

# Open Economy Public Finance: Competition Among Governments

David E. Wildasin<sup>†</sup>

Department of Economics

University of Kentucky

Lexington, KY 40506-0027

USA

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# 1 Introduction

Many readers are likely to have heard the phrase “tax competition”, which is one aspect of competition among governments that has garnered a great deal of attention in political and popular discussion.<sup>1</sup> The general idea of tax competition is that low taxes attract (and high taxes repel) people, businesses, and/or associated resources such as financial capital. There is an element of truth in this characterization, but it is seriously incomplete and misleading, especially when the term “competition” is laden with ideological overtones, favorable or unfavorable, and when debates about “tax policy” are really normative debates in disguise about the size and role of government – more properly described as expenditure policy. Those ideological connotations are to be entirely put aside here.

Like the blind men and the elephant, there are many ways to describe the forms and channels of “competition among governments”; there may be no comprehensive definition that suits all purposes, nor, perhaps, is one needed. The present essay provides an overview of competition in (or among) “open economies”, defined here to mean the economies of jurisdictions small or large (cities, states and provinces, and countries) or groups of jurisdictions (such as the EU) that are linked by the mobility of human and non-human resources, especially labor and capital. By tradition, an “open economy” is commonly understood to refer to a national economy that engages in trade in goods and services with the “rest of the world”. As a broad generalization, in Heckscher-Ohlin-Samuelson (HOS) trade theory, each open economy is endowed with exogenously-fixed amounts of primary factors of production (usually just labor and capital), domestic economic policies amount to lump-sum taxes or transfers, and attention is focused on policies that apply directly to international trade, such as tariffs and quotas. (Much the same applies to post-HOS models of international trade that postulate departures from perfectly competitive industries, such as oligopoly or monopolistic competition.) Also by tradition, much of public finance is a “closed-economy” branch of economics, focusing, almost in mirror-image fashion, on the domestic economic policies of a single government, downplaying international trade and trade policy, but sharing the HOS assumption of exogenously-fixed endowments of people and other resources. (Closed-economy intertemporal public finance analysis typically endogenizes consumption/savings behavior and capital accumulation, but still starts with a single government, a single economy, fixed initial resource endowments, and an exogenously-determined initial population.) For the study of open economy public finance and competition among governments, by contrast, it is precisely the mobility of human and non-human productive resources, and the (primarily) “domestic” economic

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<sup>1</sup>Using a popular internet search tool, the literal phrase “tax competition” yields about 1.2 million results – much greater than the modest 75,000 results from searching “fiscal competition”, a term that is used preferentially below, or the still fewer 17,000 results obtained from a search on “intergovernmental competition”. One may be tempted to hypothesize an inverse relationship between internet search visibility and numbers of syllables, although this cannot be the whole story, judging by n. 57 below.

policies that influence them, that are at the center of attention.

As already noted, government tax policies may influence the locations of mobile resources in open economies, but so may many other policies. For present purposes, an exclusive focus on tax policy is inappropriate, primarily because there is no sound economic reason to expect that people, businesses, and related resources that (potentially) flow into or out of an economy should be affected solely by tax policies, insofar as they are affected by policies at all. Indeed, as a first approximation, the expenditure side of a government's fiscal accounts are of the same order of magnitude as its revenues and, for that reason alone, the expenditure side deserves a comparable level of consideration. To a second order of approximation, in view of ineluctable accounting identities that arise from government budget constraints, one should also consider borrowing, intergovernmental transfers, and other non-tax sources of revenue, all of which are components of the fiscal accounts that go beyond tax policy narrowly conceived. At least on *a priori* grounds, these aspects of fiscal policy certainly warrant attention in the discussion of "competition" for mobile resources. Secondly, but also importantly, the boundary between "tax" policy and "expenditure" policy is often indistinct and arbitrary, as encapsulated in the concepts of "tax expenditures" or "tax incentives".<sup>2</sup> At least to the ear of the contemporary economist, the expression "fiscal competition" (though still etymologically rooted in taxation) is less specifically linked to tax policy *per se*. Recognizing that fiscal policies are often intimately connected to regulations and legal interpretations (for example, in determining which natural or legal persons are subject to tax or qualify for access to public benefits and services in a given jurisdiction), "competition" among governments is also intended here to include these aspects of "regulatory policy" as well.

By creating economic linkages among locations (at least two and perhaps many hundreds of thousands of them), interjurisdictional flows of productive resources simultaneously depend upon and help to determine economic and fiscal conditions in multiple jurisdictions. The movements of people and capital from one economy to another directly affect the markets for labor, capital, and other goods and services in both locations, altering prices (wage rates, rates of return on capital, housing prices, and others), quantities (capital stocks, employment, production), and derived magnitudes (earnings, profits, and the functional and size distributions of incomes). The quantitative importance of such resource flows, their responsiveness to government policy choices, and their impacts on markets are questions that naturally invite economic analysis. But the movements of productive resources also directly and indirectly influence demographic, financial, social, and political conditions in both origin and destination jurisdictions and thus the policies that they choose. The joint and simultaneous operation of market forces and policy-making institutions ultimately combine to determine the efficiency, distributional, and

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<sup>2</sup>The concept of "tax expenditures" is quite familiar to tax scholars; it generates an internet search yield of 910,000 hits. But "tax incentives" are apparently far more widely known (or sought after), with more than 21 million hits – more evidence, perhaps, in support of the syllable-minimization hypothesis of internet visibility.

social welfare implications of resource mobility in open economies and, importantly, the structure of governmental institutions themselves. The study of “open-economy public finance” thus presents a broad and challenging range of analytical issues in economics and political economy.

To introduce and motivate interest in the study of competition among governments, Section 2 provides an informal overview of cases in which the movement of people and capital among localities, states and provinces, and nations have been affected by government tax, public expenditure, and regulatory policies. Although far from comprehensive, this sample of illustrative cases highlights the many dimensions of competition among governments and some of the important and difficult research questions that it raises, relevant in all regions of the world and all historical periods.

Section 3 reviews some of the basic theoretical approaches and key findings that have shaped research on open-economy public finance and competition among governments. This discussion emphasizes economic intuition and interpretations, but also provides sufficient formal analysis so that readers new to the field can see how key results are derived and how they depend on critical simplifying assumptions. Sections 4 and 5 sketch the analysis of successively more complex models, showing how and why they lead to findings that strengthen, extend, or perhaps overturn findings from more classical cases; these sections also highlight some of the many open research questions that await future study.<sup>3</sup> The concluding Section 6 provides a short summary, highlighting the fact that the study of competition among governments presents opportunities for important contributions by many researchers, from many different perspectives.

## **2 Competition Among Governments: Some Motivating Illustrations**

Drawing selectively upon academic, policy, and popular literature, Sections 2.1 and 2.2 provide some concrete examples, contemporary and historical, of competition for mobile resources and related policy issues. Competition among local, state/provincial, and national governments are each discussed in turn. Section 2.3 draws attention to a number

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<sup>3</sup>It must be emphasized that this essay does not reference all relevant strands of research nor does it cite all relevant studies within its broad scope. Rather, in touching upon many different topics, it is intended first, to highlight the relevance of an open economy perspective for public policy analysis; second, to indicate the important role of “systemwide” or “general equilibrium” considerations in open economy settings; third, to illustrate the value of research contributions from many branches of scholarship – theoretical, empirical, historical, legal, economic, and others – in understanding the factors that underlie public policy analysis in open economy contexts; and, finally, to provide at least a few signposts to pertinent literature for readers who may wish to explore further. A full bibliography of relevant works would consume many pages and many important references can only be cited indirectly through the works mentioned here, some of which provide surveys of related literature. For any interested readers, a thematically-organized listing of the author’s own works, a selection of which are cited in this essay, may be found in an online appendix to Wildasin (2021).

of institutional issues related to the organization, administration, and evolution of the public sector, especially federalism and intergovernmental fiscal relations. Section 2.4 discusses external and internal border controls, their (often imperfect) enforcement, and some important instances in which they have been eased or eliminated, sometimes by the dissolution of the governments that imposed them. Section 2.5 identifies several themes that have come to characterize research on competition among governments and that will likely continue to motivate future research. This overview will also alert readers to the potential for cross-fertilization with others working in what may at first seem to be unrelated areas and help them to avoid potential misunderstanding, misapplication, or simple unawareness of relevant branches of research.

## 2.1 Subnational Governments, New and Old

### *Local Governments*

Tiebout's 1956 paper on *local* public expenditure asserts (in deliberate contrast to Samuelson's classic 1954 and 1955 papers on the "pure theory of public expenditure") that the movement of people among local jurisdictions can "solve" the problem of preference revelation for local public goods. A reader may search Tiebout's paper in vain for any formal demonstration of this claim, but the "Tiebout Model" – in quite a few different guises – has become a staple in the economics literature dealing with local government public finance. Following earlier work on local property tax capitalization, a seminal contribution by Oates (1969) focuses attention on one interpretation of the "Tiebout hypothesis", namely, the linkage between household mobility, residential property values, and local fiscal policies, emphasizing the need to account for both taxes *and* public expenditure (in this instance, local property taxes and public education spending) as determinants of property values. Oates' contribution exemplifies a very large literature, already rooted in the work of Adam Smith in its early manifestations (see also, *e.g.*, Oates (2006) and Albouy (2009, 2016))) which applies hedonic pricing theory to ascertain monetized valuations of locational attributes, including taxes, public goods and services, and other policy variables. As explained in Rosen (1979) and others, standard hedonic pricing models are built upon the maintained hypothesis that mobility – among occupations, job assignments, locations, or consumption choices – is "perfect" in the sense that prices (of housing, of labor, automobiles, and other commodities) adjust so that no agent can enjoy a higher level of utility by switching from one option to another. Many empirical studies using hedonic methods have provided convincing evidence that location-specific prices reflect the valuations that mobile households and workers place not only on local fiscal policies but on environmental quality, crime, and other locational attributes.

A key element in Oates's work and throughout the literature of local public finance is that people do not care exclusively about taxes, public services, housing costs, or employment

and income, but about all of these together. At least since Oates, this *linkage between the tax and expenditure sides of public fiscal systems and the role of locationally-fixed resources*, often in the form of housing or land, has been a distinguishing characteristic of theoretical and empirical investigations of competition among governments.

Whereas research in the Tiebout tradition emphasizes the mobility of *people* among local governments, a substantial and complementary literature on local government property taxation (again, see Smith and Marshall, among other early writers) highlights the fact that investments in buildings in any one location – whether for residential or business uses – must offer *net* rates of return comparable to those available elsewhere. Such a hypothesis implies that *capital* is a mobile resource and that its location is affected by local government policies. Following the seminal work of Mieszkowski, Zodrow, and others referenced in Section 3 below, the mobility of capital among local governments has become a thoroughly standard assumption. A portion of this literature also connects the mobility of capital to the mobility of labor.

Sorting out which resources are mobile and immobile in the context of local government finance is complicated by the fact that capital, being durable, is plausibly viewed as a fixed resource in some situations. Land, of course, is intrinsically immobile (although it may “migrate” from one jurisdiction to another if boundaries change.) Urban areas consist primarily of developed residential, commercial, and industrial properties – a plot of land plus some type of building (durable capital) – that are typically bought and sold as a unit, making it difficult to disentangle the separate values of immobile land and “somewhat immobile” capital.<sup>4</sup> In any event, in view of the fact that housing is a principal source of wealth for many households, one may hypothesize (Fischel (2001)) that voters and local policymakers seek to promote local government policies that protect and enhance the value of residential properties – a hypothesis that blends the immobility of land, the (relative) immobility of durable capital, and the mobility of households in a political economy framework.<sup>5</sup> These considerations suggest the potential usefulness of explicitly dynamic modeling in the analysis of endogenous policymaking by governments that compete for mobile resources (see Section 5.4 below).

Though now strongly associated with Tiebout’s name, the idea that households are mobile among local jurisdictions, and that households alter their places of residence in

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<sup>4</sup>Davis and Heathcote (2007) describe the problem of direct observation of residential land values as “potentially intractable”, instead decomposing house values into the value of structures measured at replacement cost and inferring land values as the residual. They find that land values constitute between 30% (in 1982) and 45% (in 2005) of the value of residential properties in the US during the period 1975-2005. Further analysis by Davis (2009) extends these estimates back to 1955 and includes the value of commercial properties. Land values vary substantially over time and by sector.

<sup>5</sup>Some studies hypothesize that local policies are chosen so as to maximize the values of property. Such a hypothesis is not inconsistent with voting mechanisms, though it may also accommodate non-voting forms of political influence on the part of commercial property owners, property developers, and others. Brueckner and Joo (1991) propose a theoretical model in which households sell their properties as they progress through the life cycle, with maximization of property value becoming more important to them as they near the age at which they sell, paying more attention to personalized benefits and costs from local policies when they are young and far from the point of sale. See also Hilber and Mayer (2009).

response to local policies, has much earlier antecedents. Stigler (1959), who stresses that household mobility places serious limitations on the ability of local governments to engage in redistributive policies, also draws attention to Cannan's (1912) discussion of local property taxation in England. The mobility of the poor was a recurring concern when responsibility for the relief of the poor, and its associated property tax burden, fell to local parishes. Cannan (p. 54) describes how a long series of statutes sought to restrict the movement of the poor from one parish to another: beginning in 1388, "it was enacted that certain persons dependent on charity should be confined to particular places". This was followed by similar acts (known alternatively, and revealingly, as "Poor laws" or "Settlement laws") in 1495, 1503, 1530, 1547, 1572, and still others after that. As might be expected, such "confinement" (which, at times, included enslavement as well as other less drastic enforcement mechanisms) was not easily achieved. The 1662 "Act for the better Releife of the Poore of this Kingdom", also (revealingly) known as the "Act of Settlement" or "Act of Settlement and Removal" (see, *e.g.*, Rose (1976), Feldman (2003)) reflects the tensions between economically productive use of human resources and poor relief in a multi-jurisdictional setting. This statute sought to prevent the poor from relocating from one parish and becoming a burden on another, but it also established what amounted to temporary worker visas "to work in Time of Harvest with [a] Certificate" issued by "the Minister of the Parish [a] Churchwarden and [an] Overseer for the Poore". These certificates were intended to confirm that the worker maintained a dwelling in his home parish, would be received there upon the completion of his work assignment, and could thus be expelled from his harvest-time abode. The act further spells out that the relevant authorities would be punished if they failed to enforce these policies, an instance of a higher-level government enlisting the services of local authorities in pursuit of its policy aims. In more recent times, local governments generally do not assume principal responsibility for the support of the poor, a public sector function that has been "upwardly reassigned" to other levels of government, as discussed further below.

One fascinating aspect of the historical studies by Cannan and many others on "local government redistribution" is that they link the *taxation* of property (the predominant source of local government revenues in earlier eras and, in the US and many other countries, still today) with the *expenditure* of funds for public purposes. The contemporary relevance of these linkages is well illustrated by the large economics, policy, and legal literatures on local public education policy in the US, in which the distributional aspects of education – expenditures on schools and the taxes and intergovernmental transfers that finance them – have played a fundamental role.

Summing up, Tiebout's early contribution touches upon one important way in which the mobility of people matters for government policy, but it is noteworthy primarily for the deeper subsequent investigations that it has stimulated – it is better appreciated not as the last word on local public finance and household mobility, but as one of the first

words. As Fischel (2006, p. 18) writes in his engaging and wide-ranging overview of research in local public finance, “the” Tiebout model (one might prefer to say the very broad *class* of models that have sprung up subsequent to Tiebout) “is now the accepted benchmark”, attributable to a “new way of looking at economic and political problems. Instead of assuming a stationary population . . . the world Tiebout envisioned is one of people in motion. . . . The Tiebout perspective, rather than the original model, is what is so attractive.”

### *State/Provincial Governments*

Localities are not the only subnational governments for which resource mobility is potentially important. In the US, policy debates regarding the taxation of personal and business income by state governments usually raise concerns – founded or unfounded – about the potential gains or losses of investment or people, especially high-income taxpayers and the low-income beneficiaries of redistributive policies. (As mentioned in Section I, the term “tax incentives” is often used for these special tax preferences, also known as “tax expenditures” for businesses.) These may take the form of very targeted – even firm-specific – tax relief, often purportedly as part of state “economic development” initiatives. Sometimes, states use explicit subsidies to encourage (inward) or discourage (outward) firm relocations. In general, such policies may span both state and local governments, supposedly aiming to attract or retain human as well as capital resources. They often include an ensemble of tax, expenditure, and regulatory policy interventions that extend over many years, highlighting the fact that “competition” often involves the use – simultaneous and sequential – of many policy instruments. (See, *e.g.*, Chirinko and Wilson (2008, 2017, 2022), Slattery and Zidar (2020), and further discussion in Section 5.1). Appendix I briefly discusses two recent high-profile episodes involving large US corporations that illustrate these features.

Migration – both internal and migration from abroad – has played a prominent, well-documented, and ongoing role in interstate (and interregional) demographic and economic change in the US since its founding. Descriptively, roughly 1.5% to 3.5% of the US population has moved from one state to another since World War II, with somewhat lower rates in more recent decades, during which time immigration from abroad has typically been 20% to 30% of the amount of internal interstate migration. About 60% of the US population resides in its state of birth, ranging from 21% in Nevada to 79% in Louisiana in 2000. These figures indicate that many people change locations over the course of their lives.

Quite aside from simple head count measures, migration can be highly important for population subgroups.<sup>6</sup> The social, economic, and policy causes and consequences of the

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<sup>6</sup>Research on international immigration by labor economists emphasizes the fact that not all immigrants are identical nor are all native workers. Holzer (2019) reviews this literature and some of its policy implications.



“Great Migration” of black Americans during the early 20th century, mainly from the rural South to urban areas in the rest of the country, have been extensively analyzed (Boustan (2016)). The migration of poor beneficiaries of social safety net policies (especially AFDC/TANF and Medicaid) has generated interest and controversy in policy and academic circles, for instance with reference to “welfare magnets” (*e.g.*, Peterson and Rom (1990), Borjas (1999), Figlio *et al.* (1999)), echoing, at a distance of six centuries, some of the same concerns that appear in the English “settlement” laws. Highly skilled and better educated workers have traditionally exhibited differentially high rates of migration, pay higher levels of taxes, and are less dependent on income-conditioned social benefits.<sup>7</sup> As already noted, whereas support for the poor was once principally carried out at the local level, US state governments are now largely responsible for the administration of such support and, to some degree, for its financing. Particularly for the past half-century, however, the Federal government has played an increasing role in the financing of social services, and, to a lesser extent, in their provision and administration – another case of institutional change resulting in an upward-reassignment of governmental functions.

The fact that gross internal migration rates far exceed net migration rates (often by an order of magnitude) is a sometimes neglected feature of internal migration in the US (and elsewhere) that highlights the heterogeneity of the population. At least since Ricardo, economists have recognized that trade in goods can be very important for a pair of countries, even if there are no bilateral trade imbalances. Likewise, *gross* migration flows between two regions, even if accompanied by zero *net* flows, affect labor markets, industrial development, economic growth, the distribution of incomes, and, one might add, interregional trade. (As an example, the movement of a thousand chemists from one region to another, accompanied by the movement of a thousand bankers, medical technicians, or construction workers in the reverse direction, does not simply constitute wasteful cross-hauling of perfect substitutes.) This observation highlights the issue of *resource disaggregation*. Should “labor” be disaggregated by skill levels, race, age, marital status, country of origin, college major, native tongue, or in still other ways? What economic factors trigger gross migration flows? What are the fiscal implications of gross flows that far exceed net flows? Do (or should) governments choose policies that target demographic subgroups so as to attract or repel them?

The process of urbanization and the shifting mix of employment in agricultural and industrial occupations, from the beginning of the industrial revolution to the present, has similarly given rise to substantial interregional demographic shifts with their attendant economic and fiscal impacts. Of course, one can hardly speak of rural-urban migration, urbanization, and industrialization without also speaking of capital mobility. Population

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<sup>7</sup>Agrawal and Foremny (2018, 2019), Agrawal *et al.* (2020), Brühlhart *et al.* (2022), and Moretti and Wilson (2023) examine income and wealth taxation by regional governments, particularly at the higher end of the income and wealth distributions.

growth is accompanied by investments in residential, commercial, and industrial property where people can live, shop, and work. State and provincial government policies that operate on investment margins are thus also linked to demographic change. *The simultaneous movement of multiple productive resources among regions throughout the world occurs at present and is well documented in historical experience.*

## **2.2 National Governments and Supra-national Institutions**

The mobility of people and capital at the international level has gained increased popular attention, especially in high-income countries, in recent years. The taxation of the incomes of multinational corporations involves complex interactions between the economic, financial, accounting, and legal dimensions of multinational enterprise and has attracted considerable attention from students of public finance from several disciplines. Efforts to constrain “harmful tax competition” and “tax havens” have given rise, in the political sphere, to multinational negotiations and agreements, notably those sponsored by the OECD, to coordinate national corporation income tax policies, as briefly discussed in Appendix I. In the absence of a powerful world government, the establishment of a global minimum corporation income tax rate and the regulations needed to implement it requires international treaties and other agreements that, inherently, reduce the policy autonomy of national governments.

In some cases, efforts to facilitate international commerce, including the movement of capital and people, have resulted in the creation of entirely new governmental institutions. From its inception in the Treaty of Rome in 1958 with six member states, the European Union has expanded, through successive enlargements to encompass more than 20 countries, with further accessions from additional countries presently under consideration. In its early stages, the EU reduced national barriers to internal trade by establishing a common external tariff, but it has also always included the free internal movement of labor and capital among its basic principles. The implementation of these principles has given rise to continued institutional adaptations, including the Schengen Agreement of 1985, under which all but a few EU countries have now eliminated passport controls for travel within the Schengen zone – a trend notably punctuated by a step in the reverse direction by Brexit. Similar arrangements exist among the (non-EU) member states of the European Free Trade Association.

Whatever the formalities may be, international migration flows have become major determinants of demographic change in the developed world over the past several decades, increasing in magnitude at the same time that rates of “natural change” have fallen to historically low levels. The demographic importance of international migration is partly the consequence of prolonged declines in total fertility rates, which, since about 1980, have generally fallen well below the “replacement rate” of 2.0 births per woman in most

OECD countries.<sup>8</sup> This “fertility bust” has been accompanied by a “migration boom” (Wildasin (2009)); since the mid-1980s, for instance, the rate of immigration to the (then) 15 EU member states has exceeded the rate of natural population change. The UN (2019) reports that for Europe as a whole, net immigration since 1990 has exceeded natural change.

The cumulative effects of such prolonged flows have by now changed the demographic landscapes of many countries. As of 2021, the foreign-born population (OECD (2023a)) constitutes more than 10% of the population of virtually all West European countries, amounting to 15% to 20% in Norway, Germany, Ireland, Austria, and Sweden; for the US and UK, this figure exceeds 13%.<sup>9</sup> In this regard, it is important to note that demographic trends tend to be highly inertial (UN (2017)), even if they can in principle be controlled to some extent. For instance, barring forced population relocations or catastrophic mortality due to wars or other causes, the population shares of the foreign born in affluent countries is certain to increase for many years to come, even if all immigration flows were stopped immediately. This is a simple consequence of the fact that today’s foreign-born populations are younger than the stock of native born, who will age out of the population relatively quickly.<sup>10</sup>

Since World War II, redistributive and social programs have grown steadily.<sup>11</sup> The 15 OECD countries (all West European) with the highest levels of *direct* social expenditures spend between one-fourth and one-third of GDP on a wide range of programs such as means-tested income support, health care, public pensions (that is, old-age support provided by the public sector, such as the US Social Security system), unemployment insurance, child care. These direct expenditures, however, provide an incomplete and misleading perspective on the overall size of public social expenditures and redistribution. First, to the extent that these programs are financed from current government revenues, social expenditures are supported by taxes and social insurance contributions, generally paid by the working age population, through assessments on earnings, personal incomes, and consumption (especially VATs). These sources of revenue often contain redistributive elements, exemplified by (but hardly limited to) features such as progressive tax rates on incomes. Furthermore, redistributive transfer policies also depend on interactions, sometimes in highly implicit forms, between public expenditure and revenue systems. For instance, net social expenditures are significantly reduced when cash

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<sup>8</sup>The “rate of natural change” is a term now commonly used in demography, substituting, tellingly, for what was more traditionally called the rate of natural increase”. Over time, “natural increase” has become “natural decrease” in many countries.

<sup>9</sup>According to the latest US Census estimate, the foreign-born population is 13.9% of the total 2022 population, up from 13.6% in 2021.

<sup>10</sup>In OECD countries, 80% of immigrants are of working age, compared to only 64% of the native-born (OECD/EU (2018)).

<sup>11</sup>The precise definitions of “redistribution” and “social welfare policy” are debatable, but typically do not include public expenditures for education, transportation, and many other public services which nevertheless have significant distributional impacts.

payments are directly taxed and when their use by recipients is subject to indirect tax, an especially important element for countries that rely on value-added taxation. Furthermore, social expenditures are effectively augmented by tax preferences that promote private expenditures for social purposes and by regulations that mandate such expenditures. Total social expenditures – including “private” social expenditures mandated or supported by the public sector – amount to about 20% of GDP in OECD countries on average. This figure is substantially higher, at 25% to 30%, in West European countries, the US, and Canada.<sup>12</sup>

Official social expenditure measurements seldom take an intergenerational perspective, but a large fraction of cash expenditures take the form of public pensions and a large fraction of in-kind social expenditures take the form of health-care benefits that are utilized by the old. In addition, redistribution between old and young is substantially increased due to explicit and implicit government borrowing. The aggregate debt/GDP ratio for OECD countries is around 121%, and many policies, such as the underfunding of social insurance programs, the depreciation of publicly-owned capital, and insufficient accumulation of reserves for contingencies, result in large amounts of implicit borrowing (Kotlikoff (1993), Auerbach, *et al.* (1999)). On the assumption that debt obligations will be repaid in some future periods, today’s young populations, and those to follow, will face some combination of reduced public expenditures and higher taxes as a consequence. In short, the fiscal systems of many countries are very much influenced by the age structures of their populations. These (and other) demographic characteristics, in turn, have already been (and, simply as a matter of demographic inertia, will in future decades continue to be) substantially affected by international migration.

As is true for subnational governments, national governments often directly or indirectly control or influence population flows. In the case of border formalities, this control is direct, to the extent that it is enforced. Such policies often involve selective controls that facilitate the admission of people with desired attributes (such as educational attainments, specific skills, wealth, age, or cultural characteristics) while excluding others.<sup>13</sup> As in the literature on “welfare magnets” and interstate mobility in the US, there is a parallel literature that examines the extent to which fiscal incentives affect international migration. For instance, Giulietti (2014) and Agersnap *et al.* (2020) provide recent – and conflicting – discussions of “welfare induced” migration, while others (*e.g.*, Kleven *et al.* (2013), Kleven *et al.* (2013) and Akcigit *et al.* (2016)) find evidence that fiscal policies affect migration of high-income workers. (Kleven *et al.* (2020) provide an overview of research on taxation and migration at multiple levels of government.)

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<sup>12</sup>The US, at 29%, is approximately tied with France (at 30%) for the highest share of net social expenditures among OECD countries (OECD (2023c)). See Adema (2000), Adema *et al.* (2014), and OECD (2023b) for details of estimation.

<sup>13</sup>Forced relocations have also been employed, both within and among countries, particularly (but not only) during or in the aftermath of wars.

### 2.3 Federalism, Institutional Change, and Competition

All large nations and most small ones contain multiple units of government, often numbering in the tens or hundreds of thousands, brought about through the explicit and implicit implementation of constitutions and legislative actions.<sup>14</sup> Rarely are the administrative and fiscal functions of these units of government neatly separated; shared (or contested) responsibilities are the norm. Systems of intergovernmental fiscal transfers are a major aspect of public finance in virtually all countries. In the US, aggregate Federal government transfers to states consistently amount to 25% to 30% of state general revenues, while state government transfers to localities account for about 30% of state expenditures and about one-third of local revenues, showing that such transfers are mainstays of state and local fiscal systems.<sup>15</sup> Intergovernmental transfer programs in the US are extremely numerous and diverse, but, in aggregate, Federal transfers to states have amounted to about 80% to 100% of state transfers to localities for the past half-century. State governments thus appear to serve, to some degree, as “conduits” or “pass-through entities” that connect the Federal government to the local governments (Wildasin (2010a)).<sup>16</sup>

To illustrate how intergovernmental fiscal relations evolve, consider means-tested programs of cash and in-kind support in the US. Over time, the Federal government has assumed growing responsibility (“upward reassignment”) for the financing of cash and in-kind assistance to the poor (see Wallis (1984) for the history of these policies), but state governments continue to exercise significant discretion over program benefits and administration. Federal transfers to the states pay for at least half of total expenditures for AFDC/TANF (cash and other benefits) and Medicaid (health benefits), with a maximum of about three-fourths granted to states with low per capita incomes, arrangements that plausibly reduce the incentives for states to limit inflows or increase outflows of poor residents. The precise form of these transfers and the Federal regulations that accompany them, however – especially the permitted degree of policy discretion open to state governments – have changed significantly over time.

In addition to TANF and Medicaid, the Federal government provides means-tested cash and in-kind benefits through other programs (*e.g.*, Food Stamps/SNAP), Supplemental Security Income, and housing assistance), sometimes administered through local government agencies, even as state and local governments pursue many other policies that (at least superficially) have redistributive impacts. For instance, local governments are the principal loci for the delivery and administration of public education, a sphere of policy

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<sup>14</sup>One might also remark that many constitutional changes have been effectuated through the use of force in revolutions, coups, wars, and alliances.

<sup>15</sup>These figures are drawn from the Census of Governments from 1977 to present. Federal transfers to localities and “upward” transfers from lower-level to higher-level governments are comparatively very small.

<sup>16</sup>Saunoris (2012) estimates that a \$1 increase in Federal aid to states produces a long-run ( $\approx$  9-10 years) increase in state aid to local governments of about \$0.60.

in which distributional objectives are frequently asserted. On the financing side, local schools are heavily supported by fiscal transfers from state governments, accompanied by an overlay of regulatory requirements which (purportedly) insure that recipient local governments use their funds to achieve desired or state mandated policy objectives.<sup>17</sup> In different ways, then, both the Federal and state governments can and do pursue policies that seem to be designed to promote distributional objectives.

Local governments exercise significant autonomy in setting their own policies, including local tax rates and land-use controls (limitations on multi-family housing, minimum lot-size requirements, development restrictions, and others). These local policies exemplify the original Tiebout insight that mobility permits people to “shop” (and pay for) varying levels of public services by establishing “prices” for local schooling and public safety, among others, plausibly enhancing efficient resource allocation compared with more uniform systems.<sup>18</sup> Price-like mechanisms also tend, however, to limit the access of lower-income households to high-quality school systems, possibly working in a direction contrary to the equity objectives of state fiscal transfers to local school systems.<sup>19</sup>

The overall efficiency and distributional performance of this system of thousands of jurisdictions, entangled by large fiscal transfers and complex regulatory structures, hinges on the locational decisions of households, the businesses that serve and employ them, and the interdependent policy choices made by governments themselves. As a conceptual device, it is often useful to consider hypothetical policy changes that could be made to one facet or another of this system, such as a change in the Federal government grant formulae through which Medicaid assistance is offered to the states. If implemented, however, such a policy reform would initiate a complex chain of adjustments of state and local policies, in addition to market responses, the totality of which constitute the ultimate impact of the Federal policy. The policies of the Federal, state, and local governments thus operate through deeply entangled constitutional, legislative, executive, and bureaucratic systems. It is easy to understand, therefore, why much research has focused on understanding the “political economy” (that is, the *endogenous determination*) of policy choices at the state and local government levels. This undertaking has naturally built upon, and fostered the further development of, insights from many fields of scholarship, including economics, law, public administration, political science, and history.

Research in fiscal federalism attempts to understand the workings of governance and

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<sup>17</sup>These transfers are often imposed or guided by court directives based on state constitutions. Courts may, for example, require – with varying degrees of specificity, up to and including detailed judicial management of school districts – that state governments provide sufficient funding for local schools to insure that all students obtain an “adequate” education.

<sup>18</sup>The same may also be said of the private provision of many other services that co-occupy spheres of local government policy, such as education, transportation, utilities, crime, and recreation.

<sup>19</sup>Local governments can in principle be fully controlled by state governments, in accordance with “Dillon’s Rule” (Dillon (1872)). In practice, however, no state attempts to do so; instead, each has created its own somewhat distinctive governance arrangements, within which many types of local governments exercise independent control over some aspects of public policy.

fiscal systems involving multiple governments, tackling the complex issues illustrated in the preceding remarks. Oates' classic *Fiscal Federalism* (1972) has stimulated much subsequent work and remains a valuable reference. Given the crucial role of fundamental institutional structures, including national and subnational constitutions and associated legal and social norms, research in this field naturally focuses on detailed country-specific issues. Interest in institutional change has been enhanced by the transformation of governance structures throughout the world in the past half-century, exemplified by the dissolution of the Soviet Union, the restructuring of political systems in the former Warsaw Pact nations, and the development of the EU and other European and international institutions. There has been a concomitant search for basic principles to guide analysis and policy in multi-governmental systems. Mature federations, such as the US and Canada, have served as reference points for the formulation and testing of models of fiscal federalism. It is not possible here to discuss fiscal federalism at greater length, but it is essential at least to be aware that the competition among governments for mobile resources occurs within multi-governmental systems and that these systems plausibly arise, in part, from the economic linkages that result from resource mobility. For additional discussion and references, see, *e.g.*, Wildasin (2004), Oates (2008), Boadway and Shah (2009), and Agrawal *et al.* (2023).

## 2.4 Mobility and Restrictions on Movement: Evidence of Absence or Absence of Evidence?

The preceding discussion illustrates some reasons why the mobility of resources warrants attention in policy analysis. But how important is it? There have been occasions where resource mobility has been rather inconsequential. For instance, immigration to the US fell substantially prior to World War I and remained relatively low until after World War II. On other occasions, international migration has assumed greater prominence.<sup>20</sup> In general, policy research must grapple with the question: under what circumstances are resources “mobile”, and to what degree?

It is certainly true that some resources, such as land, forests, or mineral deposits, are intrinsically immobile, so long as jurisdictional boundaries remain fixed. Furthermore, technological conditions may create insuperable barriers to resource mobility, as was true with regard to labor and capital mobility between the Old and the New Worlds prior to Columbus' voyages. Improvements in technology can reduce barriers to resource mobility, sometimes rather gradually, but nevertheless profoundly, as with transatlantic shipping after 1500, and sometimes more rapidly, as with the development of electronic communications during the past century. Thus, to make a clean and permanent determination

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<sup>20</sup>See Williamson (1998) and O'Rourke and Williamson (1999), who emphasize transatlantic migration, and Hanson *et al.* (2023), who focus on migration in the western hemisphere.

as to whether any particular resource is mobile is not always possible.

The mobility of people is commonly defined by a change in a person’s place of residence. It should be remembered, however, that people frequently change locations without changing their places of residence, whether for their daily commutes, recreation and tourism, or work-related travel. The fiscal and other impacts of commuting are topics of long-standing and continuing interest (*e.g.*, Greene, *et al.* (1974), Agrawal and Hoyt (2017)), as is so-called “tax exporting” through taxes on accommodations, restaurants, and other services in tourist areas (Bonham, *et al.* (1995)), the taxation of transport-sector workers in interstate commerce (Wildasin (2007)), and, more recently, the taxation of workers who work from home (Agrawal and Brueckner (2023)).

So far as changes of residence are concerned, governments can and do impose policies that impede or even prohibit such migration. Controls on international migration are the most obvious case in point, whether applied in a measured, orderly, and controlled manner, through harsh and brutal means, or by lax or haphazard enforcement of border regulations. In affluent countries, immigration restrictions are the most conspicuous forms of migration controls, but the cases of the Iron Curtain, North Korea, and Cuba show that emigration restrictions can also be important.<sup>21</sup>

Similar instruments have been used to control internal migration, as was the case in the US with respect to fugitive slaves or in *apartheid* South Africa. According to Tian (forthcoming), some 22.5% of the world population, in more than a half-dozen countries, is (or has recently been) subject to internal migration restrictions. Of particular note, China’s *hukou* (household registration) system, which especially restricted rural/urban migration in pre-reform China, has been relaxed – significantly but unevenly – during the period of rapid growth of the Chinese economy. Zi (2017) discusses how interactions between trade expansion and *hukou* liberalization have differentially affected regional factor markets, income distribution, and welfare. Tian (forthcoming) examines the endogenous adjustments of local policies by regions that have had greater or lesser gains from increased trade opportunities. Peng and Schoeb (2023) highlight the fact that local redistributive policies apply differentially to people with different *hukou* status, affecting the distributions of income and social well-being both locally and nationally. Because it restricts access by migrants to local social services, this system reflects some of the same tensions between resource mobility and redistributive policy that have already been mentioned above in connection, for instance, with the English Poor Laws and the “welfare magnets” controversies in the US.

In addition to policies imposed within the context of “stable” jurisdictional configura-

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<sup>21</sup>US citizens whose income and wealth exceed certain thresholds are subject to taxation of unrealized capital gains if they renounce their citizenship. This policy, which may be viewed either as a kind of “exit tax” or, alternatively, as a recapture of deferred gains, does not limit emigration *per se*, but may discourage it to some degree. Analysis by Organ (2022) suggests that such effects are modest.



tions, changes in jurisdictional structures themselves can drastically affect resource mobility. For instance, the Iron Curtain created serious impediments to movements of both labor and capital after World War II, but these were drastically reduced (German unification offers one dramatic and economically important illustration) after the collapse of the Soviet Union in 1991.<sup>22</sup> The breakup of the former Yugoslavia and the former Czechoslovakia, the potentially unstable division of the Korean peninsula, ongoing conflicts in Africa, and other historical and prospective changes in jurisdictional boundaries throughout the world have altered (or may in the future alter) the potential for resource movements.

Whether at the international or subnational levels, policies that impede or, in the extreme, completely obstruct migration serve as “silent witnesses” to the mobility of people who would otherwise change locations. By contrast, forced expulsions and population exchanges (as occurred, for example, after World War I, World War II, within the former Soviet Union, or at the time of Indian independence) stand as “vocal” witnesses to the heavy costs that result from policies that dictate population movement. At either of these extremes, observed migration flows are, to some extent, the consequences of policy choices.

Turning to capital mobility, various policies and institutions may regulate and, to a greater or lesser degree, limit the international mobility of capital. The post-World War II Bretton Woods system is perhaps the most conspicuous recent example of controls on international capital mobility, but many other bilateral and multilateral international agreements regarding the establishment and licensing of business enterprises can also affect the movement of capital on an international scale. On smaller geographical scales, the locations of business activities are heavily dependent upon subnational government laws and regulations governing the incorporation and operation of businesses. In the US, as mentioned above, local governments impose land-use regulations that affect overall economic development with their jurisdictions, thereby affecting the amounts and types of residential housing, commercial and industrial development, and related capital flows.

In view of the many factors that affect the movement of resources, when should one treat people or capital as mobile or immobile? Consider the analogous case of tariff policies. Increases in a tariff on some traded commodity generally reduce the volume of trade between two trading partners, and trade vanishes altogether if the tariff is sufficiently high. This usually means that the welfare cost of a tariff increases as the tariff rate goes up, and it reaches a maximum when the tariff becomes prohibitively high. Commodities

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<sup>22</sup>Although formal restrictions on East-West migration in Germany ended when the Berlin Wall fell, migration flows were limited by a complex ensemble of regulatory (including labor-market regulations, which extended West German bargained wage structures to industries in the East) and fiscal policies (capital subsidies to industry in the East) that grossly distorted factor prices and factor markets, resulting in East German wages that were about 200% (!) of manufacturing value added in 1991-1993 (Sinn (1995)). Sinn (1995, 2002) describes the political pressures from several interest groups (including West German labor unions) that resulted in these policies which resulted in very large transfer payments (not formally designated as such) to workers in the East, greatly reducing East-West migration incentives, but at a high efficiency cost.

that are exchanged between countries are said to be “tradeable”, understood to be a property (conditional on technology or other “fundamentals”) of the commodity, not the policies that regulate its exchange. Accordingly, when a prohibitive tariff is imposed on a commodity, it becomes “non-traded” but remains “tradeable”. Similarly, for resources like people and capital, policies that may effectively prohibit them from moving do not make them “immobile”: “movement” (which is often observable) is not synonymous with “mobility”. Observed movement of a resource thus confirms its mobility, but absence of movement does not confirm its immobility. Indeed, as the prohibitive tariff example illustrates, policies that restrict the movement of mobile resources can be of the utmost importance precisely when they make movement unobservable.<sup>23</sup>

Quite aside from the effects of policy interventions, observed migration and capital flows within an economic system depend upon underlying market conditions. These may be conducive either to “very large” or “very small” resource flows. As a thought experiment, one might postulate some drastic hypothetical rearrangement of human or non-human resources, far from what is presently observed. If, for instance, all residents of Europe west of the Rhine River were relocated to its east, or if all residents of North America were relocated west of the Rocky Mountains, powerful economic incentives would produce very large migration flows that would tend to restore the pre-existing population distributions. The fact that current migration flows fall far short of such amounts indicates not that labor is immobile but rather that existing population distributions are not far from equilibrium or steady-state values.

For these reasons, a “mobile resource” is understood in this essay to refer to a resource that can feasibly be relocated, irrespective of whether it is observed to move between any given locations in any particular period. This seems to be most appropriate because many kinds of policies, alone or in combination, may discourage, encourage, or stop resource movements altogether, and the magnitude of observed resource movement – including sometimes the complete absence of movement – is a joint consequence of market conditions and policy choices (by all relevant governments). It can still be useful, in the interest of analytical clarity, to postulate and compare extreme polar cases in which (say) capital is completely immobile or costlessly mobile. Such stylized comparisons may shed light on the implications of technological change (steamships, telegraphs, or the internet), changes in policy (*hukou* reform, German unification, or the imposition of uniform tax rates on corporation incomes), or market conditions (differences in rates of return or quantity perturbations due to changes in production technologies, incomes, or preferences). But it is important, in different applications, to distinguish between hypothetical extremes and to ascertain empirically the imperfect (but not zero) degree of (joint) mobility of labor, capital, and other productive resources in varying historical and geographical contexts.

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<sup>23</sup>Although incidental to the terminological distinction just made, it seems apt and perhaps suggestive here to recall Mundell’s (1957) classic paper arguing that “trade and factor mobility are substitutes”.

## 2.5 Recurring Themes and Research Questions

The preceding discussion could be augmented almost *ad infinitum*, and readers can adjoin to it their own favorite illustrations. Its primary goal is to show that resource mobility, notably the mobility of people and capital (or, if one prefers, of businesses), raises important economic and public policy issues over essentially all time scales and at all geographical scales. No single modeling framework can capture every relevant aspect of competition among governments for mobile resources, but the foregoing illustrations suggest several observations that warrant attention in analyses of competition among governments. As an incomplete summary, these include:

*Endogenous location of mobile resources in multiple locations.* At least one resource must be presumed not to be intrinsically immobile, and there must be more than one location where it may be situated. Although the movement of resources among locations may be costly and time-consuming, it is not entirely destructive: resources that leave one location arrive at some other location(s), thus necessarily affecting conditions in both (or all) places. These are obvious preconditions for the study of competition among governments, generally precluded in “closed economy” modeling frameworks.

*Multiplicity of mobile resources.* The mobility of both “labor” and “capital” (*i.e.*, of human and non-human productive resources) warrants analysis at all geographical scales. Furthermore, economic analysis has amply demonstrated that the markets for mobile and immobile resources do not operate independently of one another. The earnings of workers evidently depend on the employment decisions of firms; the prices of land, housing, and industrial property depend on the incomes and preferences of households and on the levels and composition of business activity; and business profits and the returns on capital investments depend on labor market conditions, consumer demands, and site availability. Consequently, governments do not compete for any one mobile resource in isolation, but must instead compete for all mobile resources simultaneously.

*The degree of resource mobility.* Some resources may reasonably be viewed as completely immobile. As matters of analytical convenience, either labor, capital, or particular categories of each are often viewed as “perfectly” or “costlessly and instantaneously” mobile or as intrinsically immobile. Practically speaking, however, many productive resources can in fact be relocated, but not immediately and without incurring some costs. The time periods involved range from hours or days to decades, and the costs involved can be pecuniary, psychic, and informational. Resource mobility is thus “imperfect”.

*Multiplicity of public policy instruments.* Many policy instruments, including taxes, expenditures, and regulations, affect the location of productive resources. These instruments are themselves multi-dimensional, and they are used simultaneously. For example, a government may derive revenues from taxes on value added, wages, profits, interest,

and property. It may spend the proceeds on social insurance and redistributive transfers (with benefits that are available only to eligible recipients), defense, transportation, and education, while relying on borrowing to pay for expenditures in excess of revenues. All of these policies are potentially time-varying, so that competition for mobile resources involves not just current policies but also those that have been utilized in the past and those that may be utilized in the future. Because of political, legal, and financial constraints, not all of these policies can be freely chosen, independently of each other.

*The role of political economy and governmental institutions.* The (many) public policies that simultaneously affect the locations of (many) productive resources in (many) locations are determined by (many) governments. Government policy choices are the results of collective decision-making mechanisms that emerge from governmental institutions. Because resource movements sometimes occur gradually and are not easily reversible and because they can affect economic conditions for long periods of time, they depend upon the durability and predictability of policy decisions and the institutions that produce them.

As will become evident in the following sections, the current state of research on competition among governments is relatively well developed along some of these dimensions, but substantially less so in other respects.

### **3 A Simplified Model of Competition for Productive Resources**

This section describes a model of an economic system with many (or at least two) jurisdictions, each with its own fiscal policy. Keeping the technical formalities to a minimum, it emphasizes the “simple economics” of the model and some of its most important results.

Section 3.1 outlines the “open economy” structure of the model, which appears in the equilibrium conditions that link the markets of multiple jurisdictions. These conditions, or variants of them, are simple but fundamental. Using them, Section 3.2 sketches the distributional and efficiency analysis of *exogenously given* fiscal policies in this open economy context, showing how the effects of policies in open economies differ, sometimes drastically, from those in more traditional closed-economy settings. Section 3.3 discusses the *endogenous* determination of fiscal policies by independent decisionmakers in each jurisdiction, bringing political economy considerations into the picture. Section 3.4 turns to the concepts of “movement” and “mobility” and to the implications of regulatory controls on the movement of productive resources.

### 3.1 Market Equilibrium

In order to present the model with a minimum of clutter, while preserving some of the economic and policy motivation for its development and use, let us imagine an economy with  $n$  jurisdictions (we may call them “localities”), within each of which is located a set of perfectly competitive firms that utilize two inputs in production processes that yield a single homogenous output, taken as numéraire. One of these inputs, which we may refer to as “capital” (but could just as well be called “labor”), is homogeneous and costlessly mobile throughout the economy; let  $k_i$  denote the amount of capital employed in locality  $i$ . The total amount of this input in the economy as a whole is exogenously fixed at some amount  $\bar{k}$ . The other input in each locality is fixed in amount and is completely immobile.<sup>24</sup> The total amount of output in locality  $i$  is assumed to be a twice-differentiable and increasing function of the amount of capital, with a diminishing marginal product, *i.e.*,  $f'(k_i) > 0 > f''(k_i)$ .<sup>25</sup>

All productive resources are privately owned by households who seek to earn the highest possible return (“income”) from them. Capital is freely traded throughout the economy and, in equilibrium, it must earn the same net rate of return for its owners, denoted by  $r$ , in all locations. This equilibrium condition, which is of fundamental importance for the analysis, may be viewed as a spatial arbitrage condition. The other productive input in each locality is also competitively traded, but, being completely immobile, no such spatial arbitrage condition is a necessary feature of equilibrium. Competitive factor pricing dictates that the *gross* return to capital in locality  $i$  is  $f'_i(k_i)$  and (by a standard product-exhaustion argument) the gross return to the immobile resource in  $i$  is  $w_i = f_i(k_i) - k_i f'_i(k_i)$ .

But for the specification of the public sector, the model is now complete. Each locality has a government that collects a tax from the owners of one of its productive resources and uses the proceeds to pay a subsidy or transfer  $L_i$  to the owners of the other resource. To be specific, let  $t_i$  represent a per-unit tax imposed on capital in locality  $i$ , so that the net return to capital in  $i$  is  $f'_i(k_i) - t_i$ . Total tax revenue is then  $t_i k_i$ , the local government budget constraint is

$$t_i k_i = L_i, \tag{1}$$

and the net return to the immobile resource is thus (by budget balance)  $w_i + L_i = w_i + t_i k_i$ .

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<sup>24</sup>This input is homogeneous within each locality, and hence its quantity may be normalized at unity. It need not be the same resource in each locality. If  $k$  is called capital, it may be suggestive to call the immobile resource “labor” or “land”, or to think of it as an aggregate of many types of immobile labor and natural resources.

<sup>25</sup>When desired, these properties may be augmented with Inada-type conditions to insure interior solutions.

The essential equilibrium conditions for the model are

$$\sum_{i=1}^n k_i = \bar{k} \quad (\text{capital market clearing/resource conservation}) \quad (2)$$

$$f'_i(k_i) - t_i = r \quad \forall i \quad (\text{spatial arbitrage}), \quad (3)$$

which together constitute a system of  $n + 1$  equations in the  $n + 1$  unknowns  $(r, k)$  (where  $k = (k_1, k_2, \dots, k_n)$  is the capital allocation vector).

These simple conditions provide a foundation for the analysis of fiscal policies imposed by more than one (perhaps many) jurisdictions in an economic system in which there is a single mobile resource, partially satisfying several of the modeling desiderata outlined in Section 2.5.

### 3.2 The Incidence and Allocative Effects of Local Taxes on Capital

The basic model just outlined has been applied in influential analyses of local property tax incidence by Mieszkowski (1972) and others. As is typical in incidence analysis, public policies are taken as exogenously given, and the goal is to investigate the impact of policy changes on equilibrium prices, quantities, incomes, welfare, and other variables of interest.

A first step in this direction is to note that each of the equations (3) can be solved for the local demand for capital as a downward-sloping function of the cost of capital  $(r + t_i)$  with a derivative  $k'_i(r + t_i) = 1/f''_i < 0$  and an elasticity of demand  $\epsilon_i = d \ln k_i / d \ln(r + t_i) = (r + t_i) / (k_i f''_i) < 0$ , with all expressions evaluated where (3) holds. Substituting from these demand functions into the capital-conservation equation (2), we may solve implicitly for the equilibrium net rate of return  $r$  as a function of the vector  $t = (t_1, \dots, t_n)$  of local tax rates. It follows immediately that

$$\frac{\partial r}{\partial t_i} = -\frac{k'_i}{\sum_{j=1}^n k'_j} \in (-1, 0), \quad (4)$$

from which it also follows that

$$\frac{dk_i}{dt_j} = k'_j \frac{\partial r}{\partial t_i} > 0 \quad \forall j \neq i \quad (5)$$

$$\frac{dk_i}{dt_i} = k'_i \frac{d(r + t_i)}{dt_i} < 0. \quad (6)$$

In words, *an increase in any locality's tax rate (i) depresses the economy-wide net return to capital, though by less than the increase in the tax rate itself, (ii) reduces the equilibrium*

stock of capital in that locality, and (iii) increases the equilibrium stock of capital in every other locality. In this model, a “conservation law”, embodied in (2), implies that the reallocation of capital in response to a change in any tax rate is non-destructive, so that the loss of capital from a locality that raises its tax rate is equal to the aggregate increase in capital for all other localities. These simple results, which have no counterparts in closed-economy models, show that each locality is linked to every other through the common capital market.<sup>26</sup>

As a convenient reference point, observe from (4) that  $\partial r/\partial t_i = 1/n$  in the special case where all jurisdictions are identical. (If they are heterogeneous, but not “too” different, a unit increase in  $t_i$  reduces  $r$  by approximately  $1/n$ .) To a first approximation, then, an increase of  $t_i$  by a discrete amount  $\Delta t_i$  reduces the economy-wide net return to capital by approximately  $\Delta t_i/n$ , with better approximations to be had by adjusting for differences in locality-specific attributes (as captured in their production functions  $f_i$ ). Note, however, that *if all localities – identical or not – increase their tax rates by the same amount, say  $\Delta t$ , the equilibrium net return to capital falls by  $(\sum_{i=1}^n \partial r/\partial t_i)\Delta t = \Delta t$ , that is, by the amount of the common tax increase.* Such a common change in policy also has no effect on the equilibrium allocation of capital: no locality’s capital stock increases or decreases as a result. In effect, *when all local policies are coordinated, the situation effectively reverts to the closed economy in which a single government sets policies for the entire economic system.*

The assumption that capital is privately owned means that the aggregate net income accruing to capital owners is  $r\bar{k}$ . These owners may be situated anywhere – all concentrated in one locality, equally distributed among localities, or even located outside of the entire system of all  $n$  localities (“absentee ownership”). However capital ownership is distributed, a unit increase in the tax rate in locality  $i$  reduces the net incomes of capital owners by  $|\partial r/\partial t_i|\bar{k}$ , that is, by an amount on the order of (in the symmetric case, equal to)  $\bar{k}/n$ . The tax revenue collected in locality  $i$ ,  $t_i k_i$ , changes by  $k_i(1 + \partial k_i/\partial t_i)$ , and the aggregate tax revenues of all other localities increase by  $\sum_{j \neq i} t_j dk_j/dt_i$ . If all tax rates are (approximately) identical, as is true in particular when all tax rates are initially 0, the increase in total tax revenue for all localities is (approximately)  $k_i$ . Accordingly, the *total loss in income to all capital owners, per unit of tax revenue collected, is approximately  $\bar{k}/(nk_i) \approx 1$ .*

The results of this analysis may seem to be either obvious or impossible. To understand them clearly, recall that the number of localities has so far been left indeterminate. In particular,  $n$  may be very large, and individual localities may accordingly be very small –

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<sup>26</sup>The *directions* of the effects in (4), (5), and (6) are unambiguous, but their *magnitudes* can range from “small” to “large”. One can immediately see that  $dr/dt_i$  can be a very small number when  $n$  is large – what one might consider to be a “typical” case – though it can be a much larger number when  $n$  is small, as in many models of strategic competition built upon two-person game theory. More detailed remarks follow immediately below. The importance of the number and size of competing jurisdictions for strategic modeling are discussed further in Sections 5.1 and 5.2.

so small that one might suppose that the effects of their policies on the economic system are “negligible”.<sup>27</sup>

In one respect, this is indeed true. Just as any single idealized purely competitive firm acts as though its production and input choices have zero effect on product and input prices, so a change in capital tax policy by a single small locality would have a minute and undetectable effect on the net rate of return on capital within its jurisdiction as well as economy-wide:  $\partial r/\partial t_i$  is of the order of  $1/n$ , or “nearly” 0. And yet an increase in any one locality’s tax does reduce the aggregate net rate of return *slightly*, and it does so for *all* capital owners “in the world”, that is, in the entire economic system encompassed by the model. The upshot is that the owners of capital in aggregate suffer a loss of net income approximately equal to the amount of additional tax revenue collected by this small locality: the product of a small number,  $\partial r/\partial t_i$ , when multiplied by a large number,  $\bar{k}$ , is not “negligible”. And, following the remarks above, we confirm this by observing that if  $n$  very small jurisdictions all impose taxes at some average rate  $\bar{t}$ , the effect of these taxes is to reduce the net rate of return to capital in the entire economy by approximately  $\bar{t}$ , thus reducing the aggregate incomes of capital owners by approximately  $\bar{t}\bar{k}$ . To conclude otherwise is to fall prey to a “fallacy of composition”; in exact analogy, it would be fallacious to infer that a 1% reduction in output by every one of a multitude of very small competitive firms, no one of which perceptibly influences total output, would have no effect on market supply or on the equilibrium product price. In short, the sum of very many very small numbers need not be small.

This line of reasoning highlights the importance of a “system-wide”, “multi-market”, or “general equilibrium” approach to the problem of tax incidence. The presentation above draws upon Bradford (1978). Mieszkowski (1969), Bradford, and others attribute the basic insight to Brown (1929).<sup>28</sup>

### 3.3 From Incidence to Political Economy: Endogenous Policy Choices and System-wide Equilibrium

There are multiple possible interpretations of competition among governments, but central to this concept in most cases is the *endogeneity* of policy; instead of taking policy as exogenously or parametrically given, one postulates that policies are *chosen* by gov-

<sup>27</sup>For many practical purposes, as discussed further below, this should perhaps be seen as the standard case, as the tax policy changes of very few (if any) jurisdictions, including even quite large nations, are likely to have large impacts on the economy-wide or world-wide net rate of return to capital.

<sup>28</sup>Brown was concerned with the impacts of *sector-specific* policies in a multi-sectoral rather than multi-jurisdictional economy. (As an example, Brown analyzes the effect of a tax on bricklayers, arguing that it affects the wages of workers employed in other occupations.) Harberger’s classic 1962 study of the incidence of the corporation income tax, which was grounded on the standard two-sector general equilibrium model, may also be viewed from this perspective. It has long been recognized by Mieszkowski, McLure (1969), and others, however, that this approach is readily adapted to a multi-jurisdictional setting.



ernments and then seeks to understand the implications of those choices for outcomes of interest. In the case of fiscal policies, these outcomes include tax rates, public expenditures, and, perhaps most importantly, allocative efficiency and distributional equity (aka “social welfare”).<sup>29</sup>

There are many conceivable hypotheses about how localities choose their fiscal policies. One simple and commonly employed approach is to suppose that each jurisdiction contains a single and completely immobile group of identical households, or a single “representative” household, and that the government chooses policies that maximize the welfare of that one agent.<sup>30</sup>

Suppose, then, that a single household resides in locality  $i$ , and that this household owns the total stock of the immobile resource there as well as a share  $\sigma_i \geq 0$  of the aggregate capital stock  $\bar{k}$ . Assuming that the locality is small, a change in its tax policy has an imperceptible effect on the economy-wide net return to capital, so that  $\sigma_i \bar{k} \partial r / \partial t_i \approx 0$ . Although the effect of  $t_i$  on  $r$  is minute, its effect on  $k_i$  is not, nor is its effect on the *gross* return  $w_i = f_i(k_i) - k_i f'_i(k_i)$  received by the immobile resource:  $dw_i / dt_i = -f''_i(\cdot) k'_i = -k_i < 0$ . A change in  $t_i$  also changes local tax revenue  $t_i k_i$ , which, in our simple base specification, is received by the immobile household as a transfer payment:  $dt_i k_i(\cdot) = k_i + t_i k'_i = k_i(1 + t_i \epsilon_i / (r + t_i))$ . Putting these results together, the *net* income of the immobile household thus changes by

$$\frac{d(w_i + t_i k_i)}{dt_i} + \sigma_i \bar{k} \frac{\partial r}{\partial t_i} \approx \frac{d(w_i + t_i k_i)}{dt_i} = \frac{t_i}{r + t_i} k_i \epsilon_i. \quad (7)$$

This central result says that *the welfare of a representative agent in a small locality is increased if the local tax rate on capital is decreased (in absolute value)*. That is, if the tax rate is positive, the local resident benefits from a reduction in the tax rate. Also note, however, that this result does *not* suggest that local welfare increases if the locality applies a net *subsidy* – corresponding to values of  $t_i < 0$  – to local capital. In this model, “attracting capital investment” is not an end in itself for a welfare-maximizing locality. On the contrary, local welfare is enhanced by *reductions* in *net* subsidies to capital, even recognizing that a reduction in the local subsidy would “drive away” some of the local capital stock. A reduction in a capital subsidy would indeed reduce the demand for the (complementary) immobile resource, and thus (given the assumption of a neoclassical production function) its equilibrium gross return. But because any capital subsidy is necessarily financed by taxation of the immobile resource ( $t_i < 0$  means that the net transfer payment  $t_i k_i$  is negative), a reduction in the subsidy also reduces the

<sup>29</sup>In the preceding analysis of tax incidence, governments compete for the mobile resource, but their policy “decisions” consist of exogenously-imposed tax perturbations, with redistributive transfers adjusting endogenously, and passively, to achieve budget balance.

<sup>30</sup>As strong as it may seem, the representative agent assumption is certainly less objectionable when applied to the case of (say) municipal governments than to larger entities, such as nations or groups of nations, as is often done in macroeconomics, international economics, and other fields. In any case, it offers a convenient starting point; some simple alternatives are considered later.

fiscal burden imposed on the immobile resource. This tax reduction necessarily outweighs the increase in the gross income of the representative agent. Hence, the key condition for *optimal* local policy is that

$$\frac{d(w_i + t_i k_i)}{dt_i} = \frac{t_i}{r + t_i} k_i \epsilon_i = t_i = 0. \quad (8)$$

In summary, *when local capital tax revenues are used to finance transfer payments to an immobile local resident, the optimal fiscal policy for a small locality is neither to tax nor subsidize local capital investment.*

In an economy containing many such small localities, none (if acting in the interests of their immobile residents) would tax or subsidize mobile capital, so that, in equilibrium,  $t_i = 0$  for all  $i$ . Accordingly, the spatial-arbitrage condition (3) implies that

$$f'_i(k_i) = r = f'_j(k_j) \quad \forall i, j, \quad (9)$$

that is, *in an equilibrium with competition among many small localities, the marginal productivity of capital is equated in all locations.* This is, of course, the necessary condition for the maximization of total output (the sum of GDP in all localities) in the economy, that is, for the efficient allocation of the mobile resource. In fact, it is obvious from (3) that this condition is met whenever all localities impose identical taxes; with “perfect” competition among many small localities, the identical local taxes are all *chosen* to be equal to 0.<sup>31</sup>

Note that efficient resource allocation is necessarily an issue that must be evaluated from a system-wide or general-equilibrium perspective: it is not possible to ascertain whether any one locality’s policy, considered in isolation, is efficient. For instance, suppose that all localities but the first choose a uniform “tax” rate of  $\bar{t} \neq 0$ , positive or negative. In this situation, if locality 1 sets  $t_1 = 0$ , the allocation of capital is distorted: because the spatial-arbitrage condition (9) implies that  $f'_1(k_1) = r < (>) f'_i(k_i) \quad \forall i \neq 1$ , as  $\bar{t} > (<) 0$ , the equilibrium allocation of capital cannot be efficient. What matters for efficiency is not the *levels* but the *uniformity* of net fiscal burdens, positive or negative, for mobile productive resources; because competition among small localities drives these net burdens to a uniform value of 0 everywhere (a particular type of uniformity), the resulting equilibrium is efficient.

From the viewpoint of social welfare, the zero-tax equilibrium need not be fair or equitable: the distribution of income is dependent upon the amounts and productivity of

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<sup>31</sup>The phrase “race to the bottom” is sometimes used to describe the equilibrium policies of competitive governments, as discussed more thoroughly in Section 4.3 below. Here, let us simply observe that, at least with respect to the use of fiscal instruments, no true “bottom” exists, as a tax rate can always be reduced below 0 by replacing it with a subsidy ( $t_i < 0$ ). There is no lower bound on subsidy rates (other than the complete exhaustion of the other revenue sources that may be used to finance the subsidy). Because perfectly competitive localities do not offer any subsidies at all, their “tax” rates do not even approximate a lower bound.

the immobile resources (in the model, these are embedded in the production functions  $f_i$ ), the distribution of capital ownership (the shares  $\sigma_i$ ) and the interactions of these endowments and technologies through the pricing of productive resources in competitive markets. There is an entire  $n$ -dimensional frontier or envelope of attainable net incomes, which, in this simple model, is equivalent to the utility-feasibility frontier. The fiscal-competition equilibrium with zero taxes and subsidies yields an outcome at one point on this frontier. If, for some reason, one or more “disobedient” local governments were not to pursue the policies desired by their representative immobile resource owners, it is possible that they could select asymmetric policies that create an inefficient capital allocation and, in doing so, would move the system to the interior of the utility frontier, that is, to a Pareto-inefficient outcome. Depending on “distributional preferences”, such an inefficient outcome might nevertheless be preferred, from an overall social welfare perspective, to the efficient zero-tax outcome that emerges as the decentralized policy equilibrium.

As one illustration of this last remark, suppose that the resident of locality 1 has a small capital ownership endowment ( $\sigma_1$  is small). The imposition of higher taxes on capital in other localities would increase  $k_1$  (as shown in (5)), and thus the income of the resident of locality 1, holding fixed the value of  $t_1$  (whether at zero or at any other value, positive or negative). If this household is “ethically deserving”, such policies would increase social welfare even while introducing inefficiency in the system-wide allocation of capital. This kind of equity-efficiency tradeoff is commonplace in public finance, although it can be avoided in some cases. In principle, it may be possible to achieve distributional objectives while simultaneously avoiding inefficient capital allocation by using lump-sum “interpersonal” transfers from the owners of immobile resources in one locality to (say) the representative agent in locality 1. In the present context, such transfers would be interjurisdictional in nature, which would require the existence of a suitable higher level government (or some other equivalent institutional arrangement) that could extract revenues from less-deserving jurisdictions (*i.e.*, from their representative immobile residents) with which to finance lump-sum transfers to a more-deserving one (such as locality 1 in this illustration). In this respect, the situation is quite different from the closed-economy public finance context, as the implementation of a first-best policy requires not simply the existence of ideal tax and subsidy instruments (and the information needed to utilize them), but an added *institutional structure*, as mentioned in the discussion of federalism in Section 2.3.

An interesting and under-investigated question is whether the large and durable systems of intergovernmental transfers seen in many federations have contributed to more efficient allocations of mobile resources than would otherwise have been the case. As remarked earlier (Section 2.3), state governments in the US receive around one-third of their general revenues in the form of transfers from the Federal government, and local governments likewise receive about one-third of their revenues as transfers from the

state governments. (Canada and Germany have similarly well-established programs that transfer central government funds to their subnational governments.) A hypothetical expansion, contraction, or complete elimination of such direct or implicit transfers would change the fiscal policies of lower level governments, with associated alterations in the allocation of productive resources among regions and efficiency effects of generally unknown magnitudes.<sup>32</sup> In systems with multiple governments, efficient taxation generally necessitates either direct intergovernmental transfers or equivalent tariffs and subsidies applied to interjurisdictional trade (including international capital flows), if governments cannot utilize lump-sum revenue sources (see Wildasin (1977) and Keen and Wildasin (2004)).<sup>33</sup>

Let us conclude this section by noting how the market linkages emphasized in the incidence analysis of Section 3.2 not only help to determine the gainers and losers from local policy changes; they also provide a foundation for the study of endogenous policymaking. In particular, capital mobility constrains the ability of *small* localities to affect the system-wide net return to capital, which, as we have seen, shows that capital owners need not be explicitly represented in the local political process in order to insure that they need not pay taxes in any one locality: competition does that work for them. (Observations in this spirit are central elements in the discussion of “open economy” public finance in Brennan and Buchanan (1980).) These political economy implications of resource mobility, which are elaborated further in Section 4.2, stand in stark contrast to a closed-economy model where, with the same menu of tax and subsidy instruments, the owners of all local resources are trapped in potential conflict and stand to gain or lose through the manipulation of local policies.

### 3.4 Mobility vs. Movement: “No Trade” Equilibria and Artificial Barriers to Mobility

The preceding discussion has explicitly postulated that the mobile productive resource can be freely situated in any of the  $n$  localities, with no cost of “relocation”. One may add to the model any arbitrary “initial assignment” of the mobile resource,  $k^0 \equiv (k_1^0, \dots, k_n^0)$ , to each of the localities (or even to “absentee” owners, not located in any of the  $n$  localities), provided only that the aggregate initial amount adds up to the fixed aggregate amount  $\bar{k}$ . For any given vector of policies  $t$ , the equilibrium allocation of the mobile resource  $k(t)$  is independent of this initial assignment, and the same is true for all other equilibrium values (factor prices and incomes, tax revenues, and public

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<sup>32</sup>Although intergovernmental transfers play a more modest role in the international sphere, they have gradually become more prominent in Europe since the foundation of the EU, and international financial assistance to developing countries is sometimes significant in magnitude.

<sup>33</sup>The potential efficiency gains from intergovernmental transfers when lower-level governments use distortionary taxes are also discussed in Wildasin (1983, 1984).

expenditures) of interest. For this reason, the “initial assignment” of the mobile resource is not economically important for the analysis. For the same reason, it cannot, properly speaking, be used to analyze the implications of the *movement* of this resource from one location to another (what might be called “investment flows” if  $k$  is “capital” or “migration” if  $k$  is “labor”): the implications of resource mobility (incidence, efficiency of equilibrium, and other results cited above) are unaffected by any discrepancy between the “initial” and “final” allocations.

To be even more explicit, one could, if desired, postulate that the initial assignment vector  $k^0$  is just equal to the equilibrium allocation  $k(t)$ . In this special case, although the resource is freely mobile, no “movement” of this resource need take place for the equilibrium to be achieved, a formal verification of the remarks in Section 2.4. In standard models of exchange or trade, such an outcome is customarily called a “no-trade equilibrium”, and a similar term could also be applied here. At least within the context of this model, observed resource movement says nothing about the extent of competition among governments; rather, in a very loose sense, high rates of observed resource flows would simply be interpreted as an indication that the economic system is in “disequilibrium”, that is, that the initial or current allocation of resources must be substantially changed in order to satisfy the spatial arbitrage condition (3).

As observed in Section 2.4, many jurisdictions throughout history have applied regulatory constraints to the movement of productive resources. These regulatory interventions can directly affect resource movement, and they interact in important ways with fiscal policies. As the simplest possible illustration, consider what happens in the model described above when any one locality imposes and strictly enforces a constraint that prevents the movement of a productive resource. What would otherwise be an open local economy now becomes closed (as a matter of policy), its linkage to the external factor market is severed, local fiscal policies have no effect on the allocation of resources, and factor mobility no longer prevents local redistributive policies from achieving any desired distribution of net income. This is essentially the standard analytical framework of public finance, which disallows the linkage to external markets (and which, of course, accommodates many other margins of behavioral adjustment that have been suppressed here).

In practice, quantitative controls over resource mobility may or may not be binding. If they are not binding, then the basic model operates much as before.<sup>34</sup> If, on the other hand, they are binding, the free-mobility equilibrium condition (3) does not hold, which is to say that net income differentials among localities may persist in equilibrium. The condition (9) for efficient resource allocation may conceivably still hold, but, in general, restrictions on mobility preclude the equalization of gross returns required for efficiency. Thus, the imposition of binding controls affects both the distribution of income and the

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<sup>34</sup>By restricting the set of feasible policy choices, however, constraints that are non-binding at equilibrium can nevertheless have significant effects on strategic interactions among small numbers of competing jurisdictions.

efficiency of resource allocation. When binding constraints are imposed, cross-border resource flows cannot be observed empirically, but, as in the case of no-trade equilibria, the fact that a resource cannot move does not necessarily indicate that it is immobile.

As discussed earlier, resource owners naturally seek, if possible, to influence local policies to protect and advance their own interests. Let us now consider how the political economy of fiscal policy is affected by restrictions on resource mobility. Suppose that a small locality 1 possesses an “initial” assignment of  $k_1^0$  units of the mobile resource and that it institutes a restriction that insures that only  $\hat{k}_1 - k_1^0$  units may enter the locality. This means that the locality can have a total stock of the mobile resource no greater than  $k_1^0 + (\hat{k}_1 - k_1^0) = \hat{k}_1$ . For the constraint to be binding, it is necessary that the local net return on this resource must equal or exceed  $r$ , that is,  $f_1'(\hat{k}_1) - t_1 > r$ . In this circumstance, the locality has *two* policy instruments at its disposal: its fiscal policy  $t_1$  and its regulatory policy, represented by  $\hat{k}_1$ . How do small changes in either of these policies affect the distribution of income within the locality? What policies best serve the interests of the owners of the immobile resource?

At this point, the analysis of income distribution, policy incidence, and policymaking becomes more complex. The owners of the units of the mobile resource within the locality may earn a higher net return than is available on external markets because arbitrage is restricted. Owners of the mobile resource who succeed in gaining entry to the locality enjoy a rent, or quasi-rent, relative to those remaining outside. These quasi-rents may, however, be dissipated; for instance, firms situated within the locality may still be able to obtain the resource from outside sources at a net return of  $r$  (their reservation price) and thereby earn higher profits, which are then part of the incomes of their (the firms’) owners. Following the outline of the previous analysis, it may be natural to assume that these profits accrue to the local “representative household” that owns the immobile resources within the locality, although other specifications are possible. Under this assumption, the net income  $Y_1$  of the representative household consists, as before, of its gross income  $f_1(\hat{k}_1) - k_1 f_1'(\hat{k}_1)$  plus the transfer payments that it receives,  $t_1 \hat{k}_1$ , plus the quasi-rents earned on the potentially mobile resource,  $\hat{k}(f_1'(\hat{k}_1) - t_1 - r)$ , or, simply,  $Y_1 = f_1(\hat{k}_1) - r \hat{k}_1$ .<sup>35</sup> Recalling that the regulatory restriction is assumed to be (strictly) binding,  $dY_1/d\hat{k}_1 = f_1'(\hat{k}_1) - r - t_1 > 0$ , that is, *a small easing of a binding constraint on the importation of the mobile resource increases the net income of the representative local household*. Because it reduces the amount of capital used elsewhere in the economy, such a policy change results in a small increase in  $r$ , with distributional impacts in other jurisdictions similar to those described in Section 3.2. Following the logic of Section 3.3, it is evident that the optimal local policy is always to increase  $\hat{k}_1$ , that is, *the owners of the immobile resource in a small locality are harmed by binding constraints on the entry*

<sup>35</sup>If a fraction  $\gamma_1$  of the rents accrue either to absentee capital owners or absentee owners of firms,  $Y_1 = (f_1(\hat{k}_1) - r \hat{k}_1) - \gamma_1(\hat{k}(f_1'(\hat{k}_1) - t_1 - r))$ ; the following results must be amended accordingly in this case.

of a mobile productive resource. Similar remarks would apply, *mutatis mutandis*, in the case of upward-binding limitations on the utilization of a mobile resource (as in the case of forced emigration).

## 4 Efficient and Inefficient Provision and Financing of Pure and Impure Local Public Goods

In the simplest model, local governments use only two fiscal instruments, one, a tax on a mobile resource, and the other, a lump-sum transfer payment to the immobile resource owners. One interpretation of this model has “capital” as the mobile resource and, perhaps, “labor” (or households) employed in the local economy as the immobile resource. The only purpose of the public sector is to redistribute incomes between the two. At first glance, this is a poor description of observed government policies, for at least two reasons. First, not all government policies are purely redistributive in nature. Second, governments are not generally restricted to using just two fiscal instruments. These two issues are not unrelated.

This section examines, first, the possibility that localities may provide public goods and services that may be financed by some combination of taxes on (or subsidies to) a mobile resource (denoted by  $t_i$ , as before) and a transfer to (or tax on) an immobile resource (denoted explicitly by  $L_i$ ). As will become clear, the tax mix chosen by competitive localities can vary drastically, depending on the nature of the public goods in question. Specifically, when public expenditures are used to provide “impure” public goods and services that are “congested” by the presence of the mobile resource, taxation of the mobile resource provides a means by which a locality can recover the added costs imposed upon it. In fact, in important cases, localities rely solely on taxation of the mobile resource to provide the totality of their tax revenues. This is very different from the case in which localities provide “Samuelson pure” or “uncongestible” public goods; in this case, small competitive localities impose no tax at all on the mobile resource, just as in the simplest model of Section 3.3. These results do not depend on what levels of public services the localities provide, which may be determined exogenously or endogenously. In the latter case, small competitive localities, acting on behalf of local interests, adhere to the Samuelson condition for public good provision, and this is so, whether local public goods are pure or impure.

## 4.1 Competition with Pure Local Public Goods

As an initial step, and to provide a concise illustration of how the formal model can be modified, consider the possibility that local governments provide a *Samuelson-pure public input*, *i.e.*, a public service for which the cost of providing  $G_i$  units in locality  $i$ ,  $c_i(G_i)$ , is invariant to the amount of the productive input  $k_i$ . One may then generalize the production function  $f_i(k_i)$  to one that explicitly reflects this input, say  $F_i(k_i, G_i)$ . Provided that governments retain the capacity to make (positive or negative) lump-sum transfers  $L_i$  to the owners of the immobile local resource, the local government budget constraint takes the slightly more complex form

$$t_i k_i = L_i + c_i(G_i). \quad (1')$$

The local government now has two potential degrees of policy freedom rather than just one; that is, of the three instruments  $(t_i, L_i, G_i)$ , any pair may be modified, with the third determined by the budget constraint. The added dimension of policy choice raises new questions about the implications of changes in  $G_i$  regarding the incidence of local policies and especially about endogenous local policy choice, but it does not obviate the findings from the simpler model. Formally speaking, whether  $G_i$  is determined exogenously or endogenously, each locality still faces a tradeoff subject to (1'). For any given value of  $G_i$ , the incidence of a small change in  $t_i$ , accompanied by a small change in  $L_i$  affects the allocation of capital, the equilibrium net return on capital  $r$ , and the net incomes of the owners of the immobile resources, as before. It follows, in particular, that *the optimal local policy for a small locality is to impose no tax on the mobile resource*; hence, *freely-mobile capital is efficiently allocated in a system with many small competing localities that provide pure local public goods*. Now, however, the modified local government budget constraint (1') implies not that  $L_i = 0$ , as in the simplest model with purely redistributive policies, but rather than  $L_i = -c_i(G_i)$ , that is, *a small locality maximizes the welfare of the owners of the immobile resource by imposing lump-sum taxes on this resource sufficient to finance all local expenditures on a pure local public input*. This result substantially simplifies the analysis of the optimal local choice of the public input, which – because  $t_i = 0$  – is financed by a local lump-sum tax.

Of course, although public inputs (infrastructure and the like) are important, many public goods and services may primarily (or even exclusively) benefit households. In one common specification, households are completely immobile, and their labor constitutes the local productive resource. Following the same reasoning as in the case of public inputs, the analysis of the incidence of local taxes on the mobile resource is unaltered. Furthermore, it follows that *to maximize the welfare of immobile local residents, small localities finance the provision of pure local public goods entirely by lump-sum taxes on their residents, with no taxes or subsidies on freely-mobile productive inputs*.

If the freely mobile resource consists of households (“labor”) rather than capital, it is



again possible to incorporate household preferences for local public goods with minimal formal changes. In this case, however, it is necessary to recognize that spatial arbitrage cannot be characterized simply in terms of the equalization of after-tax factor returns. Rather, households may willingly accept lower after-tax net incomes (and correspondingly lower levels of private consumption) in order to enjoy higher amounts of public services, thereby achieving higher welfare or utility. For mobile households in locality  $i$ , utility may be represented by a function  $u_i(f'_i(k_i) - t_i, G_i)$  that depends both on consumption of the numéraire private good and the level of public services  $G_i$ , and the free mobility of households implies that, in equilibrium, utility levels in all localities must be equalized at some common value  $v$ , so that

$$u_i(f'_i(k_i) - t_i, G_i) = v \quad \forall i. \quad (\text{spatial arbitrage}) \quad (10)$$

Despite its slightly more complex form, this condition is exactly analogous to (3); together with the resource-conservation condition (2), the formal model provides a system that determines the equilibrium allocation of mobile households to jurisdictions (the vector  $k$ ) and the equilibrium level of utility (denoted by  $v$ ). The analysis of the incidence of changes in the rate of tax  $t_i$  on the mobile resource is not affected by the presence of pure local public goods, provided that the lump-sum instrument  $L_i$  may still be used to finance the local public good. The condition for the efficient assignment of households to localities is now slightly modified due to the presence of local public goods, but the most important implications of government competition for the mobile resource are unchanged. Specifically, *if a locality provides a pure (congestion-free) local public good that is valued by mobile households, and if it chooses its policies to maximize the welfare of the owners of immobile resources within its jurisdiction, it is optimal to impose no tax on the mobile households and to finance its public expenditures using a lump-sum tax imposed on the owners of the local immobile resource, that is, the locality sets  $t_i = 0$  and  $L_i = -c_i(G_i)$ . In a system with many small localities, mobile households are allocated efficiently in equilibrium.*

Note that the presence of exogenously-fixed (“pure” or uncongested) local amenities and disamenities, in addition to (or in lieu of) local public goods and services, does not alter the preceding results. Formally speaking, such amenities have already been captured in the specification of the local production functions  $F_i(\cdot)$  and utility functions  $u_i(\cdot)$ , which are locality-specific in general (because of the  $i$  subscripts). Thus, despite a slightly more complex notational burden, the key findings of the basic model are essentially preserved in the presence of pure or uncongestible local public goods and inputs, provided that lump-sum taxes are still accessible local policy instruments.

## 4.2 Competition with Impure Public Goods

As just shown, a small competitive locality that provides pure local public goods can only harm the owners of fixed local resources by taxing mobile resources. The simple reason for this is that the addition of new units of mobile resources entails no extra cost for the locality.

Matters are more complex when local public goods and services are “impure”, “rival”, or congestible, *i.e.*, when a locality must increase its public expenditures to provide public services as the population (or the stock of capital) increases. This is a very important case empirically, as may be verified casually, but not misleadingly, by comparing the absolute size of the public transportation, police, or education budgets of highly populous cities with those of small cities and towns. The same is true for population-dependent social expenditures which, as described in Section 2.2, often account for a very large share of the budgets of national governments.

In terms of the model presented above, it is possible that congestion effects for public services arise from the presence of mobile resources, from the presence of immobile resources, or both. In one interpretation of the model, the immobile resource could be one category of households (perhaps low-skilled workers or the elderly) and the mobile resource could be another category of households (perhaps high-skilled workers or the young). Because their numbers cannot vary, the cost to a locality of providing a given level  $G_i$  of congestible public services to immobile residents is fixed and may be ignored for the remainder of this subsection, but the cost of providing such services to mobile households varies with their number.

To analyze this situation, a momentary change to a more suggestive notation will be helpful. Let us label the mobile resource “population” rather than “capital” and denote the population in locality  $i$  by  $N_i$  rather than  $k_i$ . Congestion effects in the provision of local public goods mean that the cost of providing a level of public service  $G_i$  depends not only on  $G_i$  itself but also on the size of the population being served, so that the cost function should be written as  $c_i(G_i, N_i)$ . The “marginal cost of the public service” is now an ambiguous term because the cost depends both on the level of the service  $G_i$  and on the population size  $N_i$ . To be precise, for any given level of public service  $G_i$ , the “marginal congestion cost” is  $\partial c_i(G_i, N_i)/\partial N_i$ , that is, the cost of increasing the population by one unit. As an illustration, the “level of education” in a locality  $G_i$  would increase if its schools were to offer more years of schooling, smaller class sizes, an enhanced curriculum, or improved school safety or facilities – enhancements that might commonly be described as “quality improvements”. However described, the crucial distinction is that such features of an educational system are different from the number of students in the schools, which is linked to population size and is the crucial determinant of congestion effects.

As one simple and frequently-used reference case, the cost of providing  $G_i$  units of a public service could be proportional to population, in which case the cost function takes the form  $c_i(G_i, N_i) = \gamma_i G_i N_i$  for some unit cost  $\gamma_i > 0$ . In this special case, the local “public” good – sometimes termed a *quasi-private* public good – is similar to an ordinary private good like bread, where consumption of the good or service by one member of the population reduces the amount available for others by the amount  $\gamma_i G_i$  unless total expenditures are increased by an offsetting amount. This special case, or some variant of it, is often assumed in the context of elementary and secondary education, where “expenditures per pupil”, *i.e.*,  $\gamma_i G_i$ , is widely used as a measure of the amount of education provided.

In the presence of congestion effects, the local government budget constraint becomes

$$t_i N_i = L_i + c_i(G_i, N_i) \quad (\text{congestible public goods, general case}) \quad (1'')$$

$$t_i N_i = L_i + \gamma_i G_i N_i \quad (\text{congestible public goods, quasi-private case}). \quad (1''')$$

It is clear that (1'') and (1''') reduce to the pure local public good case (1') when (marginal) congestion costs are 0.

Using now-familiar reasoning, hold  $G_i$  fixed and consider the effects of a change in  $t_i$ , both for an individual locality  $i$  and for the entire economic system. The spatial arbitrage condition (10) continues to hold (substituting the new notation  $N_i$  for the old  $k_i$ ), and a change in  $t_i$  affects both locality  $i$  and other localities as previously shown. More importantly, holding  $G_i$  fixed, what is the optimal choice of  $t_i$  for a locality that seeks to maximize the net income (or utility) of the owners of the local immobile resource? Using the new government budget constraint to substitute for  $L_i$ , the net return to the immobile resource is maximized when  $t_i = \partial c_i(G_i, N_i) / \partial N_i$ . Thus, *the optimal policy for a small locality is to impose a tax on the mobile resource equal to the marginal congestion cost that is produced by an additional unit of that resource.* In particular, *when local public goods are quasi-private, the optimal policy is to finance all public expenditures by such congestion tolls and to impose no tax or subsidy on the immobile resource.*

Analyzing how competitive local governments choose the “level of public good provision”,  $G_i$ , in order to maximize the welfare of the owners of immobile resources is now straightforward. The problem decomposes into two parts: first, the choice of financing for any arbitrarily given level of  $G_i$ , which we have just analyzed, and second, the choice of  $G_i$  itself. Taking the pure public good case initially, the fact that the locality chooses  $t_i = 0$  means that any changes in  $G_i$  are financed by incremental lump-sum taxes on the immobile resource. Whether the public good is one that benefits the immobile resource owners, benefits the mobile resource owners, is a public intermediate input that increases the productivity of firms, or is any combination of these, the optimal local choice is to choose  $G_i$  at the level that satisfies the appropriate version of the classical Samuelson condition. If the local public good is congestible, essentially identical reasoning establishes the same result. Because the locality sets  $t_i = \partial c_i(G_i, N_i) / \partial N_i$ , any impact of  $G_i$

on the amount of the mobile resource has no first-order effect on the optimal local policy.

To summarize this part of the discussion, we have seen that there is no “one size fits all” local tax policy that best serves the interests of immobile resource owners in all cases, irrespective of the types of public services that are provided. The taxation of a mobile resource provides a policy tool with which a locality can alter the amount of that resource, and it is optimal to use it to recover any added costs of public service provision that result from the presence of the mobile resource. This may or may not be sufficient to finance the optimal level of local public expenditures. If not, it is then optimal to tax (or subsidize, as the case may be) the local immobile resource in order to balance the local budget.

In the end, these findings in essence confirm those obtained in the simplest model of competition, presented in Sections 3.2 and 3.3. A redistributive cash transfer is certainly one example of an impure public good – in fact, one that is quasi-private. As shown in Section 3.3, the owners of immobile resources in competitive localities benefit from setting  $t_i = 0$ . Failing that, they benefit from moving  $t_i$  toward 0: decreasing it, if positive, and increasing it, if negative. In other words, the optimal “congestion toll” on a mobile resource should entirely neutralize or offset any tax imposed upon it or any subsidy afforded to it. Applying this result to the case of in-kind transfers for public services, such as health, education, housing, or other congestible public services, a locality should optimally impose charges sufficient to recover the (marginal) cost of providing any of these services that can be accessed by mobile households.

There are many variations on these basic ideas. In some cases, it may be possible for a government to impose differential charges or taxes on mobile and immobile households who use specific congestible public services (*e.g.*, by charging lower tuition for in-state students at a public university.) In other cases, (*e.g.*, in setting per-trip charges for rides on public transportation), such differential pricing may be infeasible. In this latter case of “imperfect excludability”, a locality can impose a uniform congestion toll on *all* households that use the public service in order to recover the congestion costs created by mobile households, adjusting other instruments in an offsetting manner so as to achieve the mix of taxes and public service provision that maximizes the welfare of immobile residents (Vickrey (1965)). Such variations highlight the importance of careful (perhaps imaginative) interpretation of the formal analysis for policy applications.

### **4.3 Restrictions on Instruments: Underprovision of Local Public Goods and the “Race to the Bottom”**

The situation is quite different when the revenue instruments of localities are restricted. Such a case has, in fact, been almost paradigmatic in the literature on fiscal competition

and has shaped much of the policy discussion on this subject, in which competition is said to result in a “race to the bottom” in public policies. This evocative (but not well-defined phrase) is sometimes taken to mean that local public goods are underprovided, relative to some efficient levels, that government redistributive policies are undesirably constrained, that regulatory policies are undesirably lax, that local tax policies are distorted in some manner, or perhaps several or all of these.

It is a now-standard result in the literature of fiscal competition (see, *e.g.*, Zodrow and Mieszkowski (1986) and further references in Wilson (1999) and Agrawal *et al.* (2022)) that local public goods may indeed be underprovided when (a) local governments can finance public goods only by taxing a mobile resource and (b) when there are no congestion effects associated with the presence of the mobile resource. It is easy to see why this should be the case under such conditions. Recall from the government budget constraint (1') that public expenditures in the absence of congestion effects are just equal to the sum of revenues from the taxation of the mobile ( $t_i k_i$ ) and immobile ( $L_i$ ) resources, and that competitive localities choose fully efficient policies by setting  $t_i = 0$ , relying solely on the taxation of the immobile resource to finance public expenditures (so that  $G_i = L_i$ ). If the latter source of revenues is ruled out ( $L_i = 0$ ), it is impossible to provide any public services other than by taxing the mobile resource. Intuitively, public good provision is less attractive to localities that are constrained to use this second-best funding source, and it is therefore not surprising that underprovision of public goods occurs under these conditions.

The concept of a “race to the bottom” resulting from competition among governments may be traced to a US Supreme Court opinion by Louis D. Brandeis in the case of *Liggett v. Lee* (288 U.S. 517). As discussed in more detail in Appendix II, Brandeis rues the fact that competition among state governments can lead them to liberalize their laws of incorporation – what he calls a “race to laxity” – and to reduce the taxes imposed upon corporations (especially chain stores, which Brandeis sees as potentially pernicious). The “race” in question, according to Brandeis, started as early as 1890 – more than four decades prior to *Liggett v. Lee* – when New York liberalized its laws in an ultimately unsuccessful attempt to forestall migration of corporations to New Jersey, after which New Jersey itself lost out in competition with Delaware. One may facetiously remark that, as races go, this one seems to have been a rather drawn-out affair. More seriously, the “race” metaphor highlights the question of dynamics in competition among governments, a topic that is discussed further in Section 5.3 below. Here, let us simply observe that static or atemporal models, such as those presented above, are intrinsically ill-suited to the analysis of dynamic questions.

The underprovision (or, if one prefers, the “race to the bottom”) result has featured very prominently in academic, policy, and popular discussions of fiscal competition. Its formal derivation can be traced to early works that were motivated by issues related to

property taxation and the provision of public education by local school districts in the US. These are important units of government in the US fiscal system, but they are not representative of all localities in the US, state governments in the US, or, needless to say, central governments in the US and throughout the world. At least since the 1960s, local school districts, whose expenditures are of course dedicated to “educational” uses, have obtained nearly 100% of their tax revenues and more than 75% of all of their own-source revenues from property taxes.<sup>36</sup> It is quite plausible to view such governments as the providers of just one type of public service financed by just one source of revenue, and to view local property taxes as primarily taxes on mobile capital. By contrast, municipal governments obtain only about half of their tax revenues from property taxes. Furthermore, municipalities derive about 30% of their own-source revenues from a very wide range of non-tax sources. State governments utilize a very diverse array of revenue sources, including taxes on both individual and corporation incomes, general retail sales, many specific sales taxes (on fuels, tobacco, alcohol, utilities, and other commodities and services), as well as many non-tax sources, which they use to finance many different types of public goods and services. Likewise, national governments utilize numerous sources of tax and non-tax revenues (including government borrowing) to finance a wide array of public goods and services.

It should be obvious from these descriptive remarks that a model that is perhaps well-suited to the analysis of local school districts in the US may not be equally well-suited to the analysis of other subnational and national governments in the US and elsewhere in the world. In particular, as we have seen, a conclusion that competition among governments results in the underprovision of public services (or, more dramatically, a “race to the bottom”) depends critically on the numbers and types of policy instruments that competing governments can utilize, and, with relatively rare exceptions, governments can and do make use of multiple sources of revenues. It may well be true that competition for mobile resources affects the choice of tax rates imposed by governments. As demonstrated above, competitive governments may impose no taxes at all on mobile resources, relying instead solely on the taxation of immobile resources, but they may, as a consequence, achieve fully efficient levels of public service provision. Proper benefit-cost analysis may or may not support the conclusion that the expenditure levels of states and national governments are inefficiently low, but a finding that competition for business enterprise affects their corporation income tax policies need not by itself suggest that competition makes their overall fiscal systems less efficient; it may, instead, indicate just the opposite.

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<sup>36</sup> “Own-source” means “exclusive of intergovernmental transfers”; in the present context, these are mainly transfers from state governments.

## 5 Multiple Mobile Resources, Market Areas, Large Jurisdictions, and the Degree of Resource Mobility

The previous sections have discussed many of the economic and policy implications of competition among governments under a relatively wide range of conditions. This section considers several extensions and modifications of the simplest models that address some of their limitations. In some cases, these changes do not alter the key findings of the analysis, but, in other cases, they have much more substantial impacts.

### 5.1 Multiple Mobile Resources

Economists often treat broad commodity categories as if they can be aggregated into single commodities. For example, familiar macroeconomic models treat all human resources as a single homogeneous productive factor of production (“labor”) and all non-human productive resources as homogeneous “capital”. The models of fiscal incidence and endogenous policy choice presented in Sections 3.2 and 3.3 have followed this common practice by treating mobile and immobile resources as homogeneous aggregates. Such aggregation assumptions, which must generally be viewed as approximations made for the sake of tractability, are least misleading when the relative prices of the aggregated commodities do not change (the Hicks aggregation theorem).

Unfortunately, this assumption is frequently unjustified and can be misleading in analyzing competition among governments. To begin with, the aggregate of “immobile resources” within a jurisdiction may be quite heterogeneous. The previous discussion has frequently referred to labor or households as “the immobile” resource. Land and other natural resources are intrinsically immobile but, in much of the literature, are commonly ignored – perhaps a justifiable assumption for some purposes, but potentially highly questionable.<sup>37</sup>

As an example, consider a hypothetical “rust belt” region, stereotypically consisting of intrinsically immobile natural resources, a large stock of long-since installed and now substantially depreciated public infrastructure and private industrial capital, and a population of relatively old workers whose experience and skills are adapted to the requirements of declining industries. “Old” capital can leave this region over time but only gradually, at a rate dictated by the depreciation of public capital, housing, and the industrial base. The labor force can likewise decline over time, as old workers retire, their offspring relo-

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<sup>37</sup>Land is far from a negligible resource in agriculture, of course, and economists of pre-industrial eras naturally devoted considerable attention to it. In urban areas, the utilization and valuation of land is often seen as far less important than the industrial, commercial, and residential capital investments (“improvements”) built upon it. Although the valuation of urban land is not a straightforward undertaking, recent estimates place the land value share of urban property in large cities at levels on the order of 30% to nearly 50%, which are far from negligible. See n. 4 above.

cate to other regions, and few young workers enter. Suppose that the government(s) of this region attempt to formulate tax, expenditure, and regulatory policies that attract new business investment and younger workers with skills and educational backgrounds that increase the profitability of such investments. What form would such policies take? What would the distributional effects of these policies be?

One could attempt to address these questions by treating “new” capital and labor as a composite mobile input and by treating “old” capital, “old” labor, “old” housing, and natural resources as a composite immobile resource. The preceding analysis suggests that a policy reform designed to attract the mobile resource would offer reduced tax burdens on new businesses; increased or targeted provision of public services attractive to younger workers; and amendments to land use, employment, environmental, and other regulations that facilitate the entry of mobile resources. As a corollary, the inevitable costs of these policies would fall on the immobile resource owners.<sup>38</sup> Such a reform could not easily be achieved by across-the-board changes in policy, such as changes in tax rates for all businesses or residents, because these would fail to discriminate between mobile and immobile resources. Better-suited for this purpose would be “temporary” or “targeted” tax breaks and favorable regulations for businesses (perhaps even individual firms) that locate in specific zones; reductions in social services or cash benefits for older workers; the establishment of amenity-rich residential zones; or regulations that facilitate the disposition and redevelopment of abandoned properties or those that are heavily depreciated. Such policies, which discriminate in favor of “new” capital, may well benefit the owners of immobile resources, including “old” capital (see (7)), provided that the fiscal burdens on new capital remain sufficient to recover the (marginal) congestion costs incurred in providing associated public services, as discussed in Section 4.2.<sup>39</sup>

It is clear from this hypothetical exercise that the labeling of resources as separate homogeneous aggregates of “labor”, “capital”, and “land”, where the units of each are treated uniformly by fiscal and regulatory policies, is inadequate for the purposes at hand. The hypothesized policy instruments, much like those seen in practice, apply differentially to superficially identical units of mobile and immobile resources. Treating businesses, labor, and natural resources as homogeneous aggregates may obscure important distributional impacts of policy. From the perspective of political economy, the owners of distinct immobile resources may disagree about how the costs of attracting mobile resources should be distributed and which are the best ways to attract them. There are two reasons

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<sup>38</sup>To simplify this example, let us ignore the possibility, surely relevant in practice, that some of these costs would be shifted to others, outside of the region, in the form of direct or indirect subsidies from higher-level governments and to future residents and taxpayers within the region through the use of debt, deferred maintenance, and preservation of public infrastructure and natural resources that serve immobile (but not mobile) resources.

<sup>39</sup>Chirinko and Wilson (2006), in an analysis of state corporation income taxation in the US, show that investment tax credits increased markedly over the period 1990-2006 but that average statutory tax rates were relatively stable, so that the effective tax rate (or “wedge”) fell sharply. This could be viewed as an effort to reduce tax burdens on “marginal” units of “new” capital without relinquishing tax revenues from sunk investments in “old” capital (Wildasin (2006)), a theme developed further in Chirinko and Wilson (2017).



for this. First, just as in traditional closed-economy public finance analysis, each category of immobile resource owner (for example, incumbent older workers) would prefer for these costs to be paid by the owners of other immobile resources (such as old industrial or residential properties). Second, in contrast to closed-economy analyses, policies that increase the stocks of heterogeneous mobile resources (capital and some types of labor) differentially affect the productivity of immobile resources, as incoming capital and workers exhibit different complement/substitute relationships with old capital, old workers, and natural resources. For both of these reasons, immobile resource owners have incentives to advance their conflicting interests by influencing the local political process.

These distributional impacts, their political implications, and even the descriptions of public policies themselves cannot be illuminated if resources and public policies are improperly aggregated. The preceding remarks have used the specific example of a rust-belt region by way of illustration, but it is not difficult to see how similar considerations arise in the many other contexts described in Section 2 and Appendix I. Indeed, there is a significant body of research in labor economics that examines the impact of (international) immigration on the wages of native workers, much of which draws attention to (and seeks to control for) the potential differences between immigrants and natives.<sup>40</sup>

The foregoing considerations show some of the hazards of factor aggregation in the analysis of competition among governments. Not all of the analysis and results presented in earlier sections, which distinguish only between highly-aggregated mobile and immobile resources, must necessarily change drastically in a more disaggregated approach; in substantial part, they need not change at all. The simplest way to see this is to reinterpret the mobile resource  $k$  in the basic model as a *vector*  $k_i \equiv (k_i^1, \dots, k_i^m)$  of  $m$  distinct types of resources, with  $r$ ,  $t_i$ , and  $\bar{k}$  denoting the corresponding  $m$ -vectors of factor prices, tax rates, and aggregate endowments of mobile resources. The production functions  $f_i(k_i)$  may be interpreted as depending on  $k_i$  and on any number, say  $M$ , of immobile resources. In this case, the gross returns of all resources are given by the vector of first derivatives of  $f_i$ . The distributional effects of public policies depend upon the Hessian matrices of second-order derivatives. The fundamental equilibrium conditions (2) and (3) of the simplest model remain valid as written, as do the government budget constraints. The incidence analysis of Section 3.2 can easily be generalized, and many of results that build upon that analysis in Sections 3 and 4 thus also remain valid.

It is worth noting, however, that local policy changes can now produce “cross effects” involving substitution among mobile resources that have no counterpart when  $m = 1$ .

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<sup>40</sup>Dustman *et al.* (2016) provide an overview of some of the diverse findings in this literature, noting especially the heterogeneity of both native and non-native workers, the elasticities of substitution among workers with different skills and experience, capital/labor substitution, and the time-varying effects of immigration. They also emphasize the impacts of immigration on the wages of native and non-native workers, considered as aggregates. For examples of related literature that draw attention to the labor-market, fiscal, and political-economy implications of immigration, see, *e.g.*, Scheve and Slaughter (2001), Borjas (2003), Dustman and Frattini (2014), Preston (2014), and Dustman *et al.* (2016).

Specifically, depending on the properties of the local production functions, an increase in (say)  $t_{i1}$  generally changes the local demand for all of the mobile resources. If resource 1 is highly complementary with some other resource  $j$ , then  $\partial k_{ij}/\partial t_{i1} < 0$ ; this is obvious in the extreme case of perfect complementarity (a Leontief production function) in which these two inputs are used in fixed proportions. The reverse is true when the two inputs are highly substitutable, as is obvious, again, in the extreme case of perfect substitutes (a small increase in the tax on input 1 drives that resource out of the locality entirely, and other inputs take its place). These allocative effects of local policy changes have corresponding impacts on the composition of local revenues (an increase in  $t_{i1}$  can increase, decrease, or leave unchanged in  $t_{ij}k_{ij}$  depending on the substitutability/complementarity relationship between input 1 and input  $j$ ). They also produce corresponding changes in the equilibrium factor price vector  $r$ . All of these effects are “small” if locality  $i$  is small, but, as before, they add up to system-wide effects on factor incomes that are of the same order of magnitude as the amount of tax revenue collected, so that (for example) the incidence of a tax on highly-skilled workers in one small locality may fall partially on the owners of (complementary) capital throughout the entire economy. Such effects are of interest when evaluating policies, perhaps those of a higher-level government, that may affect local policymaking.<sup>41</sup>

Factor heterogeneity also necessitates potentially important qualifications to the representative-agent prediction in (8) that each of many small localities optimally chooses  $t_i = 0$  (or, more precisely, that  $t_i$  is set equal to marginal congestion cost for each mobile resource), producing an efficient system-wide allocation of productive resources. Such a policy configuration would still be efficient and would yield the maximum net incomes for the totality of immobile resource owners in each locality, but would not generally yield maximum net incomes (or utilities) for each group individually. Hence, depending on the political process through which  $t_i$  is selected, the equilibrium policy configurations and the system-wide efficiency of the equilibrium may be disturbed, even with many small jurisdictions. These complications suggest ways that further analysis of competition among governments in open economy settings can help to illuminate the efficiency and distributional implications of political institutions.<sup>42</sup>

<sup>41</sup>As one example, a national or international policy that regulates the taxation of corporation incomes would affect the demand for capital by corporations in all jurisdictions. The incidence and welfare effects of such an agreement would depend on complement/substitute relationships between corporate capital and other mobile resources.

<sup>42</sup>Although not directly focused on intergovernmental competition, studies by Rogowski (1990), Hiscox (2001, 2002), and others have explored how production technologies and resource mobility with heterogeneous productive resources can influence political coalition-building. Similar approaches may also have much to reveal about policymaking at subnational levels.

## 5.2 The “Extent of the Market”: Small Economies, Large Jurisdictions?

The underlying economic model of resource allocation and factor pricing presented in Section 3.2 requires that there be two or more localities. The discussion of endogenous policymaking presented in Section 3.3, however, focuses on the case in which there are many such governments, each small or “atomistic” relative to the economy-wide capital market. Whether this is an economically important case, or whether jurisdictions are instead so “large” that changes in their policies have substantial effects on market prices in the “rest of the world”, is perhaps debatable. As indicated in Sections 2.2, 2.3, 2.4, Appendix I, and the discussion immediately above, many economic and policy analyses presuppose that capital, labor, or both are “internationally mobile”. Depending on the context, this may be taken to mean that resources can flow throughout the entire world, possibly with the exception of a limited number of isolated nations. Alternatively, labor, capital, or both might be mobile within large regions of the world that are isolated from the rest of the world (perhaps Europe or the Western Hemisphere), or, yet again, among just a handful of nations. In other contexts, one might suppose that competition involves only subnational governments (states within the US, say) or localities within a single state or province.

If the “market area” within which resources are mobile contains only a few jurisdictions, each of which is “large” relative to the market(s) for one or more mobile resources, the analysis of endogenous policy choice becomes far more complex than in the atomistic case, just as the analysis of oligopolistic/oligopsonistic competition among firms is much more complex than is the case with pure competition. The essence of the analytical difficulty can easily be seen from a consideration of the conditions for the preferred policy choices for each jurisdiction (8) and the systemwide equilibrium conditions (1), (2), and (3). When there are only a few large jurisdictions, each has a substantial effect on the equilibrium return to mobile resources (as shown in (4)), and the joint satisfaction of the conditions for a Nash non-cooperative equilibrium in which each (large) jurisdiction chooses its most-preferred policies is far from guaranteed and can only be assured under additional restrictions. Generally, theoretical models assume that there is only a single mobile resource, a single policy instrument, a single immobile representative agent in each jurisdiction, and only two (or perhaps several identical) jurisdictions. In addition, such models must also impose additional conditions on functional forms for preferences (often quasi-linear) or technologies (such as quadratic production functions that yield linear demand curves for mobile factors of production).<sup>43</sup>

Putting aside these theoretical hurdles, a substantial empirical literature analyzes strategic interactions among small numbers of governments (typically more than two, however),

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<sup>43</sup>See, *e.g.*, Wildasin (1991), as well as Keen and Konrad (2013), who provide a wide-ranging survey. Taugourdeau and Ziad (2011) and Rota-Graziosi (2019) have demonstrated existence of equilibria under notably more satisfactory assumptions about production technologies.

often focused on the estimation of policy reaction functions. Of course, by virtue of the government budget constraint, even the very simplest models of fiscal competition must allow, whether implicitly or explicitly, for at least *two* policy instruments. For example, a major branch of literature on “tax competition” postulates that governments choose tax rates as strategic variables, viewing observed tax rates as a Nash non-cooperative equilibrium in which each government optimizes its own policy, taking the policies of other governments as given.<sup>44</sup> These analyses assume, explicitly or implicitly, that public expenditures or other fiscal variables adjust “passively” to changes in tax rates. But this approach is not universal. Many studies postulate instead that governments choose *public expenditures* as strategic variables, with tax or other fiscal variables adjusting passively to insure budget balance.<sup>45</sup>

The choice between these alternative modeling approaches (and others, not discussed here) is quite analogous to choosing between prices (Bertrand competition) and quantities (Cournot competition) as strategic variables in the analysis of duopolistic (or, more often, oligopolistic) competition among firms. As explained in standard textbooks in intermediate microeconomics, Bertrand and Cournot equilibria are quite different from one another. For essentially the same (technical) reasons, the same is true in the “duopoly” (or “oligopoly”) context: Nash equilibria in tax rates are not the same as Nash equilibria in public expenditures (Wildasin (1988, 1991)). Given a set of localities whose (possibly) strategic interactions are to be examined, one may postulate that strategy spaces consist either of tax rates or expenditures (or, in the spirit of conjectural variations, still more exotic possibilities), but it is (logically) impossible to postulate both.<sup>46</sup> For this reason, in order not to prejudge this important question, general terms such as “fiscal competition” may be preferred to more specific terms like “tax competition” or “welfare competition”.

This analytical difficulty is most easily revealed in very simple models in which governments have only two policy instruments that are jointly subject to a government budget constraint. It by no means disappears, however – in fact, it becomes even more problematic – if one recognizes that almost all governments have very many policy instruments at their disposal, as emphasized in Section 4.3. Because governments exist for more than one period, one should also recognize that policy choices in one period are linked to those in other periods through intertemporal budget constraints. With so many policy

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<sup>44</sup>Brueckner and Saavedra (2001) analyze strategic tax rate setting by local governments in the Boston metropolitan area in a pioneering contribution to a literature that is now very large. See Agrawal *et al.* (2022) for a recent survey.

<sup>45</sup>Williams (1966) and Case *et al.* (1993) follow this approach in analyzing benefit or other spillovers among governments. Studies of “welfare competition” (*e.g.*, Figlio *et al.* (1999) and Brueckner (1999)) similarly treat welfare benefits as strategic variables. The history of local government redistribution in the UK, discussed earlier in Section 2.1, continues to inspire new research; Brueckner (2023) finds evidence of strategic interaction among localities in 19th-century Britain.

<sup>46</sup>There has been ongoing debate in the theoretical literature about the precise formulation of models of strategic interactions among governments, not only concerning the choices of strategic variables but also many other complicating features, usually in two-player games. See, for instance, Lockwood (2004) (comparing per-unit and *ad valorem* taxes), Ogawa (2013) and Hindriks and Nishimura (2017) (comparing Stackelberg and simultaneous-move games), and Keen and Konrad (2013) for still other game-theoretic considerations.

instruments, distinguished by type of policy and date, what is the most meaningful way to define the strategy space? This question can be safely sidestepped when market areas are large and no individual government can influence the equilibrium prices of mobile resources – that is, the case of “perfect competition”. How it should be resolved in cases of “imperfect competition” is a question that seems central to the analysis of competition for mobile resources among small numbers of governments, but one that so far eludes consensus.

There has been relatively little systematic consideration of how to define a market area (or, equivalently, a set of competing jurisdictions), other than on some *a priori* basis. (An analogous issue also arises in industrial organization in defining the “industry”.) One might suppose that if “capital” and “labor” are internationally mobile, as has seemingly been confirmed in many policy contexts (Section 2) and empirical analyses Section (5.1), then market areas are worldwide in scope. In this case, one might speculate that at most a handful of nations – the US, China, the EU nations collectively, or perhaps India – could be considered sufficiently large that their policies, individually, have “non-negligible” effects on the world-wide equilibrium prices of at least some mobile resources. All subnational governments would then be “small jurisdictions” whose policies do not significantly affect equilibrium factor prices within their nations, much less the world economy, and they would not compete strategically with each other. In view of the many empirical studies that provide evidence of strategic interactions among subnational governments, whether in tax rates, public expenditures, or other policy instruments, this presents a puzzle that warrants further theoretical and empirical attention.<sup>47</sup>

### 5.3 Imperfect Resource Mobility: Moving Costs in Static Models

The determination of the size of the markets for mobile resources (or their degree of “integration”) is closely related to what may seem at first to be rather different issues, such as the “costs” of resource mobility, the numbers and types of mobile and immobile resources (the factor aggregation problem), and the dynamic mechanisms through which the movement of resources takes place over time. If mobility costs are “sufficiently low”, spatial arbitrage is perfect, and (net) factor prices must always be identical in all places

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<sup>47</sup>The size of a “market area” need not be identical for every mobile resource. If capital is mobile throughout the world, virtually every national and subnational jurisdiction is “small” relative to the world capital market. However, some subset of jurisdictions, such as a group of local governments situated within a metropolitan area, may constitute a “local labor market” within which workers may switch places of employment relatively easily even if there are large hurdles to finding employment in other metro areas. In this case, one locality, such as a central city, may act as a monopsony buyer of labor from neighboring localities. If labor and capital are complementary inputs in production, taxation of central-city capital may drive down the “import price” of labor, to the benefit of central city residents. See Wildasin (2014) and Agrawal *et al.* (2022) for further discussion of this type of model. There are many other possibilities for such interjurisdictional interactions. For instance (Wildasin (1993)), the incidence of taxes on capital within a region that is small relative to the world capital market may nevertheless be borne (or “exported”) to another “small” region if the two are linked through inter-industry trade (*e.g.*, Canada and the US, US states with upstream/downstream manufacturing linkages, or EU countries with high levels of interindustry integration).

at every instant of time, as shown in (3). Because this is clearly not literally true, one might infer that there is no spatial arbitrage and no resource mobility whatsoever, as is assumed in much of traditional closed-economy public finance. Of course, in that case, there is nothing to say about competition among governments, insofar as it is related to the mobility of productive resources.

The convenient polar extremes of perfect mobility (of at least one productive resource) and complete immobility have tended to dominate theoretical research, but few would wish to take too literally either of these idealized cases. Naturally, some degree of resource mobility is a *sine qua non* for the analysis of competition among governments, but this leaves open the meaning of “degree”. The simplest way to incorporate mobility costs into a model of fiscal competition is to suppose that the movement of each unit of a mobile resource from one jurisdiction to another entails a uniform cost  $c$ . In this case, the spatial equilibrium condition (3) is altered slightly, and an economically-meaningful distinction can (and must) now be made between initial and equilibrium allocations of mobile resources. Letting  $k^0$  denote the former, and given a vector of policies  $t$ , the equilibrium allocation  $k(t)$  and the return to the mobile resource  $r$  on the external market must satisfy the market clearing/resource conservation condition (2) and, for all  $i$ ,

$$k_i(t) - k_i^0 > 0 \rightarrow r = f'_i(k_i(t)) - t_i - c \quad (\text{open: inflow of mobile resource}) \quad (11)$$

$$f'_i(k_i(t)) - t_i + c \geq r \geq f'_i(k_i(t)) - t_i - c \quad (\text{closed: zero flow of mobile resource}) \quad (12)$$

$$k_i(t) - k_i^0 < 0 \rightarrow r = f'_i(k_i(t)) - t_i + c \quad (\text{open: outflow of mobile resource}). \quad (13)$$

These conditions simply state that resource flows into or out of a jurisdiction only take place if net return differentials exceed the cost of relocation. Depending on the initial allocations, fiscal policies, and production technologies, satisfaction of these conditions may occur with resource flows between some but not all jurisdictions. Starting from any arbitrary policy vector  $t$ , small policy perturbations can readily be analyzed, just as in Section 3.2. The main difference is simply that some jurisdictions are “isolated” from external markets by mobility costs. For them, small policy changes have no effect on their equilibrium stocks of the mobile resource or gross factor returns.<sup>48</sup>

The analysis of the political economy of fiscal competition becomes more complex in this case because otherwise-mobile resources may be “trapped” in their initial locations by the cost of moving. The returns to these resources are then no longer fixed (net of  $c$ ) by perfect spatial arbitrage, and their owners therefore have incentives to influence local policies. As in the closed-economy case, the endogenously-determined policies of all localities in a fiscal competition equilibrium depend upon how the political process resolves the conflicting interests of the owners of immobile and imperfectly mobile resources. If such an equilibrium exists, every locality is, at the margin, either “open”, with inflows or

<sup>48</sup>As described previously, it is formally straightforward to allow for many mobile resources by interpreting  $k$ ,  $r$ ,  $t$ , and  $c$ , as well as the amounts of immobile resources implicitly embedded in the production functions, as vectors of any desired dimensionality.

outflows of the mobile resource, as shown in (11) and (13), or “closed”, with no movement of the mobile resource, as shown in (12). If  $c$  is sufficiently small, the properties of an equilibrium with fiscal competition approximate those of the idealized case of costless mobility ( $c = 0$ ).

A more general specification of moving costs or “attachment to place” relaxes the assumption of a uniform cost  $c$  and postulates instead that these costs differ idiosyncratically among individuals. Depending on the distribution of these idiosyncratic costs, a given utility or real-income differential between any pair of locations results in the relocation of some proportion of the population. Provided that the cost of moving is sufficiently high for some people, the equilibrium distribution of population among jurisdictions does not degenerate to a “corner solution” in which some jurisdictions are entirely empty. This remains true, even if changes in the distribution of population have no effect at all on market prices (wages, housing costs, or rates of return on capital and immobile resources). From the viewpoint of analytical simplicity, such an approach obviates the need to rely on market linkages to determine the equilibrium allocation of mobile resources via spatial arbitrage, as discussed in preceding sections, and it likewise suppresses consideration of the associated distributional, political economy, and other issues that arise with endogenous pricing. Which approach is preferable (and they are not mutually exclusive) may depend upon the questions under investigation. The key determinants of equilibrium locations in one case are distributions of unobservable idiosyncratic attributes whereas endogenously-determined market prices play that role in the other. As a matter of interpretation, it is worth noting that measures of welfare or real incomes should, in either approach, treat moving costs, whether pecuniary or psychic, observable or unobservable, as real costs for those who incur them.

#### 5.4 Imperfect Resource Mobility: Adjustment Costs in Dynamic Models

Although the introduction of moving costs allows meaningful comparisons to be made between initial and equilibrium allocations of mobile resources, they are not necessarily well-adapted to the analysis of interjurisdictional migration and investment *flows*. Such flows, by their nature, are measured by the amounts of resources (units of capital, units of human resources) that change locations *per unit of time*. Recalling the examples discussed in Section 2, these resource flows may well take place over periods of years or even decades. In other instances they may occur much more rapidly. Liquid financial asset flows may take no longer than the duration of a proverbial mouse click, a modern manifestation of the impact of technological change on financial markets already thoroughly documented and analyzed by economic historians studying intercontinental gold markets at the advent of telegraphy (see, *e.g.*, Hoag (2006)) and O’Rourke and Williamson (1999)). On the other hand, the process of site selection, regulatory approvals, and construction

of major industrial plants takes years. The employment, output, wage, profit, and fiscal impacts of such investments may persist for decades, possibly (and presumably) varying at different rates over time.<sup>49</sup> The same is likely to be true for many other situations involving resource movements.<sup>50</sup> Comparative-statics analysis, which some would call “comparative steady state” analysis, can certainly be used to suggest some of the possible effects of resource mobility, but cannot come directly to grips with the intrinsically dynamic nature of complex and lengthy processes of adjustment.

To move toward dynamic modeling, recall that static equilibrium models, as in Section 3, generally rely on some version of the spatial arbitrage condition (3) to characterize the demands for mobile resources in different locations. If the variable  $k_i$  in a condition like (3) is interpreted literally as the amount of capital in locality  $i$ , it means that there is a single equilibrium quantity of capital that depends upon the system-wide equilibrium net rate of return  $r$  and the tax rate  $t_i$ . None of the variables that appear in this condition are explicitly time-dependent, nor is the production function  $f_i(k_i)$ . Hence,  $k_i$  is determined once and for all as a *time-independent* function of the *time-independent* variables  $r$  and  $t_i$  (or, in fact, of  $r + t_i$ ). Properly speaking, then, this equation cannot be used to determine investment (whether gross or net of depreciation) in a durable input, which, to repeat, is a magnitude that is measured as a *flow* over time. Comparative-statics analyses based on equilibrium conditions like (3) thus cannot explain how *investment* depends on variables like  $r$  or  $t_i$ : such conditions can only be used to determine the “long run” equilibrium *stock* of capital in an economy with unchanging policies and market conditions. Explicit distinctions between stocks and flows have of course long been a central elements in the theory of investment. It is now standard to postulate that changes in the stock of capital are costly and that this cost is an increasing function of the rate at which it changes, that is, of the *rate* of investment. Such modeling approaches naturally produce gradual (rather than instantaneous) adjustments to equilibrium stocks in response to changes in exogenous variables.<sup>51</sup>

Dynamic analysis of fiscal competition allows the study of several issues that cannot arise in static or atemporal models. First, and most obviously, a change in fiscal policy in any one small locality (as before, a locality whose policy choices have only very small

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<sup>49</sup>Construction of the Toyota Motor Manufacturing, Kentucky, Inc. plant in Georgetown, Kentucky, begun in 1986, is presently “Toyota’s largest vehicle manufacturing plant in the world” (<https://pressroom.toyota.com/facility/toyota-motor-manufacturing-kentucky-tmmk/>). This plant has subsequently been expanded, an example of a capital installation with ongoing net investment and long-term economic and fiscal impacts.

<sup>50</sup>The Mariel boatlift of 1980 has been studied intensively by labor economists (Card (1990), Borjas (2017)); the effect of a labor supply shock on wages, generally within the immediate aftermath of the boatlift, has been the primary focus of their attention. Recently, however, St. Clair (2023) has examined the impacts of the boatlift on local governments (Miami city, schools and county) and their finances. This analysis indicates that the boatlift resulted in persistent (a decade and possibly longer in duration) and significant (20% or greater) increases in school district expenditures, accompanied by comparable increases in property tax revenues and intergovernmental transfers.

<sup>51</sup>For readers not familiar with investment modeling, it is still instructive to review early contributions, such as the discussion found in Jorgensen (1967), Tobin (1967), and Griliches (1967). See Hayashi (1982) for analysis and valuable discussion of neoclassical adjustment-cost models.



effects on the system-wide net return to mobile resources) produces gradual rather than instantaneous changes in the allocation of mobile resources. For instance, if capital is the only mobile resource in the economy, a permanent increase in the tax rate  $t_i$  in locality  $i$  causes an outflow of capital that begins at the initiation of the policy change but extends through time.<sup>52</sup> As a result, the gross and net returns to capital and the immobile resources in that locality (given by their marginal productivities, which depend on factor stocks) and the flow of government revenue must also change gradually. The *rates of adjustment* for all of these variables are governed especially by the adjustment cost technology.<sup>53</sup>

The political-economy analysis of endogenous policymaking must also change in a dynamic model. When stocks of mobile resources can only adjust gradually to policy changes, the owners of mobile resources are no longer indifferent to changes in the policies of small jurisdictions. Although the net return to the mobile resource must ultimately converge to the system-wide return  $r$ , a tax increase in a given locality can depress the net return for the mobile resource there for a possibly protracted period. Such an outcome bears some similarities to the Section 5.3 analysis of imperfect mobility in static models: policy disagreements may arise similar to those in closed-economy settings, but exit options limit the degree to which local policies can burden the owners of imperfectly-mobile resources. The static and dynamic cases differ in that exit choices occur within a single period (effectively, the only period) in the static case, whereas the exit choices occur gradually in the dynamic case.

To illustrate some of the implications of dynamic adjustments in fiscal competition, let us restrict attention to a single small jurisdiction  $i$ , which may impose a (positive, negative, or zero) tax on a single mobile resource, “capital”. In order not to confuse notations, let  $t$  denote time, a continuous variable, and let  $\tau_t$  denote the tax rate imposed on capital at time  $t$ ; because we are focusing on just one locality, we may ignore the  $i$  subscript. To maintain comparability with the preceding static analysis, let us assume that the locality initially (*i.e.*, at an arbitrary time  $t = 0$ ) has a stock of capital  $k_0$  that satisfies the spatial arbitrage condition 3, where, as before,  $r$  is the externally-given net rate of return on capital. This means that  $r + \tau_0 = f'(k_0)$ . An unanticipated change in the tax rate produces a long-run or steady-state equilibrium in which the spatial arbitrage condition is again satisfied, but at a new capital stock  $k_\infty$ . The spatial arbitrage condition can be used, just as before, to study the comparative-steady-state effects of local policy changes.

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<sup>52</sup>Needless to say, “permanent” policy changes are theoretical devices, useful simplifications in dynamic analysis but no more realistic, if taken literally, than policy changes in comparative-static/comparative steady-state analyses. In a pioneering study, Kehoe (1989) shows how competition for mobile capital can result in welfare-improving capital tax policies when governments cannot commit to future policies. In addition to time consistency, other issues naturally arise in dynamic models that have no static counterparts, but these are not discussed here for the sake of brevity.

<sup>53</sup>In particular, the rate of capital outflow can vary from extremely rapid to very slow. In the former case, the results approximate those from the earlier comparative-static analysis, whereas they approximate those from a closed-economy model in the latter case.

When changes in the stock of capital entail adjustment costs, however, a (permanent) change in fiscal policy at some arbitrary time  $t = 0$  moves the local economy gradually toward a new steady state. The change in the capital stock at any time  $t$ ,  $\partial k_t / \partial \tau$ , is initially very small (equal to 0 at time  $t = 0$ , but the *rate* of change – that is, the change in the *rate of investment* – is initially very high.<sup>54</sup> Consequently, the gross return to the immobile resource is unaffected at  $t = 0$ , but it falls as the capital stock (the complementary input) is reduced, declining in the long run as described in Section 3.2. If at least some portion of the initial capital stock is owned by non-residents of the locality, the immobile resource owners benefit, in present-value terms, from the imposition of some positive tax on (imperfectly) mobile capital: the “short run” gains from a local redistributive tax/transfer policy outweigh the “long run” losses, so that (8) no longer holds.

The analysis can be extended to allow for two imperfectly mobile resources, such as labor (possibly of a particular type, such as high-skilled or low-skilled workers) and capital, in addition to one immobile resource (or possibly more). Still focusing on just one locality, it remains true that an unanticipated policy change has no effect on resource stocks at the moment that it is initiated, and its impact on steady-state stocks still correspond to those that can be derived via comparative-statics analysis. The net return to both mobile resources is ultimately unaffected (strictly speaking, affected only negligibly) by the policy change, in accordance with 3. The long-run allocative effect of the policy depends on the substitute/complement relationships emphasized above (Section 5.1).

However, from the viewpoint of “redistributive political economy”, the comparative statics analysis is seriously misleading. To provide a concrete example, suppose that a new and permanent tax is imposed on capital and that the proceeds of the tax are redistributed to the other mobile resource, labor. The static analysis indicates that the owners of the mobile resources are indifferent to this policy but that the owners of the immobile resource are harmed by it and therefore would oppose it. The preferred local policy (the one chosen by the only party that is affected by it) is to set the tax, and the transfers that it finances, at zero. In a dynamic context, however, the situation is very different. For some period of time after this policy is instituted, the capital stock is not reduced by very much. For this reason, the gross returns to both capital and labor are also not affected very much during this period. If, as in the Cobb-Douglas case, capital and labor are complements, the outflow of capital that results from the tax would reduce gross wages somewhat, but only slightly; if instead capital and labor are sufficiently substitutable, the policy would raise the gross wage slightly. Most important, in the early stages of the policy, are the burdens imposed on capital and the transfers paid to labor, as these dominate any impacts on gross factor prices. Thus, this redistributive policy definitely harms capital owners and helps workers for some period of time. Gradually,

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<sup>54</sup>The analytical details underlying this discussion appear in Wildasin (2003) and Wildasin (2010b).

the capital stock falls sufficiently to raise the gross return to capital by the amount of the tax and the gross wage falls by the amount of the transfer payments to labor, so that net factor returns approach their (unchanged) steady-state values. Because the owners of the mobile resources cannot adjust instantaneously to changes in policy, they now can gain or lose from policies about which they would otherwise be indifferent; the magnitude of these gains or losses are increased if adjustment costs are high and result in protracted periods of adjustment.

In this dynamic setting, the political economy of local policymaking with multiple, imperfectly mobile resources shares features suggested by the comparative-statics analysis of the open economy but it also shares features similar to those that arise in closed-economy models. Relatively little research has so far been undertaken in this direction, but further investigation may provide valuable guidance for the modeling of competitive policy setting, perhaps especially for the hundreds of thousands of “small” jurisdictions throughout the world.

## 6 Conclusion

In this essay, the discussion of competition among governments has ranged widely, and readers will have seen that the subject, broadly conceived, touches upon many specialized branches of inquiry.

The policy-oriented overview of Section 2 emphasizes that competition for mobile resources is not a matter that uniquely involves Tiebout-type movement of households searching for desired local public services at low cost, nor one that only relates to the movement of capital and business activities at the subnational or international levels, but also the movement of people among and within large regions, including nations and groups of nations. Resource flows among regions and their effects – on markets, incomes, and public finances – are far from a new phenomenon. They are associated with changes in tax, expenditure, debt, and regulatory policies and the evolution of the institutions of government through which policies are made.

Amid the multitude of complexities that arise in studying competition among governments, there is useful scope for many perspectives and types of analysis. Justifiably or not, economics traditionally places the operation of markets at center stage in the analysis of resource allocation, price determination, income distribution, welfare, and public policy. Section 3 follows this tradition by focusing on resource movements as (simultaneously determined) responses to and determinants of market conditions in different locations, a distinguishing feature of “open-economy” public finance and policy analysis. The very simplest of economic models shows how a policy change in one jurisdiction

affects an entire system of open economies: their policies matter for the efficiency of resource allocation and the distribution of incomes. When individual jurisdictions are very “small” relative to the entire economic system, their policies individually are of small consequence but of great importance in aggregate. Furthermore, by creating economic linkages between markets within a jurisdiction and those external to it, resource mobility affects the distribution of economic rewards from local public policies. Insofar as economic payoffs are relevant for the actions of voters, business interests, landowners, politicians, and others involved in policymaking, openness to external markets affects desired policies and thereby the outcomes that emerge from the political process. In the highly simplified setup of Section 3, this means that, for small jurisdictions, local policies should impose no net burden on freely-mobile resources, nor should local policies offer any net subsidy to such resources. In brief, “perfect competition” among numerous small jurisdictions eliminates redistribution, cross-subsidies, or other forms of transfers between mobile and immobile resources or their owners.

The bare-bones model of Section 3 can be modified and extended in several important directions, as shown in Section 4. Many of the basic insights from Section 3 continue to hold in more complex settings that allow for government provision of public goods and services, which may range from “purely public” (uncongestible) to “quasi-private” (provision of a unit of the service to one user precludes its use by another). In these contexts, it is possible that competition can result in “underprovision” of public services if governments are limited in the tax or other policy instruments at their disposal. On the other hand, if governments can apply suitable combinations of taxes, fees, charges, subsidies, regulations, and other policies, perfect competition may support efficient outcomes. The situation changes markedly when there are small numbers of jurisdictions, each sufficiently large that its policies perceptibly influence the market returns to mobile resources in the entire economic system. In such cases, game-theoretic strategic interactions must be considered in determining the policies chosen by individual governments and their efficiency and distributional consequences.

Needless to say, blanket assertions about the implications of competition among governments cannot rest simply on the analysis of idealized economic models. If taken too literally, idealized models – whether of the open-economy variety or the more traditional closed-economy types used in much of public finance and many other branches of economics – lend themselves to “demolition by caricature”: it is often almost trivially easy, but not very useful, to find circumstances, empirically and in theory, in which their strongest implications fail to hold exactly. Meaningful assessments of the role and importance of competition among governments must be grounded on sophisticated interpretation and application of appropriate models. Section 5 draws attention to several fundamental questions that demand careful consideration: What does “competition” mean when there are many types of potentially mobile resources? Are the movements of these resources interdependent, and therefore jointly dependent on the multiple poli-

cies that apply to each, or do they proceed independently of one another? How does one determine the set of relevant policy instruments over which competing governments have control? How does one determine the geographical scope of the markets for mobile resources, and thus the set of competing jurisdictions? Are the market areas for each mobile resource identical or do they differ? Are some resources immobile in the “short run” but not in the “long run”? What are the fundamental determinants of the dynamic processes of resource movement, and over what time horizons do the policies of competitive governments extend? What are the determinants of the dynamics of policy adjustments, and how, if at all, are these related to the “degree of mobility” of productive resources?

Many additional questions are suggested, explicitly or implicitly, throughout this essay. Relative to its closed-economy counterparts, “open-economy” perspectives on public economics and, more generally, on public policy analysis, require different analytical approaches, necessarily involving the consideration of multiple jurisdictions linked through external markets for productive resources. To an extent that varies over time, perhaps due to technological change and other fundamental factors, these markets may be global in some cases, possibly smaller in geographical scope in other cases, and in some cases entirely localized. The multiplicity of jurisdictions raises questions of an institutional nature that cannot be analyzed in frameworks that allow for only a single unit of government; these include not only “horizontal” interactions among governments, but also “vertical” interactions. Indeed, competition for mobile resources may well affect the organizational structure of the entire public sector, as historical experience suggests, with different levels of government shedding, acquiring, and sharing revenue tools and programmatic functions, often within constitutional systems that are sometimes brittle, sometimes flexible, and of varying degrees of durability. An open-economy approach to public policy reveals issues for research that are highly relevant, timely, and deep.

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## Appendix I: Some Illustrative Popular Accounts of Competition for Business

The taxation of the incomes of multinational corporations has been the subject of considerable attention and debate and may serve as a first example of the issues that have arisen with respect to tax competition. For many years, some countries have opted for tax policies that afforded corporations the opportunity to reduce their tax burdens through carefully crafted investments, organizational structures, and accounting procedures (Hines (2010)). These countries (both high-income and less developed) have sometimes been characterized as potential “tax havens” that opportunistically (and perhaps unscrupulously) facilitate tax avoidance by businesses that engage in “tax driven” transactions. Many policymakers and analysts have advocated reforms of corporate income tax policy so as to limit the scope and magnitude of such practices; for the past decade, many of these reform efforts have coalesced under the umbrella of the “base erosion and profit shifting” (BEPS) initiative of the OECD. The OECD plan is structured in two major parts or “pillars”. Under Pillar One, a portion of the income of corporations can be taxed by countries from which they derive revenues, even if they are not “physically present” in those countries, an approach quite different from the OECD’s previous and longstanding “permanent establishment” rule. Under Pillar Two, countries would impose a minimum tax rate of 15% on corporation income. Much of the motivation for the OECD plan seems to be to mitigate “harmful tax competition and a damaging ‘race to the bottom’ on corporate tax rates”. At the same time, it is also supposed to support the use of “tax incentives” (a term similar in meaning to “tax expenditures”) to describe purportedly “beneficial” targeted alterations of tax policies to promote economic and other policy objectives for specific purposes: “Jurisdictions will ... be able to use the tax system to attract investment ..., but the rules will discourage the use of damaging tax incentive policies.” (OECD (2022, p. 6)).<sup>55</sup>

As of 2021, some 130 countries had formally agreed to participate in at least some parts of the OECD program (see Joint Committee on Taxation (2023, Appendix) for the current state of play). The Netherlands, whose past policies have provided significant opportunities for multinational corporations to minimize their tax liabilities (e.g., the “Dutch sandwich” arrangement) has signed on to the OECD plan; in 2021, Dutch Deputy Finance Minister Vrijlbrief remarked that “[w]hen the Americans initiate such a proposal ... and get backing from big countries like Germany and France, it would be surprising if a deal isn’t reached. Tax competition is becoming something of the past” (Baazil (2021)). Others are more skeptical. For instance, also in 2021, Finance Minister Donohoe of Ire-

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<sup>55</sup>A proper description of the BEPS project would necessitate an extensive discussion of many technical accounting and legal issues, largely avoided here in order to maintain a focus on more general economic policy questions. Of course, in this, as in all other policy settings, the regulatory implementations, procedures for adjudication of disputes, and judicial interpretations of treaties, statutes, and regulations can be of major importance.



land (home of the “Double Irish” method) expressed the view that countries should be able to use tax policies to enhance investment, employment, and innovation. US President Biden endorsed a 15% minimum tax rate in 2021 (scaled back from an initial US position in favor of a 21% rate), but the US has yet to amend its tax laws to comply with the OECD plan. Some commentators (e.g., Stiglitz and Faccio (2023)) have expressed serious doubts as to whether the US will ultimately sign on to it.

At the subnational level, the recent efforts of US municipalities to attract the second corporate headquarters of Amazon provide an interesting example of competition for large businesses. Some “238 U.S. cities submitted detailed bids” to the company (Jensen, 2019), which, in 2018, had announced its intention to find a suitable location for its new facility; cities declared their eagerness to host the new headquarters by offering a rich mixture of tax reductions, regulatory relief, and publicly financed expenditure packages (e.g., infrastructure investments). In the end, Amazon chose to build its new headquarters (“HQ2”) in Arlington, Virginia, in accordance with multi-year plans that involve undertakings by both the company and several local governments. The first phase of the construction is (supposedly) scheduled for completion in (late) 2023. (Due to the post-Covid slowdown and ongoing reconsideration of remote work in the technology and other sectors, the second phase has been postponed.) The Amazon project has drawn criticism from various quarters.<sup>56</sup>

The Amazon project is merely one of the more visible illustrations of the intermingling of private and public activities and priorities that characterize many such “economic development” projects, which have become commonplace in the past several decades. It is noteworthy that they often entail fiscal and regulatory policy changes involving not only local governments but also state governments. In the Amazon case, the municipality of Arlington, the Arlington County government, and the state of Virginia are all committed to supporting the project. It is noteworthy that the subsidies and tax relief that they have offered are contingent upon the company’s attainment of key multi-year metrics, highlighting the intertemporal policy issues that often arise in fiscal competition.

Almost by their nature, large economic development projects must be targeted at specific locations, even if supported or initiated by higher-level governments. As one illustration, the state of New York, via its Empire State Development Corporation, has used its tax,

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<sup>56</sup>Two (of many possible) critical statements convey the flavor of these criticisms, as seen contemporaneously. Jensen (2019) states that “[f]or critics of the HQ2 process, or economic development practices in general, these bids offer clear evidence that businesses dominate the ‘growth machine’ in cities, with little role for the rest of civil society”. Florida (2018) states that “[t]he mayors and civic leaders of America’s most liberal and economically dynamic cities have played right into the company’s hands, rushing to subsidize one of the world’s largest corporations and its richest man rather than building up their own local economic capacities and investing in pressing social needs. ... It’s time for residents and leaders of America’s great cities to resist this kind of extortion, which ultimately undermines their own efforts at more inclusive and equitable development.” On the positive side, supporters cite the potential benefits of the project, such as new opportunities (supported by public funds) for employment, educational facilities for a state university, and contributions by the company for “investments in affordable housing, education programs in schools and local nonprofits around Washington, DC” (Calvert, 2023).

expenditure, and regulatory policy instruments to support numerous projects in specific cities and regions within the state. One such project is a Tesla solar panel factory on a “brownfield” site in the “rust belt” city of Buffalo. As part of this project, beginning in 2014, the state built a large factory, which it leases to Tesla for \$1 annually, and it also purchased \$240 million of manufacturing equipment for use by Tesla. As of 2023, this project, part of the state’s “Buffalo Billion” plan to improve the economy of the Buffalo region, has fallen far short of expectations for output, employment, and ancillary private sector development (Bykowicz and Mann (2023)), and project auditors (KPMG (2018)) wrote down the value of project assets by more than \$1 billion. Such experiences naturally reinforce the opinions of critics of “fiscal competition”, including the use of “tax incentives” and similar “industrial policy” policy initiatives generally, whether by subnational governments or at the national level.

## **Appendix II: Brandeis, Liggett Co. vs. Lee, the “Race to the Bottom”, and the Autonomy of “Courageous States”**

Commentators frequently allude to a so-called “race to the bottom”.<sup>57</sup> According to the *Oxford English Dictionary* and Bebchuk and Hamdani (2002), Cary (1974) was the first to use this phrase, which has now taken on a number of different meanings.

One aspect of competition among US states, emphasized by Cary and many other legal scholars, involves the competition for corporate charters, that is, a competition for business incorporations. Because laws of incorporation are regulatory policies, first and foremost, the competition for charters is not exactly equivalent to “tax competition”. As discussed in the legal literature, there was significant liberalization in state laws governing business incorporations during the late 19th and early 20th centuries. Previously, states had commonly promulgated special statutes on a case-by-case basis, but they gradually shifted to “general” incorporation laws, which, in the words of Conard (1973, p 632), “were introduced in the nineteenth century to permit people to organize themselves without the necessity of a special legislative act.” The rapid growth of corporations in the early 20th century made many uneasy, however, and some states acted to limit their expansion. Florida, in particular, imposed a system of graduated corporation annual license fees intended to curtail the growth of chain stores. Specifically, under Section 5 of the Florida statute, a corporation with 2 to 15 stores in any county would pay an annual fee of \$10 per store, whereas a corporation with more than 75 stores would pay \$40 per store. Moreover, if the corporation had 2 to 15 stores in different counties, it would pay

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<sup>57</sup>In 2023, the search phrase “race to the bottom” returned over 13 million references in a general internet search and approximately 7,200 references on the JSTOR digital library of scholarly content, a number that many authors would be flattered to obtain.

not \$10 but \$15 per store, and a corporation with more than 75 stores located in different counties would have to pay \$50 per store.

A group of chain store owners challenged the constitutionality of these graduated fees, notably claiming that they were arbitrary and discriminatory. Upon reaching the Supreme Court, the majority rejected most of their arguments, but did agree that the state could not impose “unreasonable and arbitrary” differential fees on companies with establishments in multiple counties. In particular, the majority opinion stated that higher levies based on “the mere physical fact that ... one [store] lies a few feet over a county line finds no foundation in reason or in any fact of business experience. There is no more reason for adopting the county line as the measure of the tax than there would be for taking ward lines in cities, or arbitrary lines drawn through the state regardless of county boundaries” (288 US 517).

Justice Brandeis dissented from this latter element of the majority opinion, declaring the entirety of Florida’s “Anti-Chain Store Law” to be constitutional. According to Brandeis, “[w]hether the corporate privilege shall be granted or withheld is always a matter of state policy”. States have the authority to address the “harm apprehended or experienced” due to business incorporations, whether by “revoking the corporate privilege ... [or] by imposing ... the handicap of higher, discriminatory license fees” such as those in Florida. Furthermore, “[w]hether the citizens of Florida are wise in seeking to discourage the operation of chain stores is, obviously, a matter with which this Court has no concern. Nor need it ... consider whether the differences in license fees employed to effect such discouragement are inherently reasonable, since [firms] are at liberty to refuse to pay the compensation demanded for the corporate privilege and withdraw from the state, if they consider the price more than the privilege is worth”.

These statements, which highlight the tradeoffs faced by states as they compete for capital, are very much in the spirit of Sections 3 and 4 above. Brandeis here indicates not only that states are free to tax and regulate corporations as they see fit, but that the freedom to relocate affords the owners of capital all the protection they need from whatever burdens states may impose upon them. For their parts, it is up to the states to weigh the benefits and costs of alternative policies, recognizing that corporations can locate elsewhere if desired. In short, competition among the states is built into the Constitution, and it is up to the states and corporations to live with the consequences.

These remarks are interesting enough, but even more striking is the analysis employed by Brandeis in his further discussion of the prerogatives of states to “regulate” corporations. As he views the US experience, “incorporation for business was commonly denied long after it had been freely granted for religious, educational, and charitable purposes. It was denied because of fear. Fear of encroachment upon the liberties and opportunities of the individual. Fear of the subjection of labor to capital. Fear of monopoly. Fear that the

absorption of capital by corporations, and their perpetual life, might bring evils similar to those which attended mortmain. There was a sense of some insidious menace inherent in large aggregations of capital, particularly when held by corporations.”

In Brandeis’ view, states established general laws of incorporation not because “the apprehension of corporate domination had been overcome”, but rather to avoid “the scandals and favoritism incident to special incorporation” and as “an expression of the desire for equality of opportunity”. To his regret, however, states progressively relaxed previous restrictions on incorporation, “due not to their conviction that maintenance of the restrictions was undesirable in itself, but to the conviction that it was futile to insist upon them, because local restriction would be circumvented by foreign incorporation. Indeed, local restriction seemed worse than futile. Lesser states, eager for the revenue derived from the traffic in charters, had removed safeguards from their own incorporation laws. Companies were early formed to provide charters for corporations in states where the cost was lowest and the laws least restrictive. The states joined in advertising their wares. *The race was one not of diligence, but of laxity.* [Emphasis added.] Incorporation under such laws was possible, and the great industrial states yielded in order not to lose wholly the prospect of the revenue and the control incident to domestic incorporation.” Here we see at its inception the use of the term “race” – if not literally “to the bottom” – to characterize competition among governments.

Brandeis evidently disapproves of undue liberalization of state laws of incorporation, and, accordingly, is sympathetic to state policies that bring corporations under tighter control. In *Liggett*, he sees the state of Florida acting on behalf of “the individual retailers of Florida [who] are engaged in a struggle to preserve their independence – perhaps a struggle for existence. The citizens of the state, considering themselves vitally interested in this seemingly unequal struggle, have undertaken to aid the individual retailers by subjecting the owners of multiple stores to the handicap of higher license fees. They may have done so merely in order to preserve competition. But their purpose may have been a broader and deeper one. They may have believed that the chain store, by furthering the concentration of wealth and of power and by promoting absentee ownership, is thwarting American ideals; that it is making impossible equality of opportunity; that it is converting independent tradesmen into clerks, and that it is sapping the resources, the vigor, and the hope of the smaller cities and towns. ... The purpose of the Florida statute is not, like ordinary taxation, merely to raise revenue. Its main purpose is social and economic. The chain store is treated as a thing menacing the public welfare. The aim of the statute, at the lowest, is to preserve the competition of the independent stores with the chain stores; at the highest, its aim is to eliminate altogether the corporate chain stores from retail distribution.”

Brandeis’ opinion continues in this vein, citing the many and profound evils of chain stores and large corporations in general: “There is a widespread belief that the existing

unemployment is the result, in large part, of the gross inequality in the distribution of wealth and income which giant corporations have fostered; that, by the control which the few have exerted through giant corporations, individual initiative and effort are being paralyzed, creative power impaired, and human happiness lessened; that the true prosperity of our past came not from big business, but through the courage, the energy, and the resourcefulness of small men; that only by releasing from corporate control the faculties of the unknown many, only by reopening to them the opportunities for leadership, can confidence in our future be restored and the existing misery be overcome, and that only through participation by the many in the responsibilities and determinations of business can Americans secure the moral and intellectual development which is essential to the maintenance of liberty. If the citizens of Florida share that belief, I know of nothing in the Federal Constitution which precludes the state from endeavoring to give it effect and prevent domination in intrastate commerce by subjecting corporate chains to discriminatory license fees. To that extent, the citizens of each state are still masters of their destiny". In the pursuit of these goals, Brandeis finds that Florida is free to tax corporations as it sees fit, even (contrary to the majority opinion) by applying differentially higher taxes on multi-county chain stores.

It is pertinent to note that only one year prior to *Liggett v. Lee*, Brandeis had delivered an opinion in *New State Ice Co. v. Liebmann*, 285 U.S. 262 (1932) which saw the birth of another resonant phrase. Here, Brandeis championed state autonomy on the grounds that states ought to have great latitude to "experiment" with different policies, that "[d]enial of the right to experiment may be fraught with serious consequences to the nation", and that "a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country". The concept of states as "laboratories of federalism" has subsequently become very familiar to students of federalism. It may thus be unsurprising that Brandeis, as an acknowledged defender of policy experimentation by "courageous" states, was disinclined to curtail Florida's autonomy in the regulation of corporations in the Florida chain-store case, even as he may have been dismayed by the policy choices of other "experimenting" states who engaged in a "race to laxity".

Taking these two opinions together, Brandeis clearly finds a high degree of state policy autonomy to be justified under the US Constitution. Prepared as he was to recognize the freedom of states to chart their own policy paths, would he also have supported their freedom to coordinate policies, if desired? Such coordination could, after all, curtail the "liberty [of corporations] to refuse to pay the compensation demanded for the corporate privilege and withdraw . . . if they consider the price more than the privilege is worth". As noted in Appendix I, the OECD (2022) cites "harmful tax competition, and a damaging 'race-to-the-bottom' on corporate tax rates" as a justification for its Pillar Two global corporate income minimum tax rate. Because the US has maintained one of the highest statutory tax rates of any OECD country, Brandeis, one can only suppose, would have

strongly defended “rate autonomy” for the US today, so that its citizens could remain “masters of their own destiny”. But he would presumably also have sympathized with the OECD and other observers that such autonomy is less welcome when states or countries use it to offer lower tax rates. It is intriguing to ponder whether Brandeis would have approved of international agreements to set minimum tax rates and whether he would have been concerned to protect the freedom of corporations from such “cooperation” (some would say “collusion”) by taxing authorities. How would he have assessed the right of any nation, one of the world’s “laboratories”, to pursue its own path by setting low corporation income tax rates?