regional coalitions to shift taxes to other parts of the country (see Rose-Ackerman, 1981 or Winer, 1983). Such grants may or may not reduce VFI\*, since they represent further attempts at redistribution through majority rule.

The analysis developed earlier can be extended to show the effects of such a change in one of the components of the state vector  $S$ . In figure 2, point  $(M;S)$  represents the static equilibrium for the economy before any change in  $S$ . This is analogous to point  $M$  in figure 1b, except that in figure 2 the composite good has been dropped in favour of the explicit allocation of resources to NF and  $P$  goods. This helps to emphasize the general equilibrium nature of the adjustment to changes in  $S$ .<sup>12</sup>

Once the change in tastes occurs, indifference surfaces (not shown in figure 2) are altered, and the new equilibrium is represented by  $(M';S')$ . As drawn, figure 2 indicates that the shift in tastes leads to an increase of both non-federal and private goods at the expense of federal output. This outcome seems likely, even though a pure substitution of non-federal for federal goods is possible. Note also that the reference point  $(U';S')$  differs from the corresponding point in figure 1b – a shift in tastes must also change the voter's equilibrium allocation under unanimity.  $(U';S')$  lies southeast of  $(M';S')$ , since federalism with majority rule reduces the relative price of federal goods with respect to both non-federal and private output, thus leading to a lower consumption of both.

The new long-run equilibrium allocation  $(M';S')$  can be achieved only if both the federal and the provincial governments as well as the private sector make appropriate adjustments. Much of the literature from the 1950s and 1960s (see Break, 1981, chap. 3) implies that this will not happen. In effect, the lack of an appropriate response by governments (for reasons discussed below) is seen as the main cause of vertical imbalance. Given our framework, we can suggest a definition of vFI in transition between long-run equilibria that reflects this concern. Short-run vFI may be defined as the efficiency loss associated with remaining at  $(M;S = M;S')$ , rather than moving to  $(M';S')$  after a change in the state vector has occurred. That is, vFI in transition is

$$vFI(M', M;S')^T = W(M';S') - W(M;S'), \quad (5)$$

where  $(M';S')$  refers to the new long-run equilibrium with majority rule after the shock, and  $(M;S')$  denotes a situation after the shock in which the allocation of the three goods is as yet unchanged.<sup>13</sup>

A positive  $vFI^T$  indicates that voters are not in long-run equilibrium with respect to the allocation of  $Y$  among  $F$ , NF, and  $P$ . Politicians will therefore find it profitable to respond to this disequilibrium. Given the federal assignment of expenditure responsibilities and tax sources across jurisdictions, this response to the shift in demand towards NF goods can take one or a

12 In keeping with the nature of the model outlined in the second section, we assume that the allocation of the decisive voter's income to NF and  $P$  goods is a fixed proportion of the national total. We also assume that his preferred consumption pattern is a stable equilibrium.

13 Ideally one should define  $vFI^T$  as the difference between welfare when following an optimal adjustment path given transaction and information costs and when following the actual adjustment path. The definition of an optimal adjustment path is a task going beyond the scope of this paper.

combination of the following two forms. First, the federal government can lower tax rates, while tax rates at the provincial level are increased. A second way is for the federal government to provide grants. Note, however, that *both* levels of government must adjust their budgets unless we deal with the unlikely case where the decrease in the demand for federal goods is completely offset by an increase in the demand for private output.

An appropriate reduction in federal taxes would move us from  $(M;S')$  to  $(M';S')$ . Use of grants as was widely advocated in the 1950s and 1960s, on the other hand, introduces a further complication into the analysis. If governmental transfers reduce the decisive voter's perceived tax price of provincial goods (as in Winer, 1983), this suggests that the voter would want to move to  $(M'', S')$  where  $M''$  refers to the equilibrium resulting from majority rule by jurisdiction in the presence of intergovernmental grants.<sup>14</sup> The measure of transitional  $\text{vFI}$  would also be changed:

$$\text{vFI}(M'', M;S')^T = W(M'';S') - W(M;S'). \quad (5a)$$

How can we determine the location of  $(M;S')$ ? Where does it lie in relation to Lindahl equilibrium  $(U';S')$ ? It should be recalled that the price effect of federalism with majority rule is the main reason for the long-run divergence between  $(M';S')$  and  $(U';S')$ . The reduction in perceived tax prices at the provincial level associated with grants results in a second price effect, operating, however, in the opposite direction. Since the two distortions counteract each other,  $(M'';S')$  may come closer to  $(U';S')$  in a welfare sense than does  $(M';S')$  and we may find that in the long-run,  $\text{vFI}(U', M'';S')^* < \text{vFI}(U', M';S')^*$ . We are dealing with a classic case of multiple distortions and the second best.<sup>15</sup>

#### Determinants of the speed of adjustment of the $F/\text{NF}$ ratio

The question arises as to why adjustment to the new equilibrium  $(M';S')$  cannot be expected to occur at the Pareto-efficient rate. There are at least two reasons for expecting  $\text{vFI}^T$  to persist longer than might be justified on the basis of the usual transaction cost arguments. Both of these reasons are founded in the nature of political behaviour in a federation.

As the comparative static analysis above suggests, adjustment to  $\text{vFI}^T$  may occur through grants rather than a change in tax rates because political agents may attempt to take advantage of the effect of federal grants on perceived tax

14 It should be noted that the framework being used here does not contain any explanation of why political agents have the power to manipulate intergovernmental financial arrangements and therefore perceived tax prices. However, we recall that the analysis is not inconsistent with the existence of the power, since we consider only the direct consequences of such power for the equilibrium of the decisive voter.

15 Note that  $(M'';S')$  in figure 2 is associated with more non-federal goods as well as with less private output than is  $(M';S')$ . This is likely if the 'fiscal illusion' created by grants also lowers the relative price of non-federal goods with respect to goods produced in the private sector.

prices. Provincial politicians in particular may be interested in the expansion of the provincial public sector that the reduction in perceived tax prices induces. In general, since the new long-run equilibrium may not be independent of the means chosen to adjust to short-run VFI, politicians and bureaucrats may be willing to forgo some of the short-term political gains from adjusting quickly in order to secure a favourable long-run allocation. While time taken to negotiate fiscal arrangements with other levels of government may be a political liability, political agents can expect gains from influencing the means of adjustment and thereby the nature of long-run equilibrium. No doubt, political debates between levels of government partly reflect attempts to capture such long-run gains.

A second reason that rapid adjustment in fiscal structure should not be expected is that the political process reveals shifts in voter demands only slowly. Elections and polls cannot replicate the constant flow of information provided by changing relative prices in private markets. Risk-averse political agents will therefore refrain from acting quickly, since there is a possibility of confusing a temporary shift in demand with permanent shifts in the level of  $F$  and  $NF$  goods demanded. It is of interest to note that partisan political debate in a federation may serve an important social function by generating information for political agents about the long-run consequences of shifts in the state sector  $S$  that underlies our definition of short-run VFI.

#### Vertical versus horizontal balance

The debate about VFI is sometimes linked to the discussion of horizontal fiscal equity or balance across jurisdiction in a federation.<sup>16</sup> While the two issues are conceptually quite distinct, one can point to a link operating under certain circumstances. In federations that pursue horizontal balance as a policy goal, responsibility for ensuring such equity is usually placed on the federal government, as it is in Canada. If this is the case, an exogenous shock that affects individual provinces differently may alter federal fiscal responsibilities and require a change in the long-run division of national income among  $F$ ,  $NF$ , and  $P$  goods.<sup>17</sup> An example occurred in Canada in 1973 when the jump in the world price of oil following the OPEC embargo required an increase in federal Equalization payments. Under the existing Equalization program of the day, the federal government was forced to raise Equalization payments to provinces whose per capita yield from resource revenues was below the national average. It can therefore be argued that the 1973 oil shock required an increase in the ratio of federal to non-federal revenues in order to maintain horizontal balance, thus affecting the size of VFI.

16 For definitions of horizontal equity in a federal system see Graham (1964), Boadway and Flatters (1982), and Courchene (1984).

17 One should note that the analysis falls outside the model developed in the second section, since shocks influencing budget restraints in different provinces differently cannot be adequately investigated with the representative median voter model.

Clearly, different standards of horizontal balance may generate different histories of transitional VFI. For example, if the Equalization formula in Canada did not include provincial oil revenues, the oil shocks of 1973 and 1979 would not have had any implication for short-run VFI. Thus while the principles underlying a standard of horizontal balance may be unrelated to VFI, induced variations in the welfare cost associated with short-run VFI may be considered a cost when alternative standards of horizontal balance are evaluated.

#### POSITIVE ANALYSIS: INTERPRETING THE FISCAL HISTORY OF THE FEDERATION

The three-sector model and the analysis of adjustments of majority-rule equilibrium to exogenous shocks form a useful basis for interpreting the history of fiscal federalism in Canada since 1945 and for understanding the role of grants during this period.

Two shocks, or changes in the state vector  $S$ , were major forces acting on intergovernmental relations in the 1950s and 1960s. In the period immediately following the war, there was a decline in the demand for defence-related goods provided by the federal government and a rapid increase in demand for social welfare services such as education, which were constitutionally assigned to the provincial level. This shock, a shift in tastes in favour of NF goods has already been analysed above. The new equilibrium requires a decline in  $F$  relative to NF. A second shock of importance, lying behind most concerns with VFI in the 1960s, was provided by the rapid growth in real incomes of that time coupled with an income elasticity of demand for public services that was greater at the provincial than at the federal level. At unchanged tax rates this situation will generate an increase in provincial deficits relative to the federal deficit if the algebraic difference between the income elasticity of expenditure and the income elasticity of revenue is greater at the provincial than at the federal level, as was generally assumed to be the case. However, contrary to most discussions in the literature at the time, the nature of deficits is not the issue. What matters is that  $(M;S') \neq (M';S')$  and that the new equilibrium allocation, again involving an increase in NF relative to  $F$ , is not achieved at once.

Three ways of adjustment to the lower equilibrium  $F/NF$  ratio induced by these two shocks were possible: a reduction in federal and an increase in provincial taxation; grants from the federal to the provincial level; and a reassignment of provincial service responsibilities to the federal authorities. Since the last method has rarely been used in Canada, no doubt because constitutional change in the federal assignment required unanimous consent of all provincial governments until the Supreme Court decision of 1981, the burden of adjustment fell on tax structure and on arrangements for intergovernmental grants, all of which could be altered without constitutional revision.

The post-war history of fiscal federalism in Canada, as described in Moore, Perry, and Beach (1966), Burns (1980), and LaForest (1981), suggest that the federal fiscal system responded reasonably well to the long-run shift in demand in favour of provincial goods. The period from 1947 to 1972 was one of dramatic growth in both provincial tax autonomy and average provincial tax rates relative to federal rates. In 1947, immediately following the first federal-provincial fiscal agreement, all provinces 'rented' their tax fields (granted to them by the BNA Act of 1867) to the federal government in exchange for annual sums fixed for a five-year term. By 1972 the provinces were determining their own corporate and personal income tax rates annually, and the province of Quebec was also collecting these taxes, while Ontario collected its own corporate income tax. Moreover, provincial tax revenues from own sources as a percentage of tax revenues of all levels (federal, provincial and local) rose from about 20 per cent in 1947 to 35 per cent in 1972, primarily at the expense of the federal share.<sup>18</sup>

The politics of the period played an important role in bringing about these adjustments and in removing (or reducing) VFI in transition. Federal-provincial fiscal arrangements, principally those concerning access to income taxation, were substantial issues in the national elections of 1957, 1962, and 1963. In 1957 the results were dramatic, with the Diefenbaker government increasing the federal abatement of the personal income tax to the provinces from 10 per cent to 13 per cent shortly after winning the election. This was not a political accident, as argued by the *American Commission on Intergovernmental Relations* (1971, 4) in its otherwise excellent review of the period's fiscal history. There is political profit in adjusting the output of federal, non-federal, and private goods as long as short-run VFI exists. Given a persistence of voter disequilibrium, fiscal arrangements were bound to become an election issue at some point.

As suggested earlier, adjustment may occur at a slower pace than desired by voters alone. Each government will try to protect its position during the adjustment period. The federal authorities would no doubt have preferred a reassignment of provincial expenditure responsibilities to them instead of the downward shift in their average tax rates and a growth in grants. But the unanimity requirement applying to constitutional revisions made this a very costly option to pursue, even though some of the poorer provinces might have agreed to such revisions. The next best alternative was to increase conditional grants-in-aid of provincial social services. Otherwise, VFI would likely have been resolved *entirely* via increases in the provincial share of taxation, a fact that has been ignored in most discussions of the grant system. Conditional grants allowed the federal government to retain at least some political and administrative role in the provision of these provincial social services which

18 *Economic Review* (1982, 195). Provincial revenues from own sources in 1947 are defined to include tax rentals. If tax rentals are excluded from provincial revenues from own sources, the provincial percentage falls to 18 per cent in 1947.

were the most rapidly growing part of the public sector in the 1950s and 1960s. The provinces, in turn, were willing to accept grants even though they might have preferred a transfer of more federal tax room, because such grants were likely to reduce the tax-price perceived by provincial voters and to increase the size of the provincial public sector.<sup>19</sup> As a result of the bargains struck between federal and provincial governments during the period, grants (excluding those for Equalization which are regarded as being part of  $F$  goods) grew from about 12 per cent in 1947 to about 24 per cent in 1972 when expressed as a percentage of provincial tax revenue from own sources.<sup>20</sup>

While the period until 1972 was characterized by shifts in demand toward provincial public services, the oil price shocks of 1973 and 1979 increased the demand for federal expenditures such as Equalization payments and import subsidies for oil sold east of the Ottawa Valley. The oil shocks cannot be analysed as readily in the context of the simple median voter model outlined in the second section as can the other shocks, because they had different effects on the constraints of voters living in oil-producing provinces and in provinces without oil resources. It would appear, however, that these shocks contributed, together with a reduced growth in the demand for social services at the provincial level, towards a short-run  $vFI$  in favour of  $F$  goods (including Equalization) and thus opposite in character to  $vFI^T$  existing in the 1950s and 1960s. The impact of the oil shocks on the  $F/NF$  ratio was attenuated in the late 1970s by changes in the Equalization formula limiting the extent to which rising oil prices could generate increases in Equalization payments and by the fall in the relative price of oil in the early 1980s.<sup>21</sup> However the 1980s ushered in a period of low real growth and high unemployment, and this recession probably reinforced the shift in demand towards  $F$  goods, especially unemployment insurance and other federal transfers to persons.

Fiscal history is consistent with the hypothesis of a basic change in the character of  $vFI$  after 1972. The post-war decline in the federal share of total government expenditure had clearly come to an end by 1972. The federal share

19 Hartle (1976, 96), for example, quite properly expresses puzzlement as to why grants were favoured by the federal government, with their influence on perceived tax-prices appearing to benefit only the provincial governments. The answer suggested here is that the next best alternative, that is, resolution of  $vFI$  entirely via increases in provincial tax rates, was worse from the federal perspective. This answer assumes that the federal trade-off between reducing taxes (and thereby foregoing association with provincial programs via grants) and increasing grants (and thereby foregoing the political benefits of reducing taxes) resulted in a mixture of both grants and tax reductions.

20 Federal grants are defined to exclude Statutory Subsidies under the BNA Act of 1867 and Equalization paid after 1957. These transfers are considered here to be federal expenditures for the purpose of maintaining horizontal balance, a federal responsibility since Confederation. When these federal expenditures are included in with other grants, grants as a per cent of provincial tax revenue from own sources rise from 14 per cent in 1947 to 33 per cent in 1972. Sources: *Economic Review* (1982, 196), Lynn (1964, table 1), and Department of Finance (various years).

21 See Breton (1977) and Courchene (1984) for discussion of oil-related changes in the Equalization formula.

declined more or less continuously from about 84 per cent in 1945 to about 51 per cent in 1972 and has been more or less stable since then.<sup>22</sup> Moreover, Established Program Financing, introduced in 1977 amid much political debate, restricted the growth of federal grants to the rate of growth of nominal GNP.<sup>23</sup> Grants (excluding Equalization) from the federal government as a per cent of federal expenditure have since fallen from approximately 15 per cent in 1977 to about 13 per cent in 1983.<sup>24</sup> In addition, the federal government has succeeded in expanding its share of western oil revenues at the expense of producing provinces.

Analysis of a fifth, demographic shock suggests that the shift in majority rule equilibrium towards the federal level may continue in the future. David Foot (1984) has recently argued that the pre-eminent responsibility of the federal government for providing programs for older Canadians will create increasing pressures for a relative increase in the federal sector unless there is an adjustment in the existing constitutional assignment.

#### MEASURING VERTICAL FISCAL IMBALANCE

In testimony before the parliamentary task force on federal-provincial relations (1981), the Canadian Minister of Finance stated that 'some observers had concluded there is now an intergovernmental fiscal imbalance in Canada. There is no precise or generally accepted definition of the concept ... However, it generally refers to the fact that one order of government has a large and persistent deficit or surplus in its accounts in relation to that of another order of government' (Special Committee Minutes, 1981, 2A:7).<sup>25</sup>

The deficit has been widely used as a measure or indicator of VFI by both politicians and academic writers. This raises the question of whether deficits have any systematic relation to a rigorously defined concept of VFI.

Consider first whether the deficit can be related to *long-run* VFI. In a long-run equilibrium with majority rule we would expect both levels of government to engage in some borrowing. It is possible that the amount of such borrowing is influenced by the difference in constraints operating at the two levels. Since the federal government is not forced to compete with other

22 These figures include grants as an expenditure of the government that makes them. The same pattern emerges if one uses 'after transfer payment' figures. See the *Economic Review* (1982, 198-9).

23 Much analysis of EPF has concentrated on the switch from conditional to unconditional grants that was part of this agreement (e.g., Courchene, 1984). In our view, an equally important aspect concerned the *level* of federal grants.

24 These figures refer to fiscal years 1977-8 and 1983-4. See the *National Finances 1984-5*, and other years.

25 The minister made clear that it was the federal government that in his view suffered from persistent deficits, partly as a result of the increase in world oil prices, and he went on to argue that cuts in federal grants would have to be introduced in order that the burden of adjustment to a more balanced situation would be shared by the provinces. His views are in contrast to those of the Economic Council (1982), which sees no structural imbalance.



jurisdictions, it may be better able to exploit any fiscal illusion associated with the use of borrowing rather than taxation and to shift part of the present tax burden to future generations. The same forces that give rise to  $VFI$  in long-run equilibrium may therefore also affect the deficit at the two levels of government. Unfortunately, this does not mean that the relative size of deficits provides an appropriate measure of  $VFI^*$ . Borrowing is also influenced by other factors, such as the proportion of a government's budget that is devoted to capital formation. Unless the impact of such factors can be removed, the difference in borrowing associated with unequal political constraints cannot be isolated. Finally, one should note that even a successful separation of influences does not yield a measure of the social loss, but merely an indicator that  $VFI$  does exist.

As pointed out, almost all analyses of vertical imbalance are concerned with  $VFI$  in the short run rather than in the long run. Do deficits, or changes in deficits, indicate that a disequilibrium situation exists? Rapid increases in the amount of borrowing may be linked to exogenous shocks such as a sudden shift in public tastes for  $F$  relative to  $NF$ . The reason can be understood by looking at private behaviour in the face of unforeseen changes. We often observe households reacting to sudden financial demands upon them by increasing debt. As time progresses, a more gradual adjustment is worked out and outstanding debt is again reduced in relation to income. Voters may demand a similar pattern in the public sector. In other words, they may prefer an initial increase in public debt to a sudden jump in tax rates that would force them to rearrange their consumption plans. Just as in the private sector, a more gradual adjustment should then follow with the attendant reduction in the deficit.

But while changes in deficit levels may be caused by exogenous shocks, they cannot be taken as measures of  $VFI^T$ . First, it should be clear that transitional deficits may be prompted by factors that do not reflect a long-run shift in demand for federal and non-federal goods, such as short-run macro-economic fluctuations and electoral cycles, to mention just two. Again, the impact of these extraneous factors would have to be removed unless they themselves result in new long-run equilibria under majority rule with respect to the desired allocation of  $F$ ,  $NF$ , and  $P$ . Second, even if appropriate corrections are made, figures on borrowing cannot be used as a proxy for the welfare loss associated with persistent disequilibrium. Persistent deficits at one level, if corrected properly for the influence of other factors, may indicate that the process of adjustment is taking place more slowly than is desirable. However, this merely implies that such figures represent an indicator of disequilibrium; it does not make them a *measure* of short-run  $VFI$ .

In a book devoted to the concept of fiscal balance Hunter (1977) has proposed a quite different approach to measurement. He starts by asking what proportion of provincial revenues is under the full control of provincial governments and what proportion is determined by the federal government. In Hunter's view, lack of provincial control over revenue sources is synonymous

The Effect Of Changes In Exogenous Factors On Allocation In A Federal State

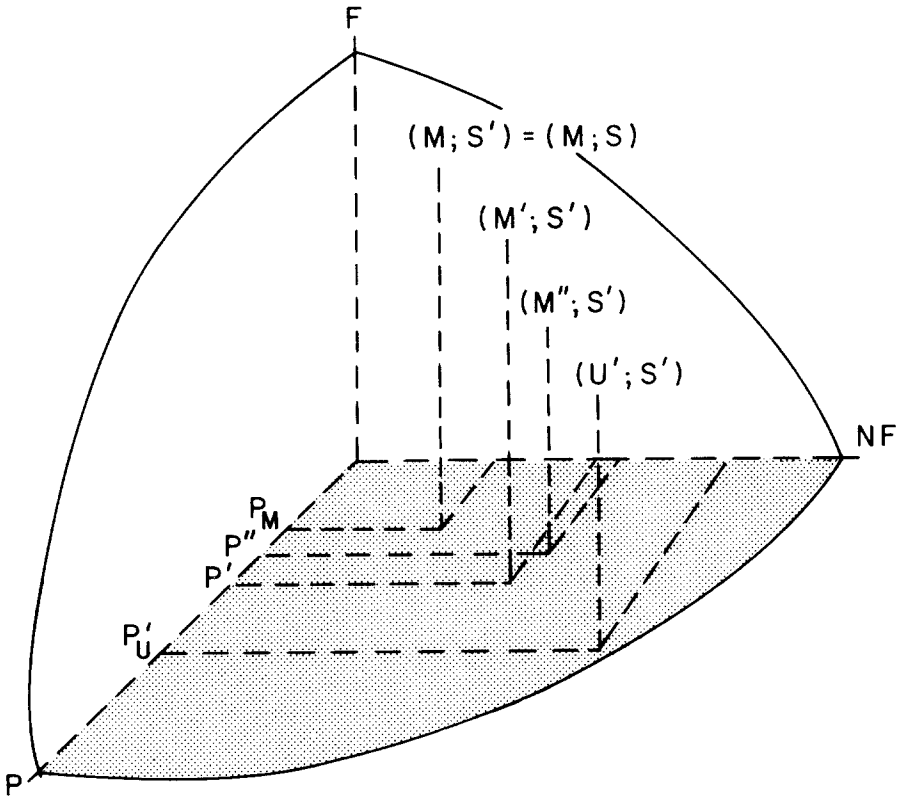


FIGURE 2 The effect of changes in exogenous factors on allocation in a federal state

with vertical imbalance. This leads him to question policy instruments such as grants since they give additional control to the federal government and reduce provincial discretion. Put in the context of figure 2, Hunter's analysis focuses mainly on whether we reach  $(M', S')$ , which is preferred, according to his assumptions, rather than  $(M'', S')$ , the equilibrium with grants.

Hunter's work can be criticized in two respects. His attempt to construct a technical measure showing the degree of provincial control over revenues depends on estimation of control weights or parameters attached to different revenue sources.<sup>26</sup> Yet he does not offer an objective methodology for determining these parameters.

26 Hunter constructs what might be called a coefficient of vertical balance to measure the degree of control. Provincial revenues are divided into six components: revenues from taxes levied exclusively by provinces; revenues from shared taxes; non-tax receipts; unconditional grants; conditional grants; and provincial borrowing. For each of these six items  $R_i, i = 1, \dots, 6$ .

The second, more fundamental question, concerns Hunter's framework for defining fiscal imbalance. There is no theoretical justification for linking vFI to a comparison of  $(M';S')$  and  $(M'';S')$ . In long-run equilibrium, the appropriate comparison is between  $(M';S')$  or  $(M'';S')$  if grants exist and some standard of reference, defined by us to be the Lindahl equilibrium consistent with unanimity over the country as a whole. In the short-run, it is between  $(M';S')$  and  $(M;S')$  or between  $(M'';S')$  and  $(M;S')$ .

As a final comment on Hunter's measure, note that the supposition that grants must reduce welfare and increase vFI is unfounded. In the previous section we showed that the price effect arising from grants can move the economy closer to  $(U'';S')$ , with the result that  $(M'';S')$  may be associated with a higher level of welfare and a smaller long-run vFI than  $(M';S')$ .

## CONCLUSION

The concept of vertical fiscal imbalance relates to the relative size of the federal, provincial and private sectors. A meaningful analysis of vFI must consider long-run and short-run as well as normative and positive aspects of the problem.

The paper analyses all four aspects in the context of a simple three-sector model where the allocation of national output among sectors results from interaction of a public choice process with an overall resource constraint. The normative analysis compares this division of output with an ideal, Lindahl allocation of resources in order to derive a definition of long-run vFI. Short-run vFI, on the other hand, is linked to disequilibrium and identified with the welfare loss resulting from a failure by the federal system to adjust promptly to exogenous shocks.

The positive analysis suggests a reassessment of Canadian fiscal history since the Second World War. It is shown that this history can be understood in large part as a response of majority rule equilibrium to several important exogenous shocks forcing a new division of national output among sectors. The political discussion and the policies chosen – such as federal grants to the provinces – reflect the attempts of political actors at different levels of government to secure a favorable outcome to the adjustment process.

While vFI is difficult to measure, it is a meaningful concept that can be defined in a theoretically consistent fashion and be used to gain a better understanding of intergovernmental policy and fiscal history. The analysis

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2, ..., 6, a control parameter or weight  $w_i$  is estimated, falling between zero and one. The resulting index, or coefficient of vertical balance (CVB), equals the ratio of the weighted to the unweighted sum of revenues:  $CVB = \frac{\sum_i w_i R_i}{\sum_i R_i}$ . The CVB will approach one if prov-

inces are largely independent in setting budgetary revenues and zero if they have only little discretion.

suggests, however, that the focus of the discussion should be shifted away from debates about deficits and about what level of government bears responsibility for them. VFI involves the broader and more important question of whether the federal system and the political process can respond effectively to major outside shocks and to changes in economic constraints that face the federation.

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