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## Abstract

Many important questions in the field of public finance can be viewed as problems involving public policies in open economies. This paper draws together, from that perspective, a wide range of topics in public economics, emphasizing the implications of resource mobility for our understanding of the efficiency and distributional impacts of public policies. These topics are relevant for the purposes of policy evaluation, political economy, and the broadest questions of governance and of public sector organization at all levels of government, from the purely local to the global.

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# 1 Introduction

To begin with a sweeping and therefore potentially misleading generalization, one may say that public finance has traditionally been dominated by a “closed economy” perspective. The main body of the discipline, as communicated to students, researchers, policymakers and the public at large, commonly proceeds from the (often implicit) assumption that fiscal policies are made by a unitary government, that they apply to a fixed group of households and firms, and that economic interactions with the rest of world may safely be ignored. As partial evidence in support of this generalization, standard textbooks seldom devote more than a single chapter (about one chapter out of twenty seems typical) to the study of policies involving more than a single government that acts in isolation from the “rest of the world”.

The phrase “open economy” is most commonly applied in the context of international economics. Generalizing once more, international economics focuses primarily on the exchange of goods and services among distinct national economies and on policies that pertain to international trade and finance, suppressing the structure and interactions of local and regional markets within national economies and the role of fiscal policies internal to these economies – i.e., those policies that are the primary focus of public finance. As partial evidence for this sweeping generalization, one may again consult standard textbooks on international economics.

These academic traditions have facilitated a highly fruitful division of labor in research, teaching, and policy analysis and debate. When attempting to investigate complex problems and communicate ideas about them, strategic simplifications are not merely convenient, they are essential. At the same time, there is broad recognition that helpful simplifications must be suitably adapted to the issues under investigation, and that there is no universal analytical framework that can address all issues; stated differently, all simplifying frameworks, as essential as they may be, are potentially misleading.

In this paper, I sketch a somewhat non-traditional perspective on public finance, one that recognizes that economies and governments do not exist in isolation from one another, but that economic (market) interactions with the rest of the world, and policy interactions with other governments, are of critical importance for many standard public finance problems. This “open-economy public economics” perspective simultaneously departs from and blends traditions of both public finance and international economics. It nevertheless has well established, if somewhat fragmented, intellectual antecedents and research traditions.

Open-economy public finance, as I characterize it in this essay, has gradually become an increasingly active branch of public finance research. In the US academic tradition, the openness of jurisdictions has long been recognized in the literature on local public finance,

a significant portion of which has appeared in the *NTJ*. In this essay, I make no attempt to provide a thorough treatment of any particular aspect of open-economy public finance. My purpose is to illustrate some of the many topics that it encompasses (Appendix A offers additional illustrations) and to sketch the outlines of a more unified approach to the study of what at first may appear to be rather unrelated questions in public finance. Viewed through the lens of open-economy public finance, insights gleaned from many distinct lines of inquiry can reinforce one another and thus deepen our understanding of difficult and subtle problems, simultaneously suggesting opportunities for researchers to profit from the contributions of those working in different branches of public finance and related fields, such as labor and international economics, economic history, political economy, political science, law, and others.

By way of recapitulation and as a point of reference, some of the key issues raised in early discussions of local public finance are briefly described in Section 2. Section 3 outlines a framework for the analysis of fiscal policy in jurisdictions where one or more productive resources is “mobile”. This framework shows how openness can dramatically affect the incidence of taxes, the welfare effects of redistributive tax/transfer policies, the political economy of fiscal policy, and other key questions in public finance. Section 3 also illustrates how insights from even the simplest framework often carry over or can be adapted to a wide range of much more complex situations. Section 4 discusses “fiscal competition”, using the simple economic insights presented in Section 3. Section 5 shows how fundamental economic, technological, and other factors, combined with policy choices and institutional arrangements, influence the degree to which governments and economies are “open”.<sup>1</sup>

## 2 Open-Economy Public Finance: Early Contributions and Fundamental Themes

Many of the key topics of open-economy public finance will be familiar to the *NTJ* readership. For those who focus mainly on closed-economy issues, however, a brief mention of some outstanding early contributions may be useful.

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<sup>1</sup>Space constraints permit only a very informal and admittedly incomplete discussion of a very large subject that has been studied by many investigators over a long period of time. Citations to relevant literature could fill many pages; only a very few prominent works are mentioned here and in the Appendices. More detailed treatments available elsewhere (e.g., Agrawal, Hoyt, and Wilson (forthcoming) and Inman and Rubinfeld (2020) provide additional references.

## 2.1 Musgrave, Tiebout, and Stigler

To frame the discussion, let us recall that Musgrave (1959) identifies three key functions of the public sector – the “allocative”, “distributional”, and “stabilization” branches, responsible, respectively, for promoting the social goals of efficiency, equity, and macroeconomic and financial stability. Musgrave devotes little more than a few pages of his classic work to “multi-level” government finance, that is, to the issues that arise at the subnational levels of government. He expresses the view that subnational governments need not devote much policy attention to the distributional or stabilization functions of the public sector, leaving these to the national or central government level, which is better equipped to address them. Subnational governments can play a useful role, however, in pursuing allocative objectives. Musgrave’s treatment, brief though it is, contains the germ of a theory of the optimal organization of the public sector.

Musgrave’s views were evidently influenced, to some degree, by Tiebout’s celebrated 1956 contribution, “A Pure Theory of Local Expenditures”, written immediately after and in explicit response to Samuelson’s classic papers (1954, 1955) on public expenditures. Tiebout clearly intends to suggest that the ability of households to choose their places of residence helps to solve the problem of “preference revelation” for public goods and services, a primary focus of Samuelson’s discussions. The general idea is that when households can move among localities, they can group together with others whose demands for public goods and services are similar to their own. Tiebout’s paper, however, contains no formal demonstration that the “Samuelson condition” for local public expenditure is achieved by household locational choices. Although Tiebout’s discussion is imprecise, it is highly suggestive, having motivated further study of several related but distinct issues in local public finance, and it is rightly viewed as seminal in this regard.

Musgrave recognizes Tiebout’s insight that household locational choices depend on local public policies. He infers that households may thus sort themselves by income levels, an outcome that is to be expected if local public goods and services are normal goods. Musgrave further observes, however, that while it is “advantageous for people with high incomes to associate with others with high incomes, excluding people with low incomes ... it will be desirable for people with low incomes to enter a community with as high an average income as possible” (p. 133). This idea is also a focal point of Stigler (1957), another insightful early contribution (apparently not known to Musgrave). Stigler examines the “tenable range” of local government fiscal functions, with special emphasis on Musgrave’s “distributional branch”. Though brief and somewhat informal, Stigler’s essay clearly indicates how open-economy considerations, again in the form of household mobility, affect the desirability and even the feasibility of local redistributive policies. Stigler observes that a progressive local income tax, for example, would tend to drive high-income households out of a locality; similarly, if the locality uses its tax proceeds

to raise benefits (or reduce taxes) for lower-income households, it will tend to attract the poor. Stigler argues that competition among governments can contribute to efficient resource allocation, but that competitive pressures make redistribution less effective, perhaps even unsustainable, and that “redistribution is intrinsically a national policy”.

Although Musgrave, Tiebout, and Stigler focus especially on household mobility, their insights are generally applicable in virtually all public finance contexts. Consumption-based taxes (retail sales, value-added, or excise taxes) can be partially or fully equivalent to taxes on household earnings or incomes, and many public goods and services (income-conditioned transfers, health, education, age-related benefits, and others) are partially or fully equivalent to transfer payments (or negative taxes); household mobility is, accordingly, potentially relevant for all such policies. Similarly, source-based taxes on (or subsidies to) capital or on capital income frequently raise issues very analogous to those related to household mobility. For this reason, it is often convenient, for brevity’s sake, to use the term “factor mobility” to include both labor and capital mobility, remembering that factors of production can be heterogeneous and, for some applications, must be disaggregated.<sup>2</sup>

A related kind of mobility arises in the context of cross-border transactions, where the locations and mechanisms (physical or virtual) of commercial transactions for both final and intermediate products may cross jurisdictional boundaries, even if buyers and sellers themselves do not change their primary places of residence or business. This type of mobility thus falls squarely within the broad framework of open-economy public finance, although the taxation (or subsidization) of commodities raises somewhat different issues than fiscal policies that are applied to persons, the primary focus of the present discussion.

## 2.2 Efficiency, Equity, Stability

The remarkably similar views expressed by Musgrave, Tiebout, and Stigler have resonated throughout the literature of local public finance, receiving much added impetus from Oates’ influential *Fiscal Federalism* (1972). These authors all consider how mobility matters for *efficiency* and *equity* or, in short, for economic welfare. Much subsequent research on “open economy public finance” may be viewed through the lens of Musgrave’s “three branches”, elucidating whether or how jurisdictions with open economies can, do or should promote efficiency and equity and how their policies affect macro/financial stability.

The efficient provision of local public goods and services, which he links to household

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<sup>2</sup>As an aggregate, “labor” includes workers who are both high- and low-skilled, young and old, native- and foreign-born, managers, the self-employed, and so forth, some, all, or none of whom may properly be considered as “mobile” in a given context.

locational choices, is the key concern raised by Tiebout. A closely related and logically prior issue, also relevant for efficiency, concerns the existence and stability of equilibrium locational choices, alluded to by Musgrave: if both the rich and the poor wish to live with the rich, what would prevent the formation of just one all-inclusive community? If that were to occur, would there not be some inefficiency arising from such a hyper-agglomeration? Stigler raises a similar issue from another angle when suggesting that local policies may be balanced on a knife's edge: any local burden on the rich means that they all vanish, whereas all of the poor end up in that one locality that offers them the largest public benefit. Such extreme outcomes are not observed in practice, which suggests that the study of local public finance questions should start with a more basic economic analysis of the location of households and businesses. A standard analytical framework, sketched in Section 3, postulates that there is a limited amount of one or more scarce, locationally-fixed resources (perhaps like land) in any local jurisdiction and that the market pricing of such resources rations access to them. Under such a specification, it is generally inefficient for the entire population to locate in just one place, which means that fiscal policies that affect locational decisions may either support or distort efficient resource allocation.

Several related questions arise along the "equity" dimension of open-economy public finance. A first, suggested by Stigler, concerns the feasibility and efficacy of local redistributive policies. A second concerns the implications of mobility for the underlying distribution of real incomes, and a third concerns the incidence or distributional effects local policies. A fourth question, lying at the efficiency/equity interface, concerns the separation of heterogeneous households (and, as an obvious extension, firms as well) into homogeneous groups; such stratification, whether by income or other attributes (age, race, family size, idiosyncratic preferences, language, religion, production technologies, etc.). How and under what conditions does mobility give rise to (some type of) homogeneity? If such stratification occurs, does it enhance or detract from efficiency or equity? Does stratification itself intrinsically give rise to equity concerns?

The "stabilization" dimension of public finance, insofar as it is separate from the efficiency and equity issues already mentioned, is also related to mobility, whether the mobility of commercial transactions (local fiscal stimulus may largely affect external trade rather than domestic output) or the mobility of labor and other inputs, (as discussed in the literature on optimal currency areas inspired by Mundell (1961)). As one illustration, the magnitude of the funds transferred under most intergovernmental grant programs are contingent, directly or indirectly, on the size of the recipient jurisdiction, whether measured in terms of total population, numbers of students, or other similar indicators. Intergovernmental transfers are also often utilized to deal with governments facing financial crises, sometimes connected to a (prospective or realized) failure to meet debt and other financial obligations. The debt policies of subnational governments are often regulated or overseen by those at higher levels, sometimes through quantitative restric-



tions (including prohibitions), special political constraints, or by statutory restrictions on allowable uses of debt. It is useful to remember that debt policy policy can be viewed as an implied or residual outcome of tax and expenditure policies; insofar as mobility matters for the latter, it must thus also matter for the former.

Although space constraints preclude discussion of many of the efficiency, equity, and stabilization issues that arise in open-economy settings, all of those mentioned above, and many more, have been the subjects of academic and policy research and debate.

### **2.3 Public Choice, the Organization of the Public Sector, and Fundamental Reform**

As in closed economy public finance, the analysis of local government policies naturally begins by asking how private sector agents and market conditions are affected by *exogenously-determined* fiscal and other policies. At another level, however, one can and should investigate how policies themselves are chosen *endogenously* through “collective choice mechanisms”, such as voting, lobbying, and the activities of political parties. In an open-economy context, interactions with external markets and other governments also matter, perhaps decisively, for policy choices: Households (and businesses) may “vote with their feet”, thereby influencing “exit” as well as “voice” (Hirschman, 1970). Although Tiebout, Stigler, and Musgrave do not discuss the political economy of local policymaking in any detail, they all emphasize that household mobility affects the constraints and incentives that bear on local policymaking, so that localities do (or at least may possibly) perform allocative functions efficiently, but may not (and perhaps cannot) achieve redistributive goals, a task that must then be left for a higher-level government.

Once local policymaking is viewed as endogenously determined, an entire series of important questions arises. Can, do, and should higher-level governments regulate, influence, encourage, or discourage the taxes, expenditures, investment, borrowing, or other policies of local governments through the use of intergovernmental transfers, mandates, floors or caps on tax rates, or other regulatory instruments? The important question here is not what an omniscient and omnipotent planner would dictate for the entirety of the public sector. Rather, the question is whether the local policymaking process produces satisfactory outcomes and how that process responds to whatever incentives may be imposed upon it by higher level authorities. Intrinsic to this question, and thus to the formulation of intergovernmental policies, is an understanding of how the local policymaking process operates, a question in positive political economy.

Needless to say, the policies chosen at higher levels of government are also determined through political mechanisms. Recognizing that higher level governments may not always be directed by benevolent planners, how can one determine whether and how central

governments should attempt to influence subnational government policies? How should (or are) policy responsibilities divided or shared among different levels of government? From a “constitutional design” perspective (notably associated with Buchanan and Tullock (1962)), authors such as Brennan and Buchanan (1980) have examined some of the implications of mobility for government organization, already mentioned by Stigler and hinted at by Musgrave.<sup>3</sup>

These questions arise in many practical policy contexts, some already mentioned. As a further illustration, the question of “fiscal decentralization” has featured prominently in policy debates and research in numerous developing and (formerly) transition economies, raising issues of policy design and implementation at all levels of government as well as basic questions of constitutional design and government structure.

A thumbnail sketch of the history of poor relief in England and elsewhere suggests how resource mobility can affect policies and the institutions that produce them. As described by Cannan (1912, pp. 182-183), in a book on local property taxation, English local governments at one time played a large role in the support of the poor. However, “the attempt of each locality to benefit its own particular [poor] inhabitants” would “offer the greatest attractions for immigrants.” . . . “This was . . . the effect of the unstandardised [i.e., decentralized] system of poor relief in the 17th century, and parliament endeavoured to meet the difficulty by restricting the freedom of migration.”

As we now know, over several centuries, local poor relief in England and elsewhere has been substantially augmented or supplanted by higher level governments. In the US, assistance to the poor involves a complex mixture of Federal, state, and local government policies, all developed within the framework of constitutional principles that preclude some of the restrictions on internal migration that were evidently feasible in 17th century England. Such restrictions still arise in other settings, however. As discussed further in Section 5, policies that control both internal and international migration continue today to be the subjects of intense policy interest in many countries, and fiscal and regulatory policies are shaped by institutions that continue to evolve. In open-economy public finance, issues of political economy, institutional structure, and institutional change are never far distant.

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<sup>3</sup>In a chapter entitled “Open Economy, Federalism, and Taxing Authority”, Brennan and Buchanan write: “Implicit in all of the analyses of [our] earlier chapters has been the assumption that the polity and the economy are perfect mappings of each other with respect to geography, membership, and the extent of trade and resource allocation. That is, we have assumed the economy to be closed: neither trade nor migration extends the economy beyond the boundaries of the political unit. . . . [In this chapter,] we examine the prospect of deliberate constitutional partitioning of the political power . . . within the confines of a larger and more inclusive political jurisdiction, within which internal trade and migration are unrestricted.”

### 3 Some Analytics of Factor Mobility and Public Finance

Readers of the *NTJ* are familiar with (many have taught) the analysis of taxes in the simplest of Marshallian partial-equilibrium settings, typically (if implicitly) presented in a closed-economy setting. Beginning with a demand/supply model that explains the determination of equilibrium prices and quantities, tax policies are treated as disturbances to market conditions that affect equilibrium demand prices, supply prices, and quantities, determined by using the method of comparative statics. Under idealized conditions of perfect competition, which of course are never perfectly satisfied in practice, these effects depend on demand and supply elasticities. The simplest version of this standard model provides an indispensable starting point for innumerable extensions and applications; indeed, many of the insights gained from such extensions derive from comparisons with it.

A similar and equally simple approach can be used to analyze the spatial allocation of productive factors of production. In this approach, the entire economy is divided into distinct regions, of which there may be many, possibly just two, but necessarily more than one. In studying public finance questions, these regions correspond to jurisdictions, such as localities, states/provinces, or countries. Within each region, some form of productive economic activity takes place, utilizing primary inputs, namely, labor (possibly of many different types), capital, and natural resources (land, minerals, water, etc.), and perhaps intermediate inputs to produce one or more outputs. Some inputs are intrinsically immobile; in fact the immobile resources effectively define what a region is. “Land” is one suggestive term that can embrace all immobile resources, though at the risk of misunderstanding if interpreted too literally.<sup>4</sup> How do market forces produce an allocation of productive inputs among regions? How do public policies, implemented in one or more regions, affect these market allocations, and what are the consequences for incomes, outputs, welfare, and other variables of interest, both within the regions where policies are instituted and throughout the entire economy?

#### 3.1 The Simplest Case

Much insight can be gained by considering the simplest possible cases. A simple diagrammatic analysis, which can be fully formalized, is sketched in the Appendix; it provides a useful reference point for further discussion. In essence, this model postulates two types of resources, freely mobile and completely immobile, used to produce goods and services

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<sup>4</sup>In some applications, for instance, one might wish to treat younger workers as mobile and older workers as immobile, or to treat workers as a whole as immobile and capital as mobile.

within a locality or region.<sup>5</sup> The government of a locality can use tax and expenditure policies that bear upon either type of resource, the simplest being a tax on one type that is used to transfer resources to the other. The welfare of the owners of mobile resources is determined, via spatial arbitrage, by the returns that they can earn in external markets, which is a key difference from the closed-economy case; it means that the burden of a local tax on a mobile resource is shifted (at least in part) to immobile resource owners.

In one important special case, the locality may be assumed to be “small”, in the sense that its policies have “negligible” impacts on the external returns to mobile resources. In this case, the owners of the immobile resources are necessarily harmed by a local tax on mobile resources: such a tax depresses the before-tax or gross incomes of the owners of immobile resources to such a degree that they are made worse off, on net, even if they receive, as lump-sum transfers, all of the revenues that are produced by the tax. If the locality is “large”, on the other hand, the owners of immobile resources could possibly benefit from such a tax/transfer policy if it is sufficiently modest in scale.

When localities are large, their policies affect the entire economic system in perceptible ways, changing the incomes of all mobile and immobile resources in all locations. Although often neglected, these effects also arise even when localities are small, and these effects are generally of *first-order* importance in the welfare evaluation of local policies. This general equilibrium perspective has been of fundamental importance in the analysis of taxes on property by local governments in the US and in other contexts (Mieszkowski (1972)).

*Normative Policy Evaluation and Predictive Political Economy (Public Choice).*

The normative evaluation of a given fiscal policy, such as the tax/transfer policy just outlined, obviously requires knowledge of the distribution of gains and losses that it produces. If “landowners” are highly deserving but “capital owners” are not, then the tax/transfer policy is desirable in the closed-economy case. It is undesirable, however, in the open-economy case, at least from the viewpoint of the single locality: it harms landowners and does not (appreciably) affect the owners of the mobile resource.

Knowledge of the distribution of gains and losses (from a fully specified policy) can also be used predictively in a public choice or political economy analysis to determine who would favor or oppose any particular policy. In the closed-economy case, “landowners” would favor the tax/transfer policy, as it raises their net incomes by the amount of the transfers they receive; “capital owners” would oppose it. These gains and losses could motivate votes, campaign contributions, lobbying efforts, bribes, or other attempts to influence the policy outcome. Because the gains and losses of the policy are distributed very differently in the open-economy case, the implications for political behavior are

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<sup>5</sup>To avoid needless complexity, it is convenient to suppose that the owners of mobile and immobile resources are distinct groups, so that the welfare effects of policies correspond to changes in net factor returns.

likewise very different: landowners would now *oppose* the policy, as it makes them worse off, whereas capital owners would be essentially indifferent to it, as their net payoff – the net return to the capital that they own – is not appreciably affected by the local policy.

The mobility of resources is partly a matter of policy choice, as discussed further in Section 5.1 below. Regulatory policies such as capital controls, immigration policies, and local zoning restrictions, for instance, all influence the ease with which owners of potentially mobile resources can utilize them in different locations. Comparisons of closed and open economy equilibria illuminate the gains and losses from changes in such policies, and thus the political pressures that come to bear when such policy issues arise.

As we have seen, both the normative and public choice analysis of fiscal policies depend on whether the policies are undertaken by closed or open jurisdictions. This outcome is most starkly revealed in the simplest of models, but remains true in much more complex situations as well.

### **3.2 Interpretations and Applications**

The analysis presented above is certainly too simple to serve as a complete treatment of any practical tax policy question, but through varied interpretations, it can provide insight, and serve as a springboard for further analysis, into many, as illustrated by following discussion.

#### *Business Income Taxation*

Much of the preceding discussion has proceeded as if “capital” is “the” mobile productive resource, an assumption that has become quite familiar in the study of local property taxes in the US. Not surprisingly, the same basic approach can also be used to study state or national corporation income taxes, where states or nations are considered to be open relative to capital markets in the “rest of the world”.

Whether capital should be viewed as the *sole* mobile resource in the local property tax or in other contexts is debatable. Cities – and, for that matter, states, provinces, and nations – contain residential, industrial, and commercial capital, but they also contain people, indicative of fundamental complementarities between the two and thus of some joint mobility. The analysis can be (and has been) extended to accommodate such added complexity.

#### *Labor Mobility*

In the local property tax case, it may sometimes be appropriate to view “land”, literally, as “the” immobile resource; on the other hand, in the case of corporation income taxes

at the state or national levels, some might wish to view labor as “the” (or an) immobile resource on the grounds that it is “easy” for capital to move but “difficult” for workers to move. Under this interpretation, the burden of taxes on corporation income, coupled with transfer payments to (or a reduction in pre-existing taxes on) the owners of immobile resources, including labor, is borne by the latter. If, as a gross generalization, capital income accrues mainly to households whose incomes are high relative to the incomes of workers, the imposition of taxes on corporation incomes, coupled with transfers to (or tax reductions for) workers would harm rather than help lower-income households. Such a result has already appeared above, expressed in different language.

Suppose, as an alternative, that low-skilled workers are immobile and that high-skilled workers are mobile. Consider a tax on wage income, perhaps applied in a progressive fashion. In this case, the model sketched above may be viewed as a variant of the famous Mirrlees (1971) model of optimal income taxation. In its standard form, that model assumes that labor is the only productive resource, all income is wage income, and the taxing jurisdiction is closed.<sup>6</sup> In the closed-economy setting, the analysis centers on the variability of labor supply (the labor-leisure tradeoff). If there is no such tradeoff, the earnings tax is distortionless and it may be evaluated solely from a distributional perspective; in particular, high taxes on the rich can effectuate lump-sum transfers to the poor, to any desired degree. On the other hand, if high-skilled workers are freely mobile, their net earnings are fixed (from the perspective of a single taxing jurisdiction) in external markets, and a highly progressive tax/transfer program harms rather than helps the poor.

#### *Mobility, Spatial Arbitrage, Risk, Insurance, and Inequality*

So far, the discussion has focused on the impacts of fiscal policies in purely deterministic contexts. Suppose, instead, that a worker’s lifetime income from the pursuit of a particular occupation or the return on a business investment cannot be known in advance, as technological change, changes in commodity prices, natural resource availability, and other events determine, in part, the productivity and thus the market returns that accrue to the owners of productive resources. Random outcomes often vary among regions in ways that are not perfectly correlated, so that workers in one location may be more productive and enjoy higher earnings than similar workers in a different location, and likewise for capital investments: resources that may be identical, *ex ante*, may end up with unequal rewards, *ex post*.

If resources are immobile, such unequal outcomes may be offset by compensatory redistributive policies. Such policies necessitate *interregional* redistribution, as income

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<sup>6</sup>The labor market of the Mirrlees model has no regional structure; thus, it is either fully integrated, so that no worker in that economy is impeded from moving freely to whatever location within it offers the highest wage, or else workers are rigidly attached to specific locations, within which their wages is determined by local technology; in the latter case, a location, and its associated productivity, becomes part of the endowments of workers.

generated by workers or nonhuman assets in more productive locations is transferred to those in less productive locations. In the US, many such transfers have taken the form of intergovernmental transfers, exemplified by programs such as Aid to Families with Dependent Children/Temporary Assistance to Needy Families, Medicaid, regional economic development policies, and income-conditioned taxes such as Federal personal income taxes. In other contexts, such as international earnings dispersion, there may be no well-established institutional mechanism through which to implement such policies; in different ways, the European Union (EU), World Bank, and other multi-national organizations represent possible institutional responses to such dispersion.

In contrast, if workers or other resources can move from less- to more-productive regions, in effect engaging in spatial arbitrage in the labor market, earnings differentials between more- and less-productive regions are diminished or, in polar cases, entirely eliminated, obviating one source of income risk and, importantly, also allowing more productive utilization of resources. For risk-averse decisionmakers, reductions in risk can raise expected utility and may encourage investments, such as the acquisition of specialized skills by young people, that would otherwise be unattractive. For example, in the US context, East-West migration during most of the period since the nation's founding, the South-North migration of black workers during the early- and mid-20th century, and the rural-urban migration of the 20th century associated with industrialization may all be viewed as important instances of spatial arbitrage that reduced earnings differentials and facilitated more efficient allocation of labor. Similar observations apply regarding international migration and internal migration in other countries.

Although spatial arbitrage through migration or investment flows may reduce the risks faced by owners of mobile resources, it may also concentrate the risks faced by owners of immobile resources, that is, it may affect the *distribution* of risk and thus the welfare evaluation of redistributive or social insurance programs, the policy rationale for the support of investments in human and non-human capital by higher- or lower-level governments, the role of financial markets in risk management, and, more generally, the suitability of institutional arrangements that mitigate inequality and risk.

### *Moving Beyond "Purely Private" Public Policies: Public Goods and Congestion Effects*

To this point, the only fiscal policies that we have considered are ones that transfer resources, in lump-sum fashion, from one set of factor owners to another, thus highlighting the implications of resource mobility for fiscal policies that are redistributive in nature, whether viewed as forms of social insurance or otherwise. The expansion of such policies has accounted for a very large share of the growth in public sector revenues and expenditures in many countries, especially the OECD countries, since World War II, as Musgrave and Stigler might have predicted. Tiebout, on the other hand, emphasizes the provision of public goods and services of the type described by Samuelson: "collective consump-

tion” goods that may not feasibly be provided privately because of non-excludability or that are not efficiently provided privately due to non-rivalness or absence of congestion. Many of the “tenable” functions of local governments lie in this realm and are of high interest for public policy.

The revelation of preferences for such goods lies at the heart of “mechanism design” issues that cannot be discussed here. There are, however, important connections between the issues of public good provision and redistribution that warrant attention. These connections are described more fully in Appendix C, which focuses on the redistributive impact of “cross subsidies” that arise when the beneficiaries of congestable public services do not bear, whether through taxes or by other fiscal and regulatory instruments, the full marginal cost of the services that they utilize. “Congestable” public services are ones for which the cost of provision rises as the number of consumers rises, which of course is a characteristic of such important local public services as education, transportation, and many others. It is also characteristic of explicit redistributive policies of the type alluded to above, such as cash or in-kind transfers. Just as Stigler emphasizes, such redistribution may not be “tenable” when jurisdictions provide services for mobile populations; in the context of publicly-provided goods and services, this line of reasoning implies that open jurisdictions should or will develop price-like financing mechanisms for many public services, not necessarily because of their preference revelation properties (although this is also possible), but in order to limit their redistributive impacts.

## 4 Fiscal Competition

“Tax competition” has become a popular topic in economic research and policy debates, as illustrated by a count of approximately one million returns using an internet search engine and a rapidly growing academic literature. The term “tax competition” is perhaps misleading, however, insofar as it directs attention toward taxes alone, to the exclusion of other policies, notably expenditure and regulatory policies, which ought generally to be considered in the same breath as tax policy; a more inclusive term, such as “fiscal competition”, may be more helpful in this respect.<sup>7</sup> Whether viewed in narrow or in broad terms, one may ask whether governments do or should choose their policies “competitively”, a somewhat vague question but one that often centers on factor mobility, i.e., on open-economy considerations. Frequently, both popular and academic discussions of fiscal competition often focus not upon the mobility of households, emphasized

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<sup>7</sup>Accounting identities imply that it is generally not possible for a government to change only one component of its taxes, expenditures, and borrowing, so that changes in fiscal policy choices necessarily involve at least two instruments. If a tax is increased in order to finance higher expenditures or to reduce borrowing, for instance, one might well speak of “expenditure competition” or “debt competition” rather than tax competition. Because competition can involve non-fiscal instruments, a case can be made for using an even more inclusive term, such as “systems competition”, used by Sinn (2001) in a different context.



by Tiebout and Stigler, but upon capital investment. There is no necessity, however, to limit the scope of the discussion to encompass capital mobility alone.

In many popular and academic discussions, “competition” means “strategic” competition – competition among a *small* number of *large* governments. As in the analysis of competition by firms, however, it would be erroneous to equate “competition” with “strategic interaction”: with large numbers of (atomistic) firms, and with large numbers of (atomistic) governments, decisionmakers face not an *absence* of competition, but rather *perfect* or pure competition. Whether strategic or atomistic, the analysis of fiscal competition, like the analysis of competition among firms, must rest upon some basic hypothesis about how policies are chosen. In the former case, profit maximization is the default specification, among many other possibilities. For what do governments “compete” and why? Here, too, many alternatives have been investigated in the literature.

#### *Competition Among Atomistic Jurisdictions.*

In the case of atomistic competition, one simple starting point builds upon the the analysis of the welfare effects of local fiscal policies sketched in Section 3. As we have seen, in contrast to the owners of immobile resources, the welfare of the owners of freely-mobile resources depends on external market conditions which are almost unaffected by local policies. Members of the latter group, therefore, have minimal incentives to devote attention or resources to the determination of local policies, unlike the former group, whose interests could thus be expected to dominate local decisionmaking.

In one widely-used specification of this type, a locality may be occupied by just one (or many identical) household(s), with local policies selected to maximize this individual’s welfare.<sup>8</sup> In what may be the best known version of this type of model, a small open locality is constrained to use only a tax on the mobile resource with which to finance a single local public good. This may roughly approximate the situation in a school district that uses a property tax to finance its expenditures. A celebrated result emerges from such a model: the utility-maximizing policy is not first-best efficient, because the mobility of the taxed resource raises the “marginal cost of public funds” to the locality. If all localities together could do so, they would jointly benefit from a coordinated increase in the rate of tax, enabling a higher level of local public good provision.

Such a result closely parallels the discussion in Section 3 of lump-sum tax/transfer policies in a small open economy. In that case, a tax on a mobile resource that is used to finance lump-sum transfers to immobile resource owners makes them worse off, and it is thus in their interest to oppose such a policy. The equilibrium local policy in this case – i.e., the *endogenously-determined* policy chosen by interested local parties – is to set the

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<sup>8</sup>If there are many different types of immobile resource owners (e.g., immobile residents and immobile local budget-maximizing bureaucrats), their interests can conflict, and more complicated models involving voting, lobbying, etc. may be required to analyze local policies.

levels of taxes and transfers to zero: competition for the mobile resource extinguishes the tax/transfer policy altogether. If instead the local representative agent wishes to provide a local public good that must be financed by a tax on the mobile resource, the equilibrium level of tax and expenditure need not be zero, but it is less than first-best efficient.<sup>9</sup>

These observations point directly to a further important prediction about endogenous policy choices: the mobility of one or more resources may provide an incentive for local decisionmakers to use alternative sources of financing for local public services, if feasible. For example, a local representative agent would elect to use a lump-sum tax instead of a tax on mobile capital to finance a local public good (e.g., local public education), if such a tax (or a close approximation to it) is feasible. Under this supposition, the “competition” for mobile resources (i.e., resource mobility itself) leads not to a finding of inefficiency in local policy but rather to the prediction about the composition of local revenue sources: a locality would set a zero tax rate on mobile resources and rely instead on distortionless taxes on immobile resources, sufficient to achieve first-best provision of local public goods.

#### *Competition Among the Few.*

As we know from basic economics, “competition among the few” (to borrow from Fellner (1949)) can be quite different from competition among many price-taking firms. In the context of fiscal competition, small open jurisdictions take as given the external rates of return on mobile resources, whereas large ones do not. For this reason, strategic or game-theoretic considerations must enter into any predictive model of endogenous policymaking with small numbers of large open jurisdictions.

Just as in the case of imperfect competition among firms, there is a profusion of alternative game-theoretic models of fiscal competition. For instance, two so-called “welfare magnet” governments might engage in Nash non-cooperative fiscal competition by choosing levels of welfare benefits for their poor residents. In equilibrium, each government would then have to raise some amount of revenues in order to satisfy its budget constraint. Alternatively, two “duopoly” governments might non-cooperatively choose their tax rates on a mobile resource (capital, high-skilled workers, etc.); the resulting equilibrium tax rates would then determine the amount of revenue available to finance public expenditures. Just as no two firms can simultaneously be Cournot and Bertrand duopolists, however, neither can two “duopoly” governments simultaneously compete in both public expenditures and in tax rates. Indeed, there are as many models of fiscal competition between any pair of governments as there are possible (and incompatible) specifications of strategic fiscal policy variables. In addition, models of strategic fiscal

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<sup>9</sup>As mentioned above, the “competition” for mobile resource in this case need not be described as tax competition; due to the government budget constraint, it could just as well be described as expenditure competition.

competition may involve repeated games, more general dynamic games, leader-follower (Stackelberg type) games, and many other possible specifications.

Theoretical analyses of small-number competition have most often focused on strategic interactions between just two governments with only one strategic variable. As a rule, more realistic models of non-cooperative games with many (asymmetric) governments (“oligopolities”) and with many policy instruments are much more difficult to analyze, if they are tractable at all. In general, it is far from evident which of the many possible theoretical specifications of fiscal competition may be best adapted to any particular application.<sup>10</sup> Empirical analyses of fiscal competition, on the other hand, have forged ahead, often by estimating policy reaction functions in contexts where there are more than two governments and possibly several policy instruments.<sup>11</sup>

#### *Evaluation of Fiscal Competition.*

On balance, is “fiscal competition” to be welcomed and perhaps encouraged, or deprecated and perhaps thwarted? Such a complex question can have no simple answer, but (as one million returns from an internet search indicate), opinions abound.

Competition among governments is sometimes imagined to result in a “race to the bottom”, a dramatic but pejorative and potentially quite misleading phrase which, in the context of fiscal competition, presumably implies that taxes and spending fall “quickly” to zero (or perhaps to some other minimum).<sup>12</sup> As seen above, competitive governments that possess a constrained portfolio of policy instruments may have incentives to choose inefficiently low (but not zero) levels of public good provision. Furthermore, they may not tax mobile resources at all in order to finance purely redistributive transfers. Provided with a sufficiently rich set of policy instruments, on the other hand, competition may also lead to “instrument substitution”, in which spending is financed by one type of tax or financing mechanism but not by another, thereby producing not a zero level of spending accompanied by efficiency losses from the misallocation of mobile resources but perhaps instead a first-best level of public good provision and a fully efficient allocation of mobile resources. School districts in the US, to take one prominent example of competitive governments, have long utilized property taxes (imposed in conjunction with regulatory instruments such as zoning restrictions) as a major funding source. This competition has produced equilibria characterized by quite unequal sustained levels of education spending among school districts whose tax rates are neither all equal to zero (or to any common minimum), which is hardly suggestive of a “race” to “the bottom”. On the contrary, high levels of education spending in some districts relative to others

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<sup>10</sup>See Keen and Konrad (2013) for extensive discussion and references.

<sup>11</sup>See, e.g., Brueckner and Saavedra (2001) for one pioneering analysis of property tax competition among some 70 towns in the Boston metropolitan area, and references therein to studies of strategic expenditure interactions among US states.

<sup>12</sup>A “race” is intrinsically a dynamic process. As yet, explicitly dynamic considerations have rarely entered into academic research on fiscal competition, which has instead relied almost exclusively on static equilibrium analysis, i.e., on the assumption that competitive equilibria are steady-state outcomes, and which cannot be characterized in terms of a “race”.

have provided a principal rationale for state-local “equalizing” transfer programs, sometimes court-mandated, throughout most of the post-World-War-II period. Through such programs, state governments now pay for about half of local public education spending, which serves as an indirect indicator of the unequal expenditure outcomes produced by fiscal competition in this policy area, and an illustration of an “upward reassignment” of a portion of Musgrave’s distributional branch functions. Perhaps one should liken competition among school districts to competition in perfectly competitive markets: competition does not drive prices to zero (in a race or otherwise), but to equality with marginal cost; both high- and low-cost (and quality) products can co-exist in equilibrium.

The evaluation of redistributive policies necessarily entails value judgments. Many will applaud some types of redistribution, but few would argue that all forms of redistribution are benign. As historical examples attest, resource mobility can constrain local tyrants or kleptocrats who would otherwise capture (quasi-)rents from those with limited opportunities to escape their depredations. The growth of central government redistributive interventions during the past century or more, welcomed by many (but not all), would presumably not have occurred had central governments not existed, or had their fiscal powers not expanded sufficiently to permit “upward reassignment” of redistributive policies from subnational governments.

The “assignment problem”, it should be mentioned, is much discussed in the literature of fiscal federalism, an issue that is related to the endogeneity of borders among jurisdictions. Borders can be changed explicitly through annexations, cessions, subdivisions, and by the creation of entirely new entities (such as the many tens of thousands of “special districts” in the US). They may also be altered functionally, if somewhat implicitly, through the creation or dissolution of interjurisdictional compacts. More implicitly still, the shifting or reassignment of (either or both) revenue or expenditure responsibility for poor relief, education, and other functions can also be viewed as a (partial) reconfiguration of the jurisdictional borders of governments or, indeed of the borders between the private and public sectors as a whole, as illustrated by the long-term shift in poor relief away from private to local and then to more centralized public sources, and by the shifting state/local balance in education finance (and control).

The evolution of public sector institutions and public policies, including redistributive policies, is, of course, an ongoing process. “Instrument feasibility” (e.g., legal, technological, or other determinants of the types of fiscal instruments governments may utilize), the presence or absence of complementary institutions (e.g., higher-level governments), political institutions, and of course the internal and external market environment all combine to determine the policy choices of competitive governments; this complex ensemble must ultimately underpin the welfare evaluation of “fiscal competition”.

As should now be apparent, open-economy public finance analysis does not support

simplistic answers to simplistic questions about competition among governments. It can, however, provide a useful framework for analysis that can help to elucidate the subtle interplay of market forces, political processes, and institutional structures that ultimately produce policy outcomes and their efficiency and distributional consequences.

## **5 Open or Closed? Resource Mobility, Technology, Institutions, and Dynamics**

The fruitful application of insights from open-economy public finance, as sketched above, necessitates a determination of whether or, more realistically, to what degree, resources such as labor (of various types) and capital are mobile. Similarly, it is necessary to ascertain whether – or, more realistically, to what degree – some but perhaps not all of the hundreds of thousands of the world’s governments should be identified as “open” or “closed”. All too often, this essential question has been overlooked, with research proceeding as if the answers are self-evident or amenable to simple characterizations: “Labor is mobile in the US, but not in Europe”, “capital is freely mobile on a global scale”, “the world is smaller”, “the poor are trapped”, “highly educated workers are more mobile than the less educated”, and so on. Such “proof by assertion” is unconvincing. This section presents two possible approaches that may help to clarify the determinants of resource mobility and thus the applicability of open-economy public finance analysis. The first considers resource mobility as a policy choice: a resource is mobile if a government allows it to be mobile. The second treats resource mobility as determined by technology. These two approaches are not mutually exclusive; monists might even argue that one is determined, at a deep level, by the other, but we may be agnostic about this question here.

### **5.1 Policies, Institutions, and Resource Mobility**

As mentioned above, government policies – capital and immigration controls are two obvious and important examples among many – affect the ability of capital owners and workers to utilize their productive inputs in different locations, as do international agreements (e.g., the World Trade Organization or the North American Free Trade Agreement/US-Mexico-Canada Agreement) and constitutional, statutory, or regulatory provisions governing subnational governments (e.g., the Commerce Clause, land-use controls). The evolution of the EU has had major effects on resource mobility in Europe. Since 1959, the Treaty of Rome and many subsequent developments (such as the Schengen agreement) have liberalized the mobility of people and capital within the EU. No less important has been the accession or attempted accession of new member states, from the founding six

members of the European Economic Community to the recent 28 members to the current post-Brexit 27. EU membership, and EU member participation in EU institutions such as the Schengen agreement, can be expected to change in the future.<sup>13</sup>

The restructuring of governments themselves, such as the collapse of the Soviet Union, the reunification of Germany, reforms of the Chinese *hukou* system, and the abolition of *apartheid* in South Africa have all had major effects on the mobility of resources. Indeed, history (and current experience) provides many vivid examples (one could wish that they were less plentiful) of instances in which governments have regulated mobility through the forcible capture and relocation of people and capital through enslavement, mass detentions or expulsions, confiscation, and war, events that, if rarely based solely on economic factors, nevertheless have important economic and fiscal origins and consequences.

Depending on one's perspective, these policy and institutional determinants of resource mobility may or may not be viewed as part of the subject matter of public finance, but their importance for fiscal systems and policies is beyond dispute. Having explored some of the implications of resource mobility for public finance, we can better appreciate some of the consequences of alternative constellations of policies and governance institutions, and some of the economic and fiscal factors from which they may spring. As one important instance, redistributive policies that are highly effective in closed-economy settings may be ineffective in open economies, so that policies that give rise to fiscal competition may limit redistributive tax/transfer programs involving mobile resources. At the same time, unimpeded resource mobility facilitates the utilization of capital and labor where they can most productively be employed, and the resulting increase in incomes may potentially be very large.<sup>14</sup> With significant exceptions, labor and capital within the US have been relatively freely mobile throughout the nation's history, which has promoted its economic growth and development, and internal resource mobility has played a similar role in other countries.

In accordance with Stigler's and Musgrave's precepts cited earlier, economic growth in the US has been accompanied by the "upward reassignment" of some public sector functions from local to state and from state to national levels in the US. Even if resource mobility and fiscal competition has limited the extent of *decentralized* redistribution, *centralized* redistribution has expanded. As resource mobility in the EU has increased, the redistributive policies of EU national governments have, in a sense, become less centralized as

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<sup>13</sup>Turkey began its effort to join the EU in 1987 and its membership application is still pending. Turkey differs linguistically and socially from most other EU nations, which some might see as major barriers to EU membership. On the other hand, many Turkish workers took advantage of Germany's postwar *Gastarbeiter* program, demonstrating that labor-market incentives (on both the demand and supply sides) can overcome such barriers.

<sup>14</sup>To illustrate, consider production technologies with two or more "essential" inputs, i.e., production processes that yield zero output in the absence of critical inputs; the Cobb-Douglas is one among many such. Regulations that prohibit the co-location of such inputs drive output to zero. As a more concrete illustration, a hypothetical division of the internal US market into 3000 isolated county-level submarkets with no resource mobility would come at the cost of much-reduced output available for both private and public uses.

national economies have become more integrated within ambient markets. To a thus-far limited extent, upward reassignment of redistributive policies in the EU is taking place; whether and how this may occur in the future, through the transfer of fiscal authority to the EU itself, through enhanced intergovernmental cooperation, or in other ways, remains to be determined. Open-economy public finance is intertwined with institutional evolution and policy change, and presents a host of important questions for academic and policy research.

## 5.2 Technology

Migration from the Old World to the New World has clearly depended on public policies, political pressures, and institutions. However, a fundamental prerequisite for such migration was the development and application of knowledge of the existence about distant continents, methods of navigation and shipbuilding, and technological innovations that made such migration feasible. Human migration as a principal determinant of population growth and as a mechanism for the transmission of human capital has been of indisputable importance for the economic history of the western hemisphere and of the entire world, and migration has equally indisputably depended upon technology. Only partly in jest, we may tentatively declare that “labor has been internationally mobile” for the past five centuries. Over long historical periods and also in more recent times, many other technological innovations (e.g., the development of communications, including print and electronic) have dramatically affected the markets for all productive resources. Some of the other costs of resource movement such as language, religion, and knowledge of legal systems have also eroded over time, thanks to investments in human capital (language education is one example) and market adaptations (e.g., immigrant enclaves, immigrant assimilation, recruitment and marketing efforts by firms seeking workers or customers), trends that can also be attributed in part to technological change.

Resource mobility thus clearly depends on technological factors, which generally seem to have reduced the cost of relocation and have thus made resources “more mobile”. The fruitful application of ideas from open-economy public finance will be much enhanced if the “degree of resource mobility” can be operationally defined and quantified.

One promising possibility is to postulate that there is some distribution of moving costs that resource owners face that can be inferred empirically from the study of migration or investment. Such an approach might yield elasticity estimates that indicate the degree of responsiveness to changes in return differentials among regions. A limitation of such an approach, however, is that it does not necessarily capture the relationship between resource movements and changes in equilibrium returns to both mobile and immobile resources, and thus many of the distributional and other welfare effects of mobility discussed above.

A somewhat different approach is to borrow from classical economic distinctions between “short run” and “long run” effects, recognizing, as suggested by illustrative examples mentioned above, that factor reallocations may not all take place instantaneously or at identical rates. The amounts of capital and labor within a given region are *stocks* of productive resources that may change because of slow or rapid *flows* of migration and investment, which suggests that the movement of productive resources may be usefully considered as *dynamic* adjustment processes of the kind that are well known in macroeconomics and growth theory. Under this approach, adjustment cost functions, which may be estimated empirically, represent the technologies that are relevant for factor mobility. Using such a specification, observed flows of factor movements are determined endogenously in response to changing economic or policy conditions and may be fast or slow depending both on the magnitude of spatial differentials in factor returns and on the underlying technology of stock adjustment. Analyses of this type show that equilibrium factor returns change gradually over time as factor stocks adjust, so that the distributional and efficiency effects of policy changes are different in the short and the long run.<sup>15</sup> Similarly, the extent to which different groups may support or oppose such changes may also vary over time.

### 5.3 Some Open Questions

Changes in policies and institutions influence factor mobility, but open-economy analysis predicts that factor mobility, or rather changes in the degree of factor mobility, may also affect the evolution of public policies and of institutions. Further progress on these difficult questions will be enhanced by better analysis of the mechanisms underlying spatial resource flows and associated distributional and efficiency impacts on factor stocks and factor returns. Historical observations suggest that these mechanisms have operated on a global scale, but perhaps only over relatively long time periods, whereas more localized resource flows may take place relatively quickly. On the other hand, the speed with which policies and institutions change due to resource mobility is plausibly related to the ease with which resource flows adjust to changing economic and policy conditions. Perhaps policies, institutions, and observed resource mobility should thus be viewed as jointly determined and, ultimately, fundamentally dependent on technology and technological change. Disentangling these complex relationships promises to be a challenging but important subject for future research.

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<sup>15</sup>For Marshall, the “short run” is a time period during which firms may adjust their utilization of labor, whereas in the long run, capital may also be adjusted, a distinction that has been part of the standard paradigm of economics ever since. It is therefore perhaps ironic or amusing to observe that much research on open-economy public finance (e.g., on fiscal competition) has relied upon exactly the reverse specification, treating capital as a variable input while labor is fixed. It may be noted here that empirical analysis of production technologies leaves no doubt that labor and capital are complementary inputs, which implies that the mobility of labor and capital tend to go together, if not entirely in lockstep – as illustrated by the dearth of cities without residents, businesses without employees, or people without employment and housing.



## 6 Conclusion

The issues and ideas outlined by Stigler, Tiebout, and Musgrave still pervade the field of open-economy public finance. Many of the most important questions in this field – only some of which have been mentioned here – can usefully be viewed through the lens of Musgrave’s “three branches” of the public sector, an invaluable organizing framework for public finance in this as in other settings. By their nature, these questions involve interactions among distinct economic regions and different governments. They include problems of local government finance, a field in which many key ideas have first appeared. They also include the tax and expenditure policies of state, provincial, and other subnational governments, and, in an international setting, of central government fiscal policies. The problems of open-economy public finance even include such structural questions as the creation of new governments, the dissolution of old governments, or the emergence and evolution of new types of multi-governmental entities. Some of these issues can be examined within relatively limited geographical contexts and over relatively short periods of time, while others are larger in geographical scope and must be considered over long time periods, historical or prospective.

These questions involve policy problems, at all levels of government, that are of intense practical interest to citizens, policymakers, and analysts. They are also among the deepest intellectual questions that confront scholars in economics, law, political science, history, and other fields of inquiry. It is obvious that many are far from settled, and it is therefore fair to conclude that some of the most interesting questions in public finance remain OPEN.

## REFERENCES

Agrawal, D.R., W.H. Hoyt, and J.D. Wilson (forthcoming), “Local Policy Choice: Theory and Empirics”, *Journal of Economic Literature*.

Brennan, G. and J.M. Buchanan (1980), *The Power to Tax: Analytical Foundations of a Fiscal Constitution* (Cambridge: Cambridge University Press)

Brueckner, J.K. and L.A. Saavedra (2001), “Do Local Governments Engage in Strategic Property-Tax Competition?” *National Tax Journal* 54 (2), 203-230.

Buchanan, J.M. and G. Tullock (1952), *The Calculus of Consent* (Ann Arbor: University of Michigan Press).

Cannan, E. (1912) *The History of Local Rates in England* (Westminster: P.S. King & Son).

- Fellner, W. (1949), *Competition Among the Few: Oligopoly and Similar Market Structures* (New York: A.A. Knopf).
- Hirschman, A.O. (1970) *Exit, Voice, and Loyalty* (Cambridge: Harvard University Press).
- Inman, R.P. and D.L. Rubinfeld (2020), *Democratic Federalism* (Princeton: Princeton University Press).
- Keen, M. and K. Konrad (2013), “The Theory of International Tax Competition and Coordination”, in A.J. Auerbach, R. Chetty, M. Feldstein, and E. Saez (eds.), *Handbook of Public Economics*, vol. 5 (Amsterdam: Elsevier), 257-328.
- McLure, C.E., Jr. (2001), “The Tax Assignment Problem: Ruminations on How Theory and Practice Depend on History”, *National Tax Journal* 54(2), 339-363.
- Mieszkowski, P.M. (1972), “The Property Tax: An Excise Tax or a Profits Tax?”, *Journal of Public Economics* 1(1), 73-96.
- Mirrlees, J.A. (1971), “An Exploration in the Theory of Optimum Income Taxation”, *Review of Economic Studies* 38(2), 175-208.
- Mundell, R.A. (1961), “A Theory of Optimum Currency Areas”, *American Economic Review* 51(4), 657-665.
- Musgrave, R.A. (1959) *The Theory of Public Finance* New York: McGraw-Hill
- Oates, W.E. (1972) *Fiscal Federalism* (New York: Harcourt, Brace, Jovanaovich).
- Samuelson, P.A. (1954), “The Pure Theory of Public Expenditures”, *Review of Economics and Statistics* 36(4), 387-389.
- Samuelson, P.A. (1955), “Diagrammatic Exposition of a Theory of Public Expenditures”, *Review of Economics and Statistics* 32(4), 350-356.
- Sinn, H.W. (2001), “Whither Systems Competition?” *CESifo Forum* 2(3), 2.
- Stigler, G.J. (1957), “The Tenable Range of Functions of Local Government”, in Joint Economic Committee, U.S. Congress, *Federal Expenditure Policy for Economic Growth and Stability* (Washington: USGPO), 213-219.
- Tiebout, C.M. (1956), “A Pure Theory of Local Expenditures”, *Journal of Political Economy* 64(5), 416-424.

## APPENDICES (For Online Publication Only)

Appendix A offers a brief elaboration of the kinds of topics that arise within the framework of “open economy public finance”. Appendix B sketches the essential elements of a formal model that underlies the specific remarks that appear in subsection 3.1 and much of the ensuing discussion. Because that model reduces fiscal policies to simple taxes and transfers, it makes no explicit allowance for public goods and services of the types analyzed by Samuelson and Tiebout. Appendix C therefore provides additional discussion of efficient financing of congestable (impure) public goods and services, emphasizing points of similarity with the analysis of redistributive policies that are the main focus of the text. Appendix D lists some of the author’s publications related to the subject matter of the text, organized by topic.

### A Topics in Open-Economy Public Finance

Discussions of “open-economy public finance” may well begin with a recognition of the sheer numbers of governmental units in the world, beginning with “local” governments. There are roughly 90,000 local governments in the US – cities, school systems, counties, special districts, and townships. Sometimes these localities are geographically distinct, in other cases their boundaries overlap, in other cases they may be geographically coterminous, and some localities are entirely contained within others. The functions and relative importance of these governments vary from state to state and within states, but, in aggregate, their tax, expenditure, debt, and regulatory policies have played major roles in the economic, social, and political development of the nation. These jurisdictions are “open economies” *par excellence*. Residents, businesses, and commercial activity flow into and out of them continuously, sometimes on a recurring daily basis (e.g., commuting, imports and exports, financial flows) or on seasonal, annual, or multi-year frequencies (up to and including life-cycle events, such as job changes, changes in educational status, family formation, labor-force entry and exit, etc.). These ongoing activities link localities to external markets for labor, capital, and goods and services. Barring special regulations, such as internal passport/registration controls in pre-*apartheid* South Africa or (especially pre-reform) China, the multitudes of local governments in other nations – in some cases, hundreds of thousands of them – likewise face substantial exposure to external markets in the modern era. As discussed below, these linkages with external markets are of significant and often decisive importance in the analysis of local government policies.

Similar to localities, the economic environments of state governments in the US and (with infrequent exceptions) subnational governments in other countries are open. People and business activities are not generally tied to specific locations, and the distributions

of populations, capital, and commercial activity can and do shift among subnational jurisdictions. Even at the level of national governments, the mobility of productive resources (broadly, capital and labor) and international commerce means that national or “central” governments, as well, are linked with external markets; this is true both in the presence and in the absence of multinational organizations and agreements, such as the EU, NAFTA/USMCA, or the WTO.

Not only do subnational governments choose and implement their policies in open market environments, they are also “open” with respect to each other. Intergovernmental linkages are sometimes “horizontal”, as, for instance, when two or more municipalities, states, or nations assume joint responsibility for provision of public services such as transportation, public safety, environmental services, or defense. Governments are also frequently linked through systems of fiscal transfers. The case of local public school finance in the US is illustrative. State governments funded about 40% of local school expenditures as early as the 1940s; since the 1970s, state support for local schools has generally exceeded funding from local sources. These state-local transfers for education – which have in many cases been significantly affected by judicial rulings – amount to about one-fifth of total state expenditures. In the US, states also support other categories of local spending; since 1977, the total amount of all state-local transfers accounts for about 40% of all local general revenue and about 30% of total state expenditures, both remarkably stable figures. It should also be noted that state governments can and do regulate the fiscal policies of localities, either through requirements, prohibitions, or other constraints on the types of revenue instruments they are permitted to use, the public service functions that they undertake, and the conditions under which they may issue debt. Among many possible illustrations, localities in some states are prohibited from using sales taxes or income taxes, whereas these revenue instruments – perhaps applied at rates that must lie within relatively narrowly-defined bands – play major roles in the financing of selected types of local governments.

Intergovernmental transfers also link national with subnational governments. In the US, Federal government transfers to state governments have amounted to roughly 25-35% of state government revenues for many decades, accounting for 15-20% of total Federal expenditures. These transfers span a wide range of public-sector functions, but play a particularly important role in programs with major redistributive components (AFDC/TANF and Medicaid). These programs entail considerable Federal regulation of the uses of funds, and thus the functions, of the recipient state governments. Under the US Constitution, states need not necessarily comply with all of the regulatory constraints that accompany these or other transfers, but failure to do so may put their funding at risk. Along the tax and debt dimensions of state and local government finance, the Federal government has sometimes provided indirect but significant support for the use of specific revenue instruments, in the form of tax expenditures that allow taxpayers to deduct some state and local taxes or by exempting from Federal income taxation the interest income

received by taxpayers on some (but not all) subnational government bonds.

All of these issues arise, in different forms, in other nations. Belgium, Canada, Germany, Italy, Switzerland, Spain, and Australia are among the many OECD countries in which the subnational governments and intergovernmental fiscal relations play a crucial role in fiscal policy.<sup>16</sup>

For the past several decades, policy questions concerning subnational government finance, intergovernmental fiscal relations, regional economic policy, and other aspects of open-economy public finance have also featured prominently in developing and “transition” economies around the world. This is not surprising, given that many of them have undergone significant institutional reconfigurations, ranging from major fiscal reforms to constitutional revisions; in some cases, new nations have been formed from the dissolution of predecessor states. These developments have stimulated much academic research that has been of direct relevance in sorting out fiscal and governance issues in these (and all) countries.<sup>17</sup>

Finally, at the international level, intergovernmental transfers sometimes take the form of foreign aid, whether bilateral or through multinational organizations (e.g., the IMF and World Bank). Such organizations also contribute to debt financing and, sometimes, debt relief, for target countries, especially including many developing countries, such as the so-called “Heavily Indebted Poor Countries”. In the EU context, “upward” flows of funds through external tariffs and national contributions are used to finance “downward” transfers for regional development, agricultural subsidies, and other purposes. The EU also influences the use of debt finance by member state, for instance through successive “stability” agreements.

As highlighted by this brief discussion, it should be apparent that few if any of the many hundreds of thousands of governmental units in the world can generally be viewed as impervious to ambient market forces or to other governments; almost all have potentially significant economic and policy interactions with the “rest of the world”. As discussed in Section 5, the extent of these interactions is partially determined by policy decisions, the implications of which can be better understood from an “open economy” approach to public finance.

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<sup>16</sup>There has been an outstanding tradition of academic policy research on federalism and subnational government finance in Canada (see, e.g., Boadway (1980, 1992), Boadway and Flatters (1982), and Courchene (1984)). Buettner (2009) shows how the fiscal adjustment dynamics of subnational governments in Germany differ from those in the US because of the operation of Germany’s system of intergovernmental equalizing transfers.

<sup>17</sup>Contributions by authors such Bird (1993), Bahl and Bird (2008), Gramlich (1993), McLure (2001), and Oates (1993), to mention only a few, convey some of the flavor of this work.

## B A Diagrammatic Analysis of Tax/Transfer Policies in Open and Closed Economies

This section sketches a simple model – perhaps the simplest possible – that provides a rudimentary foundation for the analysis of important questions in open-economy public finance. Analyses of this type underpin much of the discussion in the paper.

### B.1 Local Fiscal Policies: Preliminary Analysis

Suppose that the economy consists of two or more regions, each subject to the fiscal policies of a single government. Each region contains (in effect, is defined by) a fixed stock of a single perfectly immobile resource which is used, together with a single potentially mobile resource, to produce one homogeneous output. The stock of the mobile resource is fixed for the economy as a whole. The owners of each resource are assumed to be distinct and they seek to utilize the resource that they own to earn the highest possible net return. The gross or before-tax/transfer returns received by the owners of these factors are determined in perfectly competitive markets, which means that each resource earns the (value of) its marginal product wherever it is employed.<sup>18</sup>

Figure 1 illustrates the essence of the model, variants of which have been widely used in the literature. Here, “capital” is treated as the one mobile resource, which combines with “land” to produce output in each locality; in the figure,  $k_1$  represents the amount of capital in one such locality, locality 1.<sup>19</sup> The curve  $MP_k^1$  is the (value of the) marginal product of capital in local production, and it constitutes the local demand for capital which, under the assumption of free mobility, can be obtained from the rest of the world provided that it earns the net rate of return that prevails elsewhere, represented by  $r^*$  in the figure. For the moment, let us assume that  $r^*$  is not “appreciably” affected by any changes in local fiscal policy; such will be the case if there are many localities, each of which is “small” relative to the world economy.<sup>20</sup>

In the absence of any local policy interventions, the equilibrium amount of capital in the locality occurs at  $k_1^*$ , and the total value of local output is given by the area  $0abk_1^*$  under the  $MP_k^1$  schedule.<sup>21</sup> This is the value of local “GDP”, and it is also the total value of

<sup>18</sup>Virtually all of these assumptions, which are of course quite standard if not always innocuous, can be (and have been) relaxed. Such generalizations can result in interesting variations of the analysis.

<sup>19</sup>One may think, for instance, of a locality in which capital combines with land to produce buildings that generate valuable services for commercial, industrial, residential, or agricultural purposes. The value of the services of capital and land constitute sources of income to the owners of these commodities.

<sup>20</sup>In the case of only two “large” localities, discussed below, the curve  $MP_k^2$  in the figure represents the second locality; that curve should be ignored for the moment.

<sup>21</sup>The main step involved in formalizing this model is to postulate a production function  $f_i(k_i)$ , strictly increasing, concave, and differentiable, that shows how output in locality  $i$  depends on the amount of capital used in local production.

locally-generated income, of which the amount  $0r^*bk_1^*$  accrues to the owners of capital employed in the local economy, while the remainder,  $abr^*$ , accrues to “land”, that is, to the spatially immobile resource. Note that because of the presence of two productive resources, capital and land, there is a non-trivial functional distribution of (gross) income in this simple model, with the owners of one resource receiving one type of income and the owners of the other resource receiving the other type. Of course, because some people may own very little or very much of either or both resources, we cannot say anything about the size distribution of income so without additional information about resource ownership.<sup>22</sup>

Models of this general type, inspired especially by the work of Mieszkowski (1972), have been used to analyze the incidence of local property taxes in the US. In that application, these taxes are treated as (primarily) taxes imposed on the return to capital (or, equivalently, on capital itself) in each of many localities. Following in the spirit of Harberger (1962), essentially the same model has also been used to analyze the effects of corporation income taxes imposed by state or national government. The text discusses a wide range of other public finance questions that can usefully be investigated using this type of model.

Following the “local property tax” interpretation, suppose that locality 1 imposes a tax of  $t_1$  per unit of capital employed there (or, equivalently, a source-based tax on capital income).<sup>23</sup> Assuming as above that all factors are paid a gross (before-tax) return equal to their marginal products, the net-of-tax return to capital in the locality shifts downward by  $t_1$ , as shown by the dashed line in the figure.

If the locality were “closed”, capital would be immobile and the amount of capital in the locality in the presence of the tax would remain fixed at  $k_1^*$ . The local net rate of return on capital would fall to  $r^* - t_1$ , i.e., by the full amount of the tax. In the “open economy”

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Assuming competitive markets, the equilibrium gross return to capital is just  $f'_i(k_i)$  and the equilibrium gross return to the immobile factor is  $f_i(k_i) - k_i f'_i(k_i)$ , from which incomes and the distribution of incomes can be determined. To illustrate one straightforward extension of the model,  $k_i$  may be interpreted as a vector, a simple but empirically important generalization that allows for an arbitrary number of mobile resources and sources of income. As a second illustration, including a random technological parameter in the production function (or making the price of output a random variable) implies that outputs, factor prices, incomes, revenues, and expenditures become stochastic.

<sup>22</sup>For many public finance questions, the sources and uses of income are of central importance, and income, in various forms, accrues to “primary” factors of production such as labor, capital, and natural resources. For this reason, it is convenient to follow the common convention of ignoring intermediate stages of production.

<sup>23</sup>The following discussion assumes that  $t_1 > 0$ , that is, that the policy in question is a tax. Symmetrical analysis applies to the case in which the policy is a subsidy, i.e.,  $t_1 < 0$ . There are several reasons to make special note of this interpretation of the model. First, some policies explicitly provide subsidies for mobile resources. Second, in practice, some “tax” policies result in negative effective net taxes, or subsidies, as shown in studies of (marginal) effective tax rates of corporation income taxation. (These two points reflect the ambiguous dividing line between tax and expenditure policies that underlie the concept of tax expenditures.) Third, popular policy discussions are sometimes based on the idea that lower capital taxes attract capital, that this results in increased local output and increased demand for (and return to) labor, and that such policies are *ipso facto* desirable. The fallacy underlying such claims is evident if one considers the possibility of negative taxes: the “optimal” subsidy, under this line of argument (reminiscent of occasional claims that firms should attempt to maximize sales or market share), would be one that attracts all of the mobile resources in the world, at vast expense.

case, on the other hand (that is, when capital is freely mobile), the equilibrium stock of local capital is no longer  $k_1^*$  because capital owners can earn a higher net rate of return in the rest of the world (i.e., because  $r^* > r^* - t_1$ ). In fact, it is easy to see from the figure that the new equilibrium capital stock is  $k'_1 < k_1^*$ , sufficiently small that the *gross* rate of return on capital rises to  $r^* + t_1$ . Only in this situation is the local *net* rate of return on capital equal to the net rate of return in the rest of the world,  $r^*$ , as must hold in equilibrium. The mobility of a productive resource results in *spatial arbitrage* that equalizes the net rate of return in all locations.

This simple analysis immediately reveals a striking contrast between the “closed economy” and “open economy” cases. In the former, the net return to capital within the taxing jurisdiction falls by the amount of the tax imposed upon it, leaving the stock of capital (and total output) fixed. Neither the gross return to capital nor the return to land is affected by the tax, and thus the tax has no effect on the distribution of *gross* income. In the open-economy case, by comparison, the gross return to capital must be sufficiently high to insure that the after-tax return is the same as elsewhere. The gross return is accordingly smaller; in the figure, the total gross income received by owners of land falls to just  $ab'r'$ .

To provide a more complete discussion of the incidence and welfare effects of a local capital tax, it is necessary to close the model by specifying the uses of tax revenues. This can be done in infinitely many ways, each of which yields potentially quite different distributional and welfare effects. In the following discussion, let us focus on the case where “owners of capital” and “owners of land” are distinct groups, each consisting of completely homogeneous groups of people, and where all taxes collected from capital owners are distributed in lump-sum fashion to landowners. (Other possible specifications are possible; these could readily be adjoined to this benchmark or reference case.) This means that the local policy is a tax/transfer policy in which taxes are collected from one group and paid out to a different group. In Figure 1, the amount of tax collected is  $(r^* + t_1)b'c'r^*$ , which augments the incomes of landowners, the recipients of the redistributive transfers. As is clear from the Figure, the *net* effect of the policy is to *reduce* the net income and welfare of landowners because they suffer a loss of gross income  $((r^* + t_1)b'br^*)$  that exceeds the transfers that they receive by the amount  $b'bc'$ : the tax/transfer policy makes the transfer recipients *worse off*, on balance. The owners of the capital employed in locality 1, on the other hand, continue to earn the same net rate of return as capital owners in the rest of the world. Thus, the welfare effects of this tax/transfer policy in an open economy differ dramatically from the closed-economy case. In that case, as described above, the tax does not affect the equilibrium stock of capital, and it therefore has no effect on equilibrium gross factor incomes. The transfer of the tax revenues of  $r^*bc(r^* - t_1)$  from capital owners to landowners reduces the net incomes of the former by the amount of the tax, and raises the net incomes of the latter by the same amount.



## B.2 General Equilibrium (Systemwide) Analysis

Even given its simplifying assumptions, the analysis so far is incomplete in one essential respect: it fails to consider how the policies in one locality affect the rest of the world. If the stock of capital in the entire economy is fixed, a larger or smaller stock of capital in one locality necessarily implies an equally smaller or larger stock in the rest of the world, and this has important implications for the analysis of fiscal (and other) policies. We can usefully distinguish two cases, both of which are discussed extensively in the literature, namely, the case of “small” economies and that of “large” economies. Although the first may be more important in practice, it is helpful to begin with the second case in order to expose some key issues.

### B.2.1 Two Large Localities

Still maintaining the other assumptions of the simple model (only one mobile resource, one immobile resource, competitive markets, etc.), suppose that there are only two localities, 1 and 2, in the entire economy. This means that capital that is not employed in one locality must be employed in the other. Adapting Figure 1 for this purpose, let the length of the horizontal axis be equal to the total stock of capital in the entire economy,  $\bar{k}$ , so that any point on the axis represents a division of the entire capital stock between the two localities. Measuring the amount of capital employed in locality 1 from left to right, the amount of capital in locality 2 is thus measured from right to left. The dotted line in the figure represents the (value of the) marginal product of capital in locality 2 (i.e., the demand for capital in that locality).

If neither locality were to impose a tax on capital, the intersection of the two curves  $MP_k^1$  and  $MP_k^2$  would determine the equilibrium allocation of capital (with  $k_1 = k_1^*$  and  $k_2 = \bar{k} - k_1^*$ ), and the equilibrium rate of return on capital would be  $r^*$ . Total output and income generated in region 1 would be the area  $0abk_1^*$  as before, and the corresponding amount in region 2 would be the area  $\bar{k}db(\bar{k} - k_1^*)$ ; these areas can be decomposed to show the amount of income in each locality that accrues to the owners of capital and land. The allocation of capital in this case is efficient, and it maximizes the total income (“GDP”) of the two localities.

If locality 1 imposes a tax of  $t_1$ , and if locality 2 also imposes a tax at the same rate, the equilibrium net return to capital throughout the economy falls by  $t_1$ , and the equilibrium allocation of capital is, again,  $k_1^*$ . If the proceeds of these taxes are paid to landowners, their burdens fall entirely on capital, the recipients of the transfers enjoy an increase in their net incomes equal to the transfers that they receive, the levels of before-tax income remain unchanged for all factor owners, and the allocation of capital is efficient.

If instead the two localities impose unequal taxes on capital – say, a tax of  $t_1$  in locality 1 and no tax at all in locality 2 – the equilibrium allocation of capital, as determined by the intersection of the dashed and dotted lines in the figure, is distorted: the equilibrium stock of capital in high-tax locality 1 is  $k_1'' < k_1^*$  and there is a correspondingly higher stock of capital in locality 2. The equilibrium net rate of return on capital is  $r''$ , which is lower than  $r^*$  but higher than  $r^* - t_1$ . Thus, we see that the policies of “large” jurisdictions have non-negligible effects on the equilibrium returns to mobile resource, and that these policies can distort the allocation of productive inputs in ways that reduce aggregate output and income. Note also, however, that such distortionary policies produce gainers as well as losers. Specifically, the gross incomes accruing to the owners of immobile resources are higher (lower) in localities for which policies increase (decrease) the equilibrium amount of the mobile resource. Distortionary tax policies also reduce the equilibrium gross return to the mobile factor itself. Finally, for sufficiently small policies, the owners of immobile resources in a single locality may now benefit, on balance, from the unilateral imposition of a tax on the mobile resource: the reduction in gross income resulting from the tax can be more than offset by the use of the revenues to make compensatory transfer payments.

From these observations, we can ascertain the welfare implications of any fully-specified policies, including the breakdown of the gains and losses that they produce. It is then possible to assess these policies either normatively or, from a public-choice perspective, predictively. In particular, models of this type are widely utilized in the analysis of non-atomistic or strategic fiscal competition, as discussed in the paper. Strategic considerations arise because each locality’s policies affect the equilibrium return in the market for the mobile resource, and this affects the payoffs to resource owners, from changes in the other locality’s policies, including the payoffs to whichever resource owners or other agents are presumed to determine these policies. Thus, neither locality’s preferred policies can be chosen independently of the other’s, a kind of interdependence that arises entirely through the effects of each locality’s policy on the systemwide market equilibrium return to the mobile resource. In the specific context of capital taxation, this means that strategic interactions can only occur if each locality’s policies have non-negligible effects on the world rate of return to capital.

Moving beyond diagrammatic analysis, it is possible, at least in principle, to extend this type of model to “oligopolities” with three or more jurisdictions, although theoretical analysis, already difficult in the “duopoly” case, can quickly become intractable with three or more jurisdictions in the absence of strong (and usually empirically unappealing) assumptions such as symmetry among localities or linearity of marginal productivity curves.

## B.2.2 Many Small Localities

Let us now consider the important case where, in equilibrium, the mobile resource is found in many small jurisdictions. Here, a possibly paradoxical finding emerges. Suppose that a small locality – let us say, one of the approximately 20,000 municipalities in the US – imposes a high tax on capital. Taking a US-centric view of the world, the equilibrium capital stock of each “representative” locality would be approximately 0.005% of the “world” capital stock. If one of them imposes a high capital tax, however, its equilibrium capital stock might fall to, say, 0.001% of the total, so that the capital stock in the rest of the economy is 0.004 percentage points higher than it would otherwise have been. Using the back-of-the envelope assumption that “all elasticities are approximately 1”, the model of Figure 1 would predict that the economy-wide net rate of return on capital ( $r''$  in the figure) is lower, by about 0.004 of a percentage point, than would be the case if that one locality’s tax rate were not so high. Surely, one might think, this tiny effect can safely be ignored in any analysis of the incidence of the tax.

For some important public finance questions, however, this is not true at all. The tax imposed by a single atomistic locality depresses the equilibrium net rate of return by an amount so minute that it can and would certainly be ignored in the policymaking process in that locality. From a systemwide perspective, however, although such a tax depresses the net rate of return by a minute amount, it reduces the net return to the entire worldwide capital stock. By how much, then, does this one local tax reduce net capital income? The answer is given by the product of a small number (the fall in the net return) a very large number (the worldwide stock of capital). As made clear by the work of Mieszkowski (1972) and others,<sup>24</sup> the tax imposed by a very small locality will be “negligible” relative to the total worldwide return to capital because the locality in question is “negligible” relative to the world economy. The burden of a single local tax is definitely *not* negligible, however, relative to the amount of tax collected in the small locality. In fact, the reduction in worldwide capital income is of the same order of magnitude as (i.e., approximately equal to) the amount of tax collected by the taxing jurisdiction. One can thus say (approximately) that the incidence of a capital tax imposed by one small, open locality falls upon capital owners worldwide, even if “almost none” of the world capital stock is situated in the taxing jurisdiction. The impact of the local tax on the general equilibrium of the entire world economy is of first-order importance in assessing its incidence.

If this result appears paradoxical, it can be made plain by a simple “fallacy of composition” argument: “what is true of each is not necessarily true of all”. Suppose that each of 20,000 municipalities imposes a tax of some specified amount on capital located within its boundaries. Each of these 20,000 taxes, taken in turn, can have only a tiny

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<sup>24</sup>The treatment in Bradford (1978) is particularly compelling. The basic idea is already present in Brown (1924).

impact on the worldwide net return to capital. However, the impact of 20,000 local taxes clearly has the same effect on the equilibrium net rate of return as a single tax, at the same rate, imposed by a central government on the economy-wide stock of capital. As we have already seen in the previous discussion of the incidence of a capital tax in a closed economy, such a tax depresses the net return to capital by the amount of the tax, and so it must if each of 20,000 localities imposes the tax. This argument, in essence, is no different from the argument that demand curves or supply curves reflect the behavior of atomistic buyers or sellers, no one of whom can appreciably affect market conditions but whose actions, in aggregate, entirely determine market prices and quantities.

Of course, it would be impossible in practice to estimate directly the effect of one small locality's capital tax on the worldwide return to capital. (Although such an effect would not be visible in empirical data, it could certainly be predicted from a computable general equilibrium model.) If there is one integrated capital market for the entire globe (arguably true already in the 19th century, and *a fortiori* at present), then virtually every national economy, probably including that of the US and, presumably, that of every other nation, state, province, or municipality in the world, is "small" relative to the global capital market.<sup>25</sup>

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<sup>25</sup>The US, a relatively capital-rich country, produces about 20% of world GDP, contains perhaps one-fourth of the world capital stock. If capital taxes in the US were sufficiently high to reduce the US equilibrium capital stock by 20% , then, still assuming a fixed global capital stock, the equilibrium stock of capital in the rest of the world would be approximately 5 percentage points higher (i.e., 0.80 instead of 0.75). The equilibrium global net rate of return would be lower by a corresponding amount – say, 2.85% instead of 3%. Four-fifths of the loss in capital income resulting from the higher US tax would fall on capital located outside of the US. For every other country and, *a fortiori*, for all jurisdictions contained within them, including every state and locality in the US, the reduction in the world net rate of return from such a tax change would be smaller still.

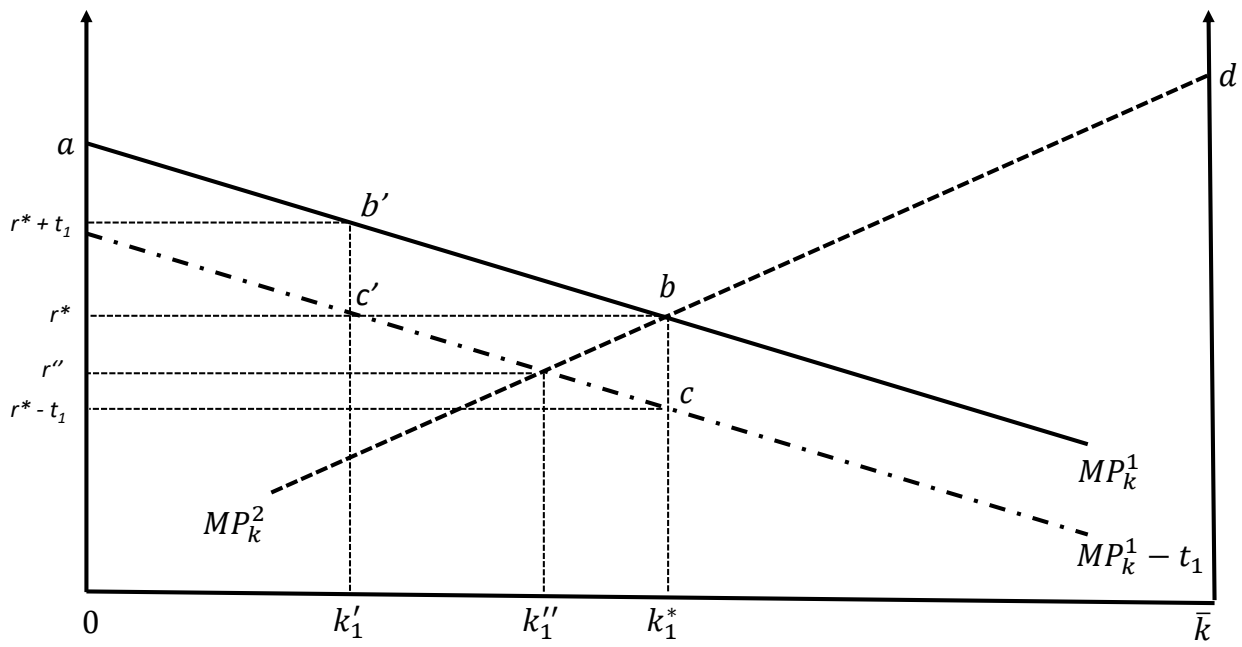


Figure 1

## C The Financing of Public Goods and Services and Redistribution

Sometimes it is possible to increase the number of households (or businesses) that utilize a publicly-provided good or service at no additional cost, at least up to some level. For instance, allowing more people to gain access to signals from GPS systems does not increase the cost of providing GPS services; similarly, a warning siren that alerts local residents to emergency weather conditions may not be substantially less audible if there are many rather than few residents within its effective range. Such goods and services are sometimes called “(Samuelson-)pure”, to be distinguished from those for which the cost of provision rises as the size of the consuming group rises, sometimes called “impure” or congestable public goods and services. Purely redistributive programs that provide cash or in-kind benefits to their recipients are congestable in this sense: a given level of cash transfer or nutritional support for  $2n$  people will require twice the level of resources as the provision of such benefits to  $n$  people. When the costs of a public service are strictly proportional to the number of beneficiaries, we may refer to it as “quasi-private”, similar, in this respect, to the public provision of a purely private commodity to some group.

As mentioned in the text, many of the goods and services provided by local governments are not Samuelson-pure, but rather exhibit some degree of congestability. Although they need not be exactly quasi-private, the costs of providing education, transportation, and many other public goods and services clearly depends importantly on the size (and composition, and other characteristics) of the groups for whom they are provided. In a concise shorthand, the size of a local budget can be written as  $C(z, n)$ , where  $z$  is the amount of public services provided and  $n$  describes the population with access to these services. In a simple case,  $z$  might represent the quality of educational services provided in a school district and  $n$  might represent the number of people (proportional, say, to the number of students) in the district. If the public service is “non-rival”, “Samuelson-pure”, or uncongestable, the size of the budget is independent of  $n$ . Few public goods provided by local governments have this property. Far more commonly, the size of the budget must rise as  $n$  rises. In the important special case of a quasi-private public good, the budget is simply proportional to  $n$ ; the assumption of quasi-privateness is implicit in the use of measures like “expenditures per pupil” as indicators of the “quality” of education,  $z$ .

Although many local public services exhibit economies of scale in  $n$  (i.e., holding  $z$  fixed,  $C(z, n)/n$  falls as  $n$  rises), especially for small values of  $n$ , “congestion effects” – the marginal cost of extending a given level of public service to one more person – are generally quite significant for local public services and, indeed, the quasi-private assumption

is often a good first approximation.<sup>26,27</sup>

If a household enters a locality that provides a congestable public service, local expenditures must rise by an amount equal to the marginal congestion cost if the level of public service is to be preserved. Barring debt finance or intergovernmental transfers, which raise separate questions<sup>28</sup>, the critical issue for present purposes is whether the system of local own-source finance (taxes, charges) results in the marginal household contributing incremental revenue equal to marginal congestion cost. The importance of marginal cost pricing for efficient resource allocation, including for public services, has long been recognized (e.g., Vickrey (1963)). Viewed in terms of redistribution, a household that gains access to congestable public services without bearing the full marginal (congestion) cost imposes a net fiscal burden on others who must absorb that cost, and conversely for those who pay taxes in excess of marginal cost.<sup>29</sup> In that respect, the departure from marginal-cost pricing of congestable public goods is a cross-subsidy from one group to another and, in that sense, constitutes a redistributive transfer. This is clearly illustrated in the case of publicly-provided lump-sum cash transfers of the type implied by Stigler. The marginal congestion cost of providing a \$1 cash transfer to the resident of a locality is \$1, and access to this publicly-provided (quasi-private) service would be efficiently priced if the recipient pays \$1 for it, that is, if there is no transfer, and thus no redistribution, whatsoever.

The implementation of efficient pricing mechanisms often presents a practical challenge, of course. In the context of local government finance in the US, a recurring question is whether local property taxes, often used in practice, are or are not efficient. The sizes of local property tax bases are obviously positively correlated with population size, which suggests that at least a portion of the marginal cost of providing local public services is financed by this revenue instrument. If augmented by suitable regulations and other fees, such as zoning requirements such as restrictions on multi-family residences, building

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<sup>26</sup>Because  $C(z, n)$  is a function of (at least) two variables,  $z$  and  $n$ , the concepts of “marginal” and “average” cost” can be confused. The derivative  $\partial C(z, n)/\partial z$  is the marginal cost of raising the level of public services, and  $C(z, n)/z$  is the average cost per unit of service provided, holding fixed the population to be served. (As an illustration,  $z$  could represent some measure of the quality of teachers in a school system, which could be raised or lowered by adjusting teacher training or performance requirements.) Congestion effects, on the other hand, are related to variations in  $n$ , holding  $z$  constant. For non-rival or pure public goods,  $\partial C(z, n)/\partial n = 0$ , and  $C(z, n)/n$  is always falling in  $n$ , whereas, in the quasi-private case,  $C(z, n) = c(z)n$  for some function  $c(z)$  depending on  $z$  alone. In the quasi-private case, marginal and average cost *with respect to  $n$*  are equal. Because both  $z$  and  $n$  can be interpreted as vectors, reflecting the many attributes of local public services and the communities that they serve, further refinements of the concepts of marginal and average cost are possible and often desirable, although they do not raise fundamentally new issues.

<sup>27</sup>Here, congestion effects are represented by the cost, at the margin, of raising  $n$  while keeping  $z$  fixed. Measuring congestion effects in terms of  $\partial C(z, n)/\partial n$  is very useful for public finance analysis. If, alternatively, the total budget  $C(z, n)$  is held fixed as  $n$  increases, the level of public service  $z$  must fall (assuming that both marginal costs are positive), which would correspond to “congestion” in the perhaps more popular sense of “service degradation”. These two senses are (or can be made) formally equivalent, however, if the cost function  $C(z, n)$  is known. Letting subscripts denote partial derivatives,  $dC = C_z dz/dn|_C + C_n = 0$  means that  $C_n = -C_z dz/dn|_C$ , thus transforming service degradation from an increase in  $n$  with a fixed budget into the budget increase required to keep service constant.

<sup>28</sup>In the case of school finance, local spending is often heavily financed by grants from state governments that almost always depend on  $n$ .

<sup>29</sup>Similar considerations apply to business taxation; see, e.g., Pogue (2007).

codes, and minimum lot size requirements, or fees or mandates that require property developers to pay for or provide infrastructure, a system of local property taxation may even approximate a system of “head taxes”.<sup>30</sup> The extent to which this is true has been widely discussed in the literature of local public finance. In any case, the regulation and taxation of property by local governments in the US provides a tangible illustration of the potential importance of taking both fiscal and regulatory policies simultaneously into account, an observation that can be applied in many other contexts as well.

Note, finally, that the preceding remarks concern the *redistributive* aspects of local public finance, signified by discrepancies between marginal congestion costs and payments made by beneficiaries through taxes or other mechanisms, which is conceptually very distinct from the problem of efficient local public good provision. The latter question involves the determination of  $z$ , the level of public service(s), which has been taken as given throughout the preceding paragraphs. Samuelson’s original public expenditure theory papers, outstanding exemplars of closed-economy public finance analysis, focus attention on the preference-revelation problem, benefit taxation/pricing à la Wicksell, Lindahl, benefit-cost analysis for closed economies, and on related issues that arise when  $z$  is a variable and  $n$  is exogenously fixed. By contrast, in the open-economy setting, there are two efficiency margins: the determination of  $z$ , and the determination of  $n$ . These are related problems because the efficient level of each depends, in general, on the level of the other. Although there may be mechanisms (such as profit-maximizing clubs or their governmental equivalents) that can solve both problems simultaneously, the two margins are nevertheless logically distinct, a distinction not always clearly made by Tiebout or in some subsequent literature. In order to obviate issues relating to preference revelation or benefit evaluation, the discussion in the present essay focuses largely on the simplest types of tax and expenditure policies, such as in Appendix B, where governments use lump-sum taxes to finance lump-sum transfers. In such simple cases, policies that provide pure cash transfers or that impose pure lump sum taxes are generally valued on a dollar-for-dollar basis by those who receive or pay them, presenting no Samuelson-type efficiency questions (the choice of  $z$ ) and thus drawing attention more clearly to open-economy issues.<sup>31</sup>

## REFERENCES

Arnott, R.J. and J.E. Stiglitz (1979) “Aggregate Land Rents, Expenditure on Public

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<sup>30</sup>See, e.g., Mieszkowski and Zodrow (1989) for additional discussion. It should be noted that even perfect “head taxes” are not fully efficient when the cost of public services depends not just on the numbers and types of users but on their intensity of use, as discussed extensively in the theory of clubs (e.g., Berglas and Pines (1981) and much related literature). Health care is an obvious case where efficient pricing cannot be achieved solely through head taxation or per capita charges.

<sup>31</sup>Even under the simplifying premises of the present quite informal discussion, these comments need to be qualified. The problems of benefit spillovers from the provision of local public goods are of critical importance in that part of open-economy public finance that deals with the (mis-)matching of jurisdictional boundaries with the areas that enjoy the benefits of publicly-provided goods and services. Many aspects of public sector organization and intergovernmental fiscal relations, including the equilibrium and optimal formation of jurisdictions, the design of intergovernmental fiscal transfers, and the problems of intergovernmental bailouts, hinge on such (potential) spillover effects.



- Goods, and Optimal City Size”, *Quarterly Journal of Economics* 93(4), 471-500.
- Bahl, R.W. and R.M. Bird (2008), “Tax Policy in Developing Countries: Looking Back – and Forward”, *National Tax Journal* 61(2), 279-301.
- Berglas, E. and D. Pines (1981) “Clubs, Local Public Goods, and Transportation Models: A Synthesis”, *Journal of Public Economics* 15(2), 141-162.
- Bird, R.M. (1993), “Threading the Fiscal Labyrinth: Some Issues in Fiscal Decentralization”, *National Tax Journal* 46(2), 207-227.
- Boadway, R.W. (1980), *Intergovernmental Transfers in Canada* (Toronto: Canadian Tax Foundation).
- Boadway, R.W. (1992), *The Constitutional Division of Powers: An Economic Perspective* (Ottawa: Minister of Supply and Services).
- Boadway, R.W. and F. Flatters (1982), “Efficiency and Equalization Payments in a Federal System of Government: A Synthesis and Extension of Recent Results”, *Canadian Journal of Economics* 15.
- Boadway, R.W. and M. Keen (1996), “Efficiency and the Optimal Direction of Federal-State Transfers”, *International Tax and Public Finance* 3, 137-155.
- Bradford, D.F. (1978) “Factor Prices May Be Constant but Factor Returns Are Not”, *Economics Letters* 1(2), 199-203.
- Brown, H.G. (1924), *The Economics of Taxation* (New York: Holt).
- Buettner, T. (2009), “The Contribution of Equalization Transfers to Fiscal Adjustment: Empirical Results for German Municipalities and a US-German Comparison”, *Journal of Comparative Economics* 37(3), 417-431.
- Courchene, T. (1984), *Equalization Payments: Past, Present, and Future* (Toronto: Ontario Economic Council).
- Gramlich, E.M. (1993), “A Policymaker’s Guide to Fiscal Decentralization”, *National Tax Journal* 46(2), 229-235.
- Harberger, A.C. (1962), “The Incidence of the Corporation Income Tax”, *Journal of Political Economy* 70(3), 215-240.
- Harberger, A.C. (2008), “The Incidence of the Corporation Income Tax Revisited”, *National Tax Journal* 61(2), 303-312.

Mieszkowski, P.M. and G.R. Zodrow (1989), "Taxation and the Tiebout Model: The Differential Effects of Head Taxes, Taxes on Land Rents, and Property Taxes", *Journal of Economic Literature* 27(3), 1098-1146.

McLure, C.M, Jr. (2001), "The Tax Assignment Problem: Ruminations on How Theory and Practice Depend on History", *National Tax Journal* 54(2), 339-364.

Oates, W.E. (1993), "Fiscal Decentralization and Economic Development", *National Tax Journal* 46(2), 237-243.

Oates, W.E. (2008) "On the Evolution of Fiscal Federalism: Theory and Institutions", *National Tax Journal* 61(2), 313-334.

Pogue, T.F. (2007) "The Gross Receipts Tax: A New Approach to Business Taxation?" *National Tax Journal* 60(4), 799-819.

Vickrey, W.S. (1963), "General and Specific Financing of Urban Services" in H.G. Shaller (ed.) *Public Expenditure Decisions in the Urban Community* (Washington: Urban Institute) 62-90.

Zodrow, G.R. and P.M. Mieszkowski (1986), "Pigou, Tiebout, Property Taxation, and the Underprovision of Local Public Goods", *Journal of Urban Economics* 19(3), 356-370.

## D Related Works

The discussion in the paper (and in the preceding appendices) is intended to offer an accessible and informal perspective on a very broad subject matter. Some readers might wish to see a more thorough treatment of one aspect or another of the topics broached there.

For such readers, the best solution is to consult other relevant literature and to make their own critical assessments of the field. All of the topics mentioned above have been investigated by many scholars, working in many distinct areas, over the course of many decades; their work has certainly shaped and deepened my understanding of public finance.

I cannot properly acknowledge here the contributions of the many authors to whom I am intellectually indebted, but, as an imperfect substitute, I list below a number of my own publications related to open-economy public finance, organized thematically. These publications, which span several decades, reflect my own evolving understanding of this topic and contain many references to related literature. They are organized into categories (and chronologically within categories) that correspond, loosely, to topics discussed in the paper. References to reprints, to unpublished working paper versions, and works in

progress are omitted.

## D.1 General works, reviews, and introductory essays

*Urban Public Finance*. (New York: Harwood Academic Publishers, 1986), pp. viii, 175. Volume 10 in the series Fundamentals of Pure and Applied Economics.

“Theoretical Analysis of Local Public Economics,” Chapter 29 in Edwin S. Mills (ed.), *Handbook of Regional and Urban Economics*, Volume 2 (Amsterdam: North-Holland, 1987), 429-476.

“Theoretical Issues in Local Public Economics: An Overview,” with John Douglas Wilson, *Regional Science and Urban Economics* 21(3), November 1991, 317–331.

“Introduction,” in D.E. Wildasin (ed.), *Fiscal Aspects of Evolving Federations* (Cambridge: Cambridge University Press, 1997), 3–13.

“Fiscal Aspects of Evolving Federations: Issues for Policy and Research,” in D.E. Wildasin (ed.), *Fiscal Aspects of Evolving Federations* (Cambridge: Cambridge University Press, 1997), 14–37.

“Fiscal Competition: An Introduction,” *Journal of Public Economic Theory* 5(2), April, 2003, 169–176.

“Capital Tax Competition: Bane or Boon?,” with John D. Wilson (principal author), *Journal of Public Economics* 88(6), June, 2004, 1065–1091.

“Fiscal Federalism,” *The New Palgrave Dictionary of Economics*, Second Edition, Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan, 2008.

“New Directions in Fiscal Federalism: Introduction,” with R. Boadway and T. Buettner, *Journal of Public Economics* 92(12), December 2008, 2285-2297.

## D.2 Public choice/political economy in open economies

“Local Government Decisions and Property Values: Some Implications for Welfare and the Theory of Public Choice – Abstract,” *Journal of Economics* 2, 1976, 160.

“Public Expenditures Determined by Voting with One’s Feet and Public Choice,” *Scandinavian Journal of Economics* 79, 1977, 326-337.

“Local Public Goods, Property Values, and Local Public Choice,” *Journal of Urban*

*Economics* 6(4), October 1979, 521-534.

“Demand Estimation for Public Goods: Distortionary Taxation and Other Sources of Bias,” *Regional Science and Urban Economics* 19(3), August 1989, 353-379.

“Fiscal Policy in Post-EMU Europe,” *European Union Politics* 3(2), June, 2002, 251–260.

“Fiscal Competition”, in Barry Weingast and Donald Wittman (eds.), *Oxford Handbook of Political Economy* (Oxford: Oxford University Press, 2006), 502-520.

### **D.3 Efficient fiscal policies in open economies**

“Locational Efficiency in a Federal System,” *Regional Science and Urban Economics* 10(4), November 1980, 453-471.

“More on the Neutrality of Land Taxation,” *National Tax Journal* 35(1), March 1982, 105-108.

“Income Taxes and Urban Spatial Structure,” *Journal of Urban Economics* 18(3), November 1985, 313-333.

“Public Facility Location and Urban Spatial Structure: Equilibrium and Welfare Analysis,” with Jacques-François Thisse, *Journal of Public Economics* 48, 1992, 83–118.

“Optimal Transportation Policy with Strategic Locational Choice,” with Jacques-François Thisse, *Regional Science and Urban Economics* 25(4), August 1995, 395–410.

### **D.4 Mobility**

#### **D.4.1 Mobility: Redistribution**

“Income Redistribution in a Common Labor Market,” *American Economic Review* 81(4), September 1991, 757-774.

“Relaxation of Barriers to Factor Mobility and Income Redistribution,” in Pierre Pestieau (ed.), *Public Finance in a World of Transition*, a Supplement to Vol. 47, 1992 of *Public Finance/Finances Publiques*, 216–230.

“Income Redistribution and Migration,” *Canadian Journal of Economics*, 27(3), August 1994, 637–656.

“Decentralized Income Redistribution and Immigration,” with Dietmar Wellisch, *Euro-*

*pean Economic Review* 40(1), January 1996, 187–217.

“Income Distribution and Redistribution Within Federations,” *Annales d’Economie et de Statistique* 45, Janvier/Mars 1997, 291–313.

“Factor Mobility and Redistributive Policy: Local and International Perspectives,” in Peter Birch Sorensen (ed.) *Public Finance in a Changing World* (London: MacMillan Press, Ltd., 1998), 151–192.

#### **D.4.2 Mobility: Risk and Insurance**

“Optimal Tax-Subsidy Policies for Industrial Adjustment to Uncertain Shocks,” with Robin W. Boadway, *Oxford Economic Papers* 42(1), January, 1990, 105-134.

“Factor Mobility, Risk, and Redistribution in the Welfare State,” *Scandinavian Journal of Economics* 97(4), 1995, 527-546; also

“Risky Local Tax Bases: Risk-Pooling vs. Rent Capture,” with John D. Wilson, *Journal of Public Economics* 69(2), August, 1998, 229–247.

“Labor Market Integration, Investment in Risky Human Capital, and Fiscal Competition,” *American Economic Review* 90(1), March 2000, 73–95.

“Economic Integration and Labor Market Institutions: Worker Mobility, Earnings Risk, and Contract Structure,” with Ronnie Schöb, *Regional Science and Urban Economics* 37(2), March, 2007, 141-164.

#### **D.5 Environmental, disaster, and fiscal policies in open economies**

“Taxation, Migration, and Pollution,” with Agnar Sandmo, *International Tax and Public Finance* 6(1), February, 1999, 39–59.

“Local Public Finance in the Aftermath of September 11,” *Journal of Urban Economics* 51(2), March 2002, 225–237.

“Disaster Policy in the US Federation: Intergovernmental Incentives and Institutional Reform,” *National Tax Association, Proceedings of the 99th Annual Conference* (2007), 171–178.

“Disaster Policies: Some Implications for Public Finance in the U.S. Federation,” *Public Finance Review* 36(4), July, 2008, 497-518.

“Think Locally, Act Locally: Spillovers, Spillbacks, and Efficient Decentralized Policy-making,” with H. Ogawa, *American Economic Review* 99(4), September, 2009, 1206-1217.

## D.6 Fiscal competition and tax exporting: atomistic and strategic

“Interstate Tax Competition: A Comment,” *National Tax Journal* 39(3), September 1986, 353-356.

“Tax Exporting and the Marginal Cost of Public Spending,” *Economics Letters* 24(4), 1987, 353-358.

“The Demand for Public Goods in the Presence of Tax Exporting,” *National Tax Journal* 40(4), December 1987, 591-601.

“Nash Equilibria in Models of Fiscal Competition,” *Journal of Public Economics* 35(2), March 1988, 229-240.

“Interjurisdictional Capital Mobility: Fiscal Externality and a Corrective Subsidy,” *Journal of Urban Economics* 25(2), March 1989, 193-212.

“Some Rudimentary ‘Duopoly’ Theory,” *Regional Science and Urban Economics* 21(3), November 1991, 393-421.

“Steady-State Welfare Effects of Social Security in a Large Open Economy,” with Friedrich Breyer, in Bernhard Felderer (ed.), *Journal of Economics (Zeitschrift für Nationalökonomie), Supplementum 7* (Vienna: Springer Verlag, 1993), 43-49.

“Fiscal Competition and Interindustry Trade,” *Regional Science and Urban Economics* 23, 1993, 369-399.

“Comment on Douglass C. North, ‘Institutional Competition’,” in H. Siebert (ed.) *Locational Competition in the World Economy* (Tübingen: J.C.B. Mohr (Paul Siebeck), 1995), 38-44.

“Are State Business Tax Incentives Good Public Policy?: Comments on Some Multi-Disciplinary Perspectives in the Wake of *Cuno v. DaimlerChrysler*,” *National Tax Association, Proceedings of the 99th Annual Conference* (2007), 45-49.

“Technology and Tax Systems”, with D.R. Agrawal, *Journal of Public Economics* 185, 104082, 2020.

## D.7 Dynamics

“Imperfect Mobility and Local Government Behaviour in an Overlapping-Generations Model,” with John D. Wilson, *Journal of Public Economics* 60(2), May 1996, 177–198.

“Fiscal Competition in Space and Time,” *Journal of Public Economics* 87 (11), October, 2003, 2571–2588.

“Fiscal Competition for Imperfectly-Mobile Labor and Capital: A Comparative Dynamic Analysis”, *Journal of Public Economics* 95(11-12), December, 2011, 1312-1321.

“Human Capital Mobility: Implications for Efficiency, Income Distribution, and Policy”, in M. Gérard and S. Uebelmesser (eds.), *The Mobility of Students and the Highly Skilled*, MIT Press, 2014.

## D.8 Intergovernmental fiscal and regulatory relations

“The Welfare Effects of Intergovernmental Grants in an Economy with Independent Jurisdictions,” *Journal of Urban Economics* 13(2), March 1983, 147-164.

“The Welfare Effects of Intergovernmental Grants in an Economy with Distortionary Local Taxes: A Simple General Equilibrium Analysis,” *Journal of Public Economics* 25(1/2), November 1984, 103-125.

“A Note on the Analytics of the RFPS Equalization Formula,” with Thomas J. Courchene, in *Equalization Payments: Past, Present and Future* (Toronto: Ontario Economic Council, 1984), 409-426.

“The (Apparent) Demise of Sales Tax Deductibility: Issues for Analysis and Policy,” *National Tax Journal* 41(3), September 1988, 381-389.

“Non-cooperative Behavior and Efficient Provision of Public Goods,” with Robin W. Boadway and Pierre Pestieau, *Public Finance/Finances Publiques* 44(1), 1989, 1-7.

“Tax-Transfer Policies and the Voluntary Provision of Public Goods,” with Robin W. Boadway and Pierre Pestieau, *Journal of Public Economics* 39(2), July 1989, 157-176.

“Externalities and Bailouts: Hard and Soft Budget Constraints in Intergovernmental Fiscal Relations”; World Bank Policy Research Working Paper No. 1843, 1997.

“Pareto-Efficient International Taxation,” with Michael Keen, *American Economic Review* 94(1), March 2004, 259–275.

“The Institutions of Federalism: Toward an Analytical Framework,” *National Tax Journal* 62(2), Part 1, June 2004, 247–272.

“The Dynamics of Municipal Fiscal Adjustment”, with Thiess Buettner, *Journal of Public Economics* 90(6-7), August 2006, 1115-1132.

“State Government Cash and In-kind Benefits: Intergovernmental Fiscal Transfers and Cross-Program Substitution,” with James Marton, *Journal of Urban Economics* 61(1), January, 2007, 1-20.

“Medicaid Expenditures and State Budgets: Past, Present, and Future,” with James Marton, *National Tax Journal* 60 (June, 2007), 279-304.

“Pre-Exemption: Federal Statutory Intervention in State Taxation,” *National Tax Journal* 60 (September, 2007), 649-662.

“Intergovernmental Transfers to Local Governments”, in Gregory K. Ingram and Yu-Hung Hong (eds.), *Municipal Revenue and Land Policies* (Cambridge: Lincoln Institute of Land Policy, 2010), 47-76.

“Comment on ‘Local Deficits and Local Jobs – Can States Stabilize Their Own Economies?’ by Gerald Carlino and Robert Inman”, *Journal of Monetary Economics* 60, 2013, 531-534.

## **D.9 International Applications**

“Budgetary Pressures in the EEC: A Fiscal Federalism Perspective,” *American Economic Review* 80(2), May 1990 (Papers and Proceedings), 69-74.

“Comments on ‘Fiscal Federalism and Decentralization: A Review of Some Efficiency and Macroeconomic Aspects,’ by Vito Tanzi” in Michael Bruno and Boris Pleskovic (eds.), *Annual World Bank Conference on Development Economics, 1995* (Washington, DC: The World Bank, 1996), 323–328.

“Public Pensions in the EU: Migration Incentives and Impacts,” in Arvind Panagariya, Paul R. Portney and Robert M. Schwab (eds.), *Environmental and Public Economics: Essays in Honor of Wallace E. Oates* (Cheltenham: Edward Elgar, 1999), 253–282.

“Factor Mobility and Fiscal Policy in the EU: Policy Issues and Analytical Approaches,” *Economic Policy* 31, October, 2000, 337–378.

“Tax Coordination: The Importance of Institutions,” *Swedish Economic Policy Review* 9(1), Spring, 2002, 171–194.



“Liberalization and the Spatial Allocation of Population in Developing and Transition Countries,” in Jorge Martinez-Vasquez and James Alm (eds.) *Public Finance in Developing and Transition Countries: Essays in Honor of Richard Bird* (Cheltenham, UK: Edward Elgar Publishing, 2003), 63–100.

“Economic Integration and the Welfare State,” *CESifo Forum* 5(3), Autumn 2004, 19–26.

“Fiscal Policy, Human Capital, and Canada-US Labor Market Integration,” in Richard G. Harris and Thomas Lemieux (eds.), *Social and Labour Market Aspects of North American Linkages* (Calgary: University of Calgary Press, 2005), 489–536.

“Global Competition for Mobile Resources: Implications for Equity, Efficiency, and Political Economy,” *CESifo Economic Studies*, 52(1), March 2006, 61–111.

“Public Pensions and Demographic Change in Developed Countries: Fertility Bust and Migration Boom?,” in J. Bhagwati and G. Hanson (eds.), *Skilled Immigration Today: Problems, Prospects, Policies* (Oxford: Oxford University Press, 2009), 81-129.

## D.10 Subnational Applications

“State Income Taxation of Mobile Labor,” *Journal of Policy Analysis and Management* 12, Winter 1993, 51-75.

“Tax Reform in Kentucky: Principles and Practice,” Ch. 1, 1-14; “Recent Trends in Kentucky State and Local Tax Policy,” Ch. 2, 15-26; “Sales Taxation in Kentucky: Problems and Prospects,” Ch. 3, 27-38; and “Local Government Finances in Kentucky,” Ch. 6, 73-102, all in D. E. Wildasin, M. T. Childress, M. Hackbart, L. K. Lynch, and C. W. Martie, *Financing State and Local Government* (Frankfort: Kentucky Long-Term Policy Research Center, 2001).

“State and Provincial Corporation Income Taxation: Current Practice and Policy Issues for the US and Canada,” *Canadian Tax Journal* 48(2), 2000, 424–441.

“Local Government Finance in Kentucky: Time for Reform?” *Kentucky Annual Economic Report*, 2007, 11-22.

“State and Local Government Finance in the Current Crisis: Time for Emergency Federal Relief?,” *Municipal Finance Journal* 29(4), Winter, 2009, 49-64.

“State Corporation Income Taxation: An Economic Perspective on Nexus”, *National Tax Journal* 63, December, 2010, 903-924.