COMPETITION AND SUBNATIONAL GOVERNMENTS: 
TAX COMPETITION, COMPETITION IN URBAN AREAS, 
AND EDUCATION COMPETITION

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Competition at the subnational level concerns how jurisdictions set tax, spending, or regulatory policies while accounting for the fact that these policies affect the locations of individuals, firms and mobile factors. This paper highlights the importance of studying subnational competition and then places the field of fiscal competition in the context of the broader public economics literature. We argue that studies of competition at the state and local level should extend beyond traditional issues relating to tax competition and must consider how many different agents respond to policies. The paper then summarizes the six papers in this special issue, which were presented at a conference on subnational competition.

Keywords: subnational competition, tax competition, fiscal competition, urban areas, economics of education

JEL Codes: H7, I2, R5

I. INTRODUCTION

According to one prevalent view, competition among governments improves access to services, lowers costs, and enhances alignment between demands and service provision. With a wide variety of local public service levels provided across jurisdictions, individuals are able to closely match their preferences to the services provided. This view dates to Tiebout (1956), who constructed a model in which highly mobile individuals choose among communities based on public goods financed by head taxes, with the outcome that local public services are provided efficiently.

These potential benefits of government competition must, however, be weighed against the potentially perverse effects that arise with other tax sources, such as inef-
ficiently low tax rates (particularly from tax competition) that can result in the under-provision of public services. On the other hand, tax exporting — or the desire to raise taxes on “foreigners” — can result in tax rates being too high. Co-occupation of tax bases at multiple levels of government may also result in sub-optimal tax and spending levels as each level of government does not directly account for its effect on the tax base of other governments in the federalist hierarchy.

A large literature on international tax competition has developed in recent years; for a summary, see Keen and Konrad (2013).\(^1\)\(^2\) However, the high degree of autonomy given to many local governments suggests that subnational government competition should be viewed much more broadly than the setting of tax rates. We refer to the setting of any local policy when economic agents and /or factors are mobile across borders as fiscal competition. Fiscal competition can include competition over tax policies, but spending policies and regulatory regimes also affect locations. Governments set these policies knowing that agents and factors — whether it be shoppers, firms, residents, capital, workers, or school children — are potentially mobile to other jurisdictions.\(^3\) We unify varying forms of competition into a common framework and argue that research on fiscal competition is important to studying how government policies affect economic behavior. The paper is positive — rather than normative — in its focus. Often, aspects of fiscal competition cannot be viewed in isolation because agents seek a package of taxes and public services. Although some residents may be attracted to a jurisdiction because taxes are low, they can be repelled if its public services are under-provided or are of extremely low quality.

We focus on three key areas of fiscal competition: tax competition, competition in the provision of education, and competition in cities. Competition in cities may involve the setting of tax policies, but regulatory policies and the building of urban infrastructure in order to attract mobile residents or firms are especially important in cities.\(^4\) The study of tax competition has traditionally fallen under the domain of public finance economists, while labor economists have worked on the economics of education and urban economists have studied our cities. Each of these three topics has an important place in the future research agenda of fiscal competition, and each

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\(^1\) Although our focus will be on subnational competition, many of the issues we discuss also apply to the international context.

\(^2\) Other surveys of both theoretical and empirical work include Wilson (1999), Zodrow (2003), Brueckner (2003), Fuest, Huber, and Mintz (2005), Wilson and Wildasin (2004), Revelli (2005), Revelli (2006), Wildasin (2006), and Zodrow (2010). We survey this literature with the aim of linking various types of competition and relating the literature to broader issues of behavioral responses.

\(^3\) We use the term jurisdictions, but we acknowledge that activities such as online shopping involve agents being mobile to a remote source for goods (Goolsbee, 2000; Ballard and Lee, 2007; Goolsbee, Lovenheim, and Slemrod, 2010; Ellison and Ellison, 2009; Einav, et al., 2014). Although the Internet cannot set a sales tax rate, jurisdictions are effectively competing for sales that may otherwise occur on tax-free websites. Towns and states may also worry that firms will elect to engage in online operations rather than brick-and-mortar sales (Bruce, Fox, and Luna, 2015). Thus, jurisdictions may account for revenue leakages due to online shopping when setting their sales tax rates (Agrawal, 2013).

\(^4\) For this reason, we classify urban competition as a separate subfield that that does not focus on a specific policy, but rather an important type of competition.
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of these three strands of literature can benefit from the methodologies used in the others.

Tax competition arises when governments vie with their neighbors to attract a mobile tax base. For example, in the case of excise taxes, a government may lower the tax on beer in order to attract cross-border shoppers from nearby jurisdictions. It is the potential mobility of the tax base across borders that causes a jurisdiction to account for the tax policies of other localities when setting its own tax rate.

The scope of tax competition is broad and focuses on various mobile factors. The literature on tax competition has studied the mobility of productive capital subject to capital taxes (Zodrow and Mieszkowski, 1986; Wilson, 1986), shoppers determining where to purchase goods that are subject to sales or excise taxes (Kanbur and Keen, 1993; Nielsen, 2001), mobile households and workers subject to decentralized income taxes (Bucovetsky, 2003; Wilson, 2015), corporate income subject to source-based taxes (Devereux and Lorentz, 2013; Altshuler and Goodspeed, 2015), migration of the elderly in response to estate taxes (Conway and Rork, 2004; Brülhart and Parchet, 2014), reported diesel consumption subject to taxation based on miles driven in each state (Marion and Muehleggner, 2014) and many other margins. Although many of these examples imply that competition may occur for an additional piece of capital or an additional worker, competition may also occur over a specific firm or entity. The “bidding for firms” literature studies how jurisdictions might set policies in order to attract a firm or foreign direct investment to the jurisdiction (Black and Hoyt, 1989; Kessing, Konrad, and Kotsogiannis, 2009; Ferrett and Wooten, 2010).

Mobility also influences education policymaking. The school choice movement — in particular, the formation of charter schools — allows families to select their children’s school. As a result, students may leave the public school system, and towns may respond by changing spending policies that improve educational services in the district. School districts may also respond to potential mobility resulting from parents obtaining information on the quality of the district relative to nearby districts or private schools. This competition may be especially intense in economically linked areas with substantial variation in school choices, where residents may select different education bundles by shifting residential location without changing jobs.

Given that metropolitan areas are characterized by a high degree of economic integration, the movement of firms and people within an urban area can often occur without losing access to a particular set of amenities. Despite this, urban areas generally have no unifying governmental structure, but rather are characterized by a highly decentralized and fragmented system of local governments. These localities frequently adopt economic development or zoning policies that benefit their residents without much regard for their impact elsewhere in the metropolitan area. Cities are also special with respect to fiscal competition because the location decisions of firms and individuals are inherently tied to the decisions of others through economies of agglomeration (Brülhart, Bucovetsky, and Schmidheiny, 2015). The existence of economies of agglomeration is the economic process that induces firms to locate close to one another and this may result in taxable agglomeration rents (Jofre-Monseny, 2013) because firms are less mobile if they are more productive when clustered around other firms.
In order to facilitate discussion across each of these three themes, the Office of Tax Policy Research of the University of Michigan; the Center for Business and Economic Research of The University of Tennessee, Knoxville; and the Department of Economics of the University of Georgia organized a conference on the topic of sub-national competition, held on April 4–5, 2014 at the UT Center for Business & Economic Research. The conference featured 11 presentations of scholarly research, six of which are published in this special issue of the National Tax Journal. In addition to encouraging interactions across public finance, urban, and labor economists and tax accountants, the conference also sought to link theoretical models of fiscal competition with empirical approaches. In this paper we describe each of these three inter-related areas of fiscal competition, and summarize the research in the special issue. The paper then discusses how subnational competition relates to the broader literature in public finance. We stress again that this paper is positive, rather than normative in focus.

II. MOTIVATION FOR STUDYING FISCAL COMPETITION

To illustrate the importance of fiscal competition — or the study of open economy public finance — we begin by describing an example concerning local retail sales tax rates in the United States. Local sales taxes are an intriguing starting point because sales taxation in the United States is highly decentralized in comparison to most other countries in the world — municipalities often have taxing authority including control over the tax rate and administration — and this implies that the tax base might be mobile to nearby regions in terms of both cross-border shopping and firm location decisions.

Using comprehensive data from Agrawal (2015), we document some stylized relationships important to fiscal competition. Using April 2010 data on town, county, and district sales taxes, we calculate the average of neighboring tax rates for each town (commonly known as a spatial lag). For this paper, the spatial lag is defined as the average of local tax rates within a 30-mile radius of the population-weighted centroid of each jurisdiction. Figure 1 plots the cumulative (county plus town plus district) local option sales tax rate in each town with respect to the average rate in its neighboring jurisdictions.

Figure 1 shows a strong positive relationship between the cumulative local tax rate in one jurisdiction and the average of its neighbors’ tax rates. Of course this association may indicate the presence of fiscal competition, but it may also arise because spatially proximate jurisdictions have similar preferences or characteristics. It may also be evidence of yardstick competition (Besley and Case, 1995; Allers and Elhorst, 2005), whereby

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5 For purposes of this exercise, we restrict the sample of towns to states that allow localities to set local option taxes. The spatial lag, however, is calculated using all towns – even if they are in states that do not allow for local taxation.

6 In all figures, we use a linear fit from an unweighted regression. Weighted results that give more weight to large towns are qualitatively similar. When using a linear fit, the model may yield predicted values below zero, but in both specifications, this does not appear to be a major concern.
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Jurisdictions look to their neighbors to benchmark their policies in a political sense. Examples of studies of horizontal competition include Case, Hines, and Rosen (1993), Figlio, Kolpin, and Reid (1999), and Luna (2004). The fiscal competition literature has made progress towards identifying whether such a relationship reflects true strategic interaction (Lyytikäinen, 2012; Eugster and Parchet, 2013), but much more remains to be learned. For purposes of this paper, we simply display these data as evidence that spatial relationships are important in open economy public finance, whether it is through a Tiebout-type mechanism that results in sorting of similar people to nearby jurisdictions, or whether it is the result of explicit strategic interactions. The figure makes it clear that the spatial and competitive pressures that arise in open economy public finance must be accounted for when analyzing issues related to local public finance.

Figure 1 illustrates the horizontal relationship of tax rates — horizontal because it concerns neighboring jurisdiction tax rates within the same level of the federalist hierarchy. Vertical relationships may also arise between governments of different levels in the federalist hierarchy that share the same tax or spending base. In Figure 2, we show the relationship between town level tax rates and county level tax rates after restricting the sample to states that allow for both levels of government to set local sales tax rates. Diagonal interactions may also arise when jurisdictions at one level of government com-
pete with neighboring higher levels of government that do not share the same tax base (for example, competition between the city of Chicago and neighboring Lake County). Figure 2 illustrates a negative relationship between town and county tax rates. The theoretical literature on vertical tax relationships (Keen, 1998) indicates that the slope of this line could be positive or negative depending on the curvature of the demand function. The empirical literature finds both positive (Besley and Rosen, 1998) and negative (Hayashi and Boadway, 2001) relationships between the taxes of higher and lower level governments. Figure 2 makes it clear that tax rates at one level of government are not independent of the policies at other levels of government. This implies that researchers studying fiscal competition must also be concerned with issues relating to fiscal federalism. Strategic interactions may arise not only with one’s neighbors, but also with other levels of government. Studies of vertical tax competition include Esteller-Moré and Solé-Ollé (2001) and Besley and Rosen (1998). Brüllhart and Jametti (2006) and Devereux, Lockwood, and Redoano (2007) consider both horizontal and vertical tax competition.8

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7 We do not focus on diagonal interactions in this paper, but accounting for diagonal strategic interactions is important to obtain unbiased estimates of horizontal and vertical competition.

8 The literature on fiscal federalism has also considered the design of intergovernmental grants, which we do not focus on in this paper. Dahlby (1996) is one example.
Federalism and decentralization are common around the world and this decentralization concerns more than tax policy (Boadway, 2006). While both of the above figures plot tax rates, in the following section we argue that fiscal competition should extend beyond tax competition to various forms of competition. We focus on education, by far the largest spending item for local jurisdictions in the United States, accounting for 42.1 percent of direct general local expenditures in 2011, and competition in urban areas where regulations and infrastructure are important.

III. WHY FISCAL COMPETITION IS ABOUT BEHAVIORAL RESPONSES

In the prior section we motivated the study of fiscal competition by analyzing the policies that governments set and how they interrelate. This requires going beyond studying how jurisdictions react, and understanding how economic agents behave. Indeed, fiscal competition arises because of responses by agents. Because agents are mobile, researchers in this field must answer questions related to how responsive people and firms are to tax and spending differentials and what parameters can affect tax avoidance and evasion at the subnational level.

In order to motivate this idea, in this section we introduce a reduced-form tax competition model where governments maximize tax revenues and show that the equilibrium tax rates can be expressed in terms of elasticities that can be empirically estimated. Before presenting the model, we discuss the objective function of governments.

A. The Objective of Governments

Given the large scope of fiscal competition discussed in this paper, how do researchers model the government objective function in the context of studying fiscal competition? In this section we discuss several commonly used models that study the choices that governments make. In the following section, we make the stylized assumption of revenue maximization so that the equilibrium tax rates can be expressed solely as a function of an elasticity that researchers can estimate empirically; with more complex objective functions, this elasticity will still play a role, but so too would other factors.

Although revenue maximization — Leviathan governments — is a common assumption in the literature on preferential tax treatment (Keen, 2001; Bucovetsky and Haufler, 2007) and tax competition for cross-border shoppers (Kanbur and Keen, 1993), other strands of the fiscal competition literature assume welfare maximization (Keen and Kotsogiannis, 2002; Keen and Kotsogiannis, 2004). In the context of tax rates, Wrede (1996) notes that justifications for the Leviathan objective function include: (1) its simplicity and ability to derive clear-cut results; (2) that the revenue maximization model is equivalent to welfare maximization when the marginal utility of public goods is very high; and (3) that the political economy assumptions of Brennan and Buchanan (1980) imply that the revenue maximization assumption has explanatory potential. Specifically,
Brennan and Buchanan (1980) argue that the government “is effectively unconstrained by electoral considerations” or electoral competition. While these justifications are extreme, Keen and Konrad (2013) note that welfare maximizing — or benevolent — government objectives are also extreme. In the case of the model to follow, the assumption of revenue maximization delivers a clear result showing that tax rates follow an inverse elasticity rule; the point that this elasticity is important would also arise with welfare-maximizing governments, but the result would not be as stark. Again, we reiterate that the model we present is a positive model that yields testable predictions.

An alternative is to assume benevolent governments. Welfare maximization (by decentralized state or local governments) raises challenges to researchers especially when households are mobile across jurisdictions in response to tax or spending policies. In this case, who gets counted in the welfare function? Wilson (2014) discusses this issue in the context of the Gordon and Cullen (2012) model of taxation with migration. In this model, the sum of residential utilities is maximized where the maximization is over — as noted in Wilson (2014, p. 8) — “the sum of utilities for whatever set of individuals currently reside in the state.” This is consistent with a voting model where only residents and not possible migrants vote. Although Gordon and Cullen (2012) focus on a welfare function that aggregates over a static set of existing residents, with migration, who is in the welfare function might change dynamically over time possibly leading to a gradual adjustment process of tax rates. The assumption regarding which people are counted in the welfare function might be justified by political economy reasons, but these political economy motives are not usually modeled and may be controversial in their own right.

Some fiscal competition models posit other objectives besides revenue and welfare maximization. One such objective might be to explicitly model the political process or to assume a particular political structure. For example, Fuest and Huber (2001) study tax competition when fiscal policy results from majority voting. However, the distribution determining the median voter is not always obvious and the political environment might make either the mobile or immobile residents decisive. Koethenburger (2014) considers two extreme cases where the government maximizes the income of the immobile households or the government maximizes the income of the mobile households. As an alternative, with mobile residents, governments might make policies by maximizing the property values of land owners (Sonstelie and Portney, 1978; Wildasin, 1979; Brueckner, 1983; Henderson, 1985; Hoyt, 1993). Hoyt (1992) shows that, for a large city, utility maximization and property value maximization need not result in equivalent outcomes; the policies of a large city will influence prices in the alternative locations that the household may choose.

10 When thinking about welfare maximization with multiple (horizontal) governments, we refer to welfare maximization as an objective of each of these individual governments. This is in contrast to social welfare maximization of the entire economy (by a social planner or a higher level of government).

11 Political economy considerations may also introduce issues related to yardstick competition (Besley and Case, 1995), which does not involve any factor mobility.

12 Epple and Zelenitz (1981) and Yinger (1982) are similar in that residents are mobile.
Empirical evidence can help shed light on the underlying motives. Epple, Romer, and Sieg (2001) reject the myopic voting model (Epple, Filimon, and Romer, 1984) where voters ignore the effects of migration and treat the community population as fixed while also finding evidence consistent with utility taking models where voters anticipate the migration. However, after accounting for peer effects, the myopic model fits the data well (Calabrese, Epple, Romer, and Sieg, 2006). Given the importance of understanding these motives, we believe that continued empirical research in this area could help develop more accurate theoretical models of fiscal competition.

B. A Model of Fiscal Competition with Elasticities

In the spirit of Keen (2001), consider two governments that maximize tax revenue by assessing a tax rate on a mobile tax base. The towns are indexed by \( i = 1, 2 \) and set a tax rate \( t_i \). Town \( i \) is assumed to set its tax rate in a Nash game with town \( j \) in order to maximize its revenue, which is given by:

\[
R_i = t_i B_i(t_i, t_j, x_i),
\]

where \( R_i \) is revenue, \( B_i \) is the tax base, and \( x_i \) is a set of local characteristics. The tax base depends on the town’s own tax rate, the neighboring town’s tax rate and characteristics of the municipality. The base will not locate entirely where the tax rate is lowest due to mobility costs. Differentiating the revenue functions yields the first-order conditions and the local tax rates are implicitly defined by the strategic reaction functions

\[
\frac{\partial R_i}{\partial t_i} = B_i(t_i, t_j, x_i) + t_i \frac{\partial B_i(t_i, t_j, x_i)}{\partial t_i} = 0.
\]

These reaction functions can often be written in a simple closed-form solution. For example, in Nielsen’s (2001) model of tax competition for cross-border shoppers, the reaction functions of the two towns are

\[
t_1 = \frac{d}{2} (1 + b) + \frac{t_2}{2},
\]

13 As tests of the property-value-maximization objective, empirical estimates of the relationship between property taxes and property values originate with Oates (1969). Brueckner (1982) tests whether towns provide public goods in a manner consistent with property value maximization and Barrow and Rouse (2004) study the effect of spending on residential property values.

14 The tax base in our model can be given a variety of interpretations as long as the tax base is mobile across jurisdictions. For example, the tax base might be corporate income, personal income, or sales, although the mechanism through which mobility occurs will differ among these bases.

15 Buettner (2003) shows that the own-tax rate of the jurisdiction has strong negative effects on the tax base, but that the average tax rate of neighboring jurisdictions only has strong effects on small jurisdictions.
(4) \[ t_2 = \frac{d}{2}(1 - b) + \frac{t_1}{2}, \]

where \(1 + b\) is the population of town 1, \(1 - b\) is the population of town 2, and \(d\) is the cost of driving to the border to buy goods in the other town. Each jurisdiction’s tax rate depends on the jurisdiction’s characteristics (in this case population and driving cost) and the neighboring jurisdiction’s tax rate. These types of theoretical reaction functions have led fiscal competition researchers to estimate reduced-form empirical reaction functions of the form

(5) \[ t_i = \alpha + \beta \bar{t}_i + x_i \gamma + e_i, \]

where \(\bar{t}_i\) is a weighted average of neighboring tax rates. But this is not the limit of fiscal competition. If we work with the reaction function in (2) instead of closed-form solutions such as (3) and (4), we clearly see the role of behavioral responses. For simplicity, assume that the pre-tax price of the item composing the tax base is fixed in both jurisdictions at \(p\) and that the post-tax price is given by \(q_i = p + t_i\). Letting \(e_i\) denote the absolute value of the elasticity of the tax base, some rearrangement of (2) yields

(6) \[ t_i = -\frac{B(t, t_j, x_j)}{\partial B(t, t_j, x_j)/\partial t_i} = -\frac{B(t, t_j, x_j)}{q_i} \frac{\partial B(t, t_j, x_j)/\partial q_i}{q_i} = \frac{q_i}{B(t, t_j, x_j)} \frac{\partial B(t, t_j, x_j)/\partial q_i}{\epsilon_i} = \frac{q_i}{\epsilon_i}, \]

which yields a familiar inverse elasticity rule

(7) \[ \frac{t_i}{q_i} = \frac{1}{\epsilon_i}. \]

Thus, although (2) yields a reduced-form government reaction function, it also provides researchers with a call to determine how responsive individuals and firms are to changes in tax rates and other policies. Notice that this elasticity is a function of the neighboring town tax rate as well as a function of the characteristics of the jurisdiction. This further suggests that researchers should look for heterogeneities in elasticities across the sample of jurisdictions, and be aware that jurisdictions might adopt non-tax rate policies that influence this elasticity. For example, jurisdictions might selectively build roadways and bridges across borders in an effort to make people and firms less mobile across borders; jurisdictions may also change how they enforce evasion of the use tax in order to reduce cross-border shopping (Trandel, 1992). These examples suggest that agents will be responsive to the tax system as a whole (Slemrod and Gillitzer, 2014) — not just tax rates.
To illustrate the empirical counterparts of (7), consider a model of commodity taxation where jurisdictions may lower the excise tax rate in order to attract shoppers. In the Nielsen (2001) model of tax competition for cross-border shoppers mentioned above, consumers have no choice over how much of the good they want to buy; the only choice is where they want to buy the good — in their home town or in the neighboring town. In that model, the elasticity of interest is the elasticity of cross-border shopping. The larger jurisdiction usually faces a smaller elasticity of cross-border shopping (because it has many people far away from the border), while the smaller jurisdiction has a larger elasticity (Kanbur and Keen, 1993; Trandel, 1994; Nielsen, 2001). This influences the pattern of tax rates. The larger the differences in jurisdiction size, the greater will be the differences in tax rates. In a more complex model, consumers may choose where to buy the good as well as how much to buy; in this case the relevant elasticities to be estimated are the elasticity of cross-border shopping and the elasticity of demand. For other types of mobile tax bases and tax rates, similar elasticities arise specific to the tax base being studied.

Thinking about fiscal competition through the lens of (7) implies that we can learn about how governments interact simply by measuring how responsive individuals are and along what margins they respond. If the elasticity is driven by mobility responses across borders, the policy implications may be quite different than if people adjust their demand but do not respond by leaving (or shopping in) the nearby jurisdictions. Indeed, although some of the papers presented at the conference on subnational competition focus on estimating or deriving an equation similar to (5), most of the papers investigate how responsive people and firms are to taxes in an open economy model that tries to estimate various determinants of the elasticity in (7). Still other papers try to determine if people respond by moving or by simply changing their behavior without moving. Other papers study where people buy goods and whether it is online or from a brick-and-mortar store. In the case of online shopping, behavior can change without the individual leaving their home.

Jurisdictions compete over taxes, spending policy, and regulations because agents respond or engage in tax evasion. Thus, understanding how responsive agents are is of first-order importance to understanding fiscal competition. Examples of studies that estimate how responsive agents are to tax policies, without studying fiscal competition directly through a reaction function, include estimates of migration in response to income taxes (Young and Varner, 2011), elasticities of cross-border shopping (Fox, 1986; Tosun and Skidmore, 2007), the responsiveness to lottery jackpots (Knight and Schiff, 2012), the effect of taxes on the location and growth of firms (Duranton, Gobillon, and Overman, 2011; Rathelot and Sillard, 2008), the effect of taxes on economic activity (Wasylenko, 1997), the effect of fiscal incentives on star scientists (Moretti and Wilson, 2014), migration more broadly (Fox, Herzog, and Schlottman, 1989), the effect of the minimum wage on employment (Gittings and Schmutte, 2014), and the effect of

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16 Haufler (1996) studies tax competition when jurisdictions have different preferences for public goods, while Hoyt (2001) studies optimal taxation with hierarchical governments.
taxes and fiscal zoning rules on “big box” employment (Burnes, Neumark, and White, 2014). Many other possible examples exist.

**IV. THE VARIETY OF FISCAL COMPETITION**

The three main modules of subnational competition examined at the conference and in this special issue of the *National Tax Journal* — tax competition, urban competition, and education competition — highlight the breadth of fiscal competition as a subfield within public economics. In this section, we define these three types of fiscal competition, highlighting similarities and differences with the broader public finance literature.

**A. Tax Competition**

Tax competition is about how jurisdictions — at any level of government — choose their tax policies when taking into account how these policies affect the distribution of economic activity. Although issues of open economy public finance are familiar in an international perspective, subnational competition allows researchers to study policies that cannot be researched at the international level because of limited access to sufficient cross-country data. Isolating competitive effects is also more difficult across countries because of cultural differences, trade barriers, and variation in labor markets that are difficult to control for empirically. One advantage of studying local tax competition is the relative homogeneity of nearby local regions, which allows the researcher to better isolate the effects of fiscal policies on markets and economic behavior. The sheer number of municipalities with tax-setting authority also allows for ample variation in tax rates across space and time. The challenge to the researcher working with local data is to identify strategic interactions separately from omitted variables that are spatially correlated (Gibbons and Overman, 2012); generalizing theoretical models of international tax competition to the local level has helped in this challenge. For an excellent summaries of recent developments in the tax competition literature, see Brueckner (2003) and Revelli (2015).

Recent increases in data availability on tax rates at the state and local levels are allowing researchers to study many new and interesting questions. For example, Agrawal (2014) constructs an exhaustive monthly panel data set for all town, county, district, and state retail sales tax rates in the United States. Data collection at the local level is not limited to the United States; in fact, studies of the effects of local tax rates are quite common in Europe. Parchet (2013) constructs comprehensive panel tax data for all Swiss municipalities. Fuest, Peichl, and Siegloch (2013) and Siegloch (2014) use panel data of local business tax rates in Germany. Breuillé, Duran-Vigneron, and Samson (2013) study multiple local tax instruments from France using panel data from 1994 to 2010. These increases in the availability of local tax data have been complemented by the ability to measure physical proximity using geographic information systems. The ability to easily compute geo-spatial data has in turn allowed tax economists to study tax competition and tax evasion near borders (for example, Lovenheim, 2008;
Merriman, 2010; Berger et al., 2015; Agrawal, 2015). Borders create characteristic-based notches, as modeled in Gillitzer, Kleven, and Slemrod (2014). Because fiscal competition affects the location of economic activity, research on fiscal competition involves studying the extent of behavioral responses to taxes, spending, and regulation. For example, sales taxes affect where consumers shop and where businesses locate. Income taxes affect where individuals move and work, and may affect commuting patterns. Although tax policies may result in behavioral responses, they need not always induce a response by the various agents. For example, households may have preferences to live near their families or firms may need to locate near a particular labor pool or resource or may benefit from other benefits of agglomeration; such considerations limit the intensity of tax competition. As a result, the study of tax competition sheds light on how responsive individuals are to tax and spending policy, just as economists study the degree of behavioral response to the income tax by estimating the elasticity of taxable income (Saez, Slemrod, and Giertz, 2012). Mobility of the tax base also informs us of the extent of tax evasion and avoidance (Fox, Luna, and Schaur, 2014). Although fiscal competition entails studying how policies are chosen, the study of tax competition goes well beyond the political economy of subnational decision making. The study of subnational competition is about behavioral responses and distortions in an open economy setting. In that respect, tax competition shares similar goals with the broader public finance literature, but with the added complexity that open economy concerns and strategic interactions are especially important. State and local tax policies have the prospect of affecting migration decisions, the location of capital, and where consumers shop; in addition, tax competition may affect housing prices, spatial development of urban areas, and may have economic consequences on the incidence of taxes. This naturally leads us to the next module within fiscal competition.

B. Urban Competition

Transportation costs and commuting are central determinants of a city’s urban spatial structure in standard urban economics models of the monocentric city (Alonso, 1964; Mills, 1972; Muth, 1969). Many empirical urban economics models also rely on geographic borders and the policy discontinuities that arise at these borders to provide economists with variation to identify the effects of policies on economic outcomes (Holmes, 1998). As such, tax policy, zoning policy, local road networks, and even federal highways (Baum-Snow, 2007; Baum-Snow, 2010) are essential determinants of the urban spatial structure. Taxes can also affect urban sprawl; for example, income taxes that change the opportunity cost of commuting (Wildasin, 1985) and property

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taxes (Brueckner and Kim, 2003) may distort the size of cities.\textsuperscript{18} Because these policies are determined by multiple competing decentralized governments, fiscal competition has important implications for the amount of congestion in cities, the land rent and density gradients within the city, commuting patterns, and many other facets of the urban economy.

Competition within metropolitan areas is especially interesting in the context of the fiscal federalism structure of the United States (Calabrese, Cassidy, and Epplle, 2002; Calabrese, Epplle, and Romano, 2012). Metropolitan Statistical Areas (MSAs) — which are integrated labor and commuting markets — have no unified metropolitan government.\textsuperscript{19} As a result, MSAs are composed of multiple cities and often cross-county and cross-state borders. Over 50 MSAs, composed of more than 70 million residents, cross state lines in the United States. Because MSAs are integrated economically but are disintegrated politically, fiscal competition for mobile capital and workers can be intense within the MSA. Coomes and Hoyt (2008), Brueckner and Saavedra (2001), de Bartolome and Ross (2003), and Albouy (2009) analyze competition for mobile workers and capital in urban areas. These studies find that local policies and federal tax policies that vary because of quality of life and wage differences have significant effects on where people choose to live, where capital chooses to locate, and how sprawling our cities are.

Recent developments in statistical and geographic methods place the study of boundary discontinuities on the frontier of research in local public finance. Turner, Haughwout, and van der Klaauw (2014) expand the methods exploiting boundary discontinuities to the context of land regulation; these methods were first pioneered by Holmes (1998) to study right-to-work laws at the state level. One of the reasons for exploiting geographic variation to identify spatial tax competition within urban areas is the proliferation of large parcel-level data sets (Brooks and Lutz, 2013) along with increased ease of geocoding the location of parcels that facilitates the calculation of distances to major locations within the cities. Given these improvements in data and geographic information systems, studying competition in urban areas is at the frontier of economic research and will make valuable contributions to the fiscal competition literature.

At the same time that regulatory policies and infrastructure are important in urban areas, competition in urban areas is also unique in that agglomeration plays an important role. The forces of agglomeration link firms and people together and potentially allow jurisdictions to raise their tax rates because of the reduced mobility resulting from agglomeration (Brühlhart, Jametti, and Schmidheiny, 2012). The linkages of agglomeration also have implications for the spatial location and distribution of firms and people within the city, which can also be influenced by urban zoning regulations or investment

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\textsuperscript{18} Taxes also have other important effects in urban areas. For example, Braid (1987) shows the effect of central city and suburban taxes on the spatial incidence of the taxes on commodity prices; Braid (2002, 2003, 2009) shows the spatial effects on wages and employment.

\textsuperscript{19} The number of jurisdictions in the MSA affects tax rate and public service level as well as the welfare of residents (Hoyt, 1991). The number of jurisdictions in the metropolitan area may also affect the tax instruments used to raise revenue (Braid, 1996).
in infrastructure. Infrastructure in urban areas is vastly different than in small towns, as road networks are dense and public schools often face a series of challenges arising from the diversity of student populations, urban labor markets, and a range of other factors. This naturally leads us to our next topic.

C. Education Competition

Between 1960 and 1995, real per-pupil spending on elementary and secondary public education tripled in the United States, pupil-teacher ratios declined by nearly one-third, and the rate of teachers holding graduate degrees increased by more than 30 percentage points. Despite these dramatic changes in school resources, student achievement advanced very little, if at all (Hanushek, 2002). Student performance on National Assessment of Educational Progress exams has remained steady since 1970, which is when the U.S. Department of Education began tracking student proficiency in various subjects and grades. The evidence on whether public education resources meaningfully affect achievement is mixed and inconclusive. Studies examining the short-term effect of school resources on achievement tend to find little, if any, impact (e.g., Cellini, Ferreira, and Rothstein, 2010; Hanushek, 1997). However, emerging research on the long-term impact of high-quality pre-school education, class-size reductions in the early grades, and exposure to more effective teachers points to much more substantial, positive impacts of school resources on college enrollment and adult outcomes (Heckman et al., 2010; Chetty, et al., 2011; Chetty, Friedman, and Rockoff, 2014a; Chetty, Friedman, and Rockoff, 2014b).

Many experts have anointed competition among schools as the silver bullet for improving educational outcomes, arguing that inefficiencies in public education are the result of weak ties between student achievement and consequential rewards or sanctions for their schools. School accountability, taken together with school choice and empowered and informed parents may introduce competitive pressures without substantially changing traditional public schools. For example, Bifulco and Ladd (2006), Ni (2009), and Zimmer et al., (2009) find little positive effect of geographically-near charter schools on traditional public schools, but gains to traditional public schools are larger when competition comes from high-quality charter schools (Cremata and Raymond, 2014). Even if competition has just modest impacts on short-term achievement, these gains may compound into large, long-lived, and fruitful human capital investments.

School competition schemes typically take the form of private school vouchers, charter schools, open enrollment, and related innovations. Absent these reform-oriented

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20 Vouchers may also affect household location decisions (Nechyba, 2000; Ferreyra, 2007), which may alter the tax base in affected areas. Empirical studies of the effect of vouchers on traditional public schools include Hoxby (2003), Chakrabarti (2008), and Figlio and Rouse (2006).

21 If charter schools force traditional public schools to close, parents who prefer those public schools may be displaced to less-preferred schools. Thus, understanding the welfare implications of charter schools remains a difficult question. Epple, Jha, and Sieg (2014) provide some evidence on school closing decisions.
measures, the dominant source of competition is between public schools themselves, arising from household sorting into districts or attendance zones according to parental preferences for neighborhood and school quality. The study of fiscal competition in education can provide new insights on the theoretical implications of competition across schools, the interaction between school accountability and school choice, and the information pathways available to parents. Like many of the papers at the conference on subnational competition, the study of fiscal competition in education may focus on those mechanisms that enhance school choice and need not be focused on estimating a reaction function in educational spending levels.

V. THE PAPERS IN THIS SPECIAL ISSUE

In this section, to highlight the breadth of fiscal competition, we summarize the contributions of each of the papers published in this special issue.22

A. Tax and Spending Competition

Three papers in this special issue focus on tax competition and its effects on economic activity and the location decisions of agents. One of the papers is a theoretical model while the other two emphasize the effect of tax competition on the behavior of firms or individuals.

1. E-Tailer Sales Tax Nexus and State Tax Policies (Bruce, Fox, and Luna, 2015)

In traditional models of tax competition, the tax base is mobile to other jurisdictions that have authority to set their own tax rate. In the modern economy, the tax base is also mobile to the Internet through online transactions not subject to the sales tax. In this world of increased competition, firms have the choice to establish nexus — a physical presence from which they expect to profit — in one or many states; firms also have the option of competing with brick-and-mortar stores from only a select location. Bruce, Fox and Luna (2015) study how state tax policies affect where firms establish a physical presence in a world where e-commerce allows these businesses to locate remotely and to ship to other states. This paper adds to the existing literature that demonstrates consumers are sensitive to sales tax rates and are more likely to engage in online shopping if they live in high-tax states (Goolsbee, 2000) by showing that firms also respond to tax rates. Bruce, Fox, and Luna (2015) collect a novel data set of firm nexus for a number of years; the data set is constructed by visiting each firm’s website and placing a transaction from every state in the country. The decision of e-tail firms to establish

22 Additional papers that were presented at the conference include Hatfield (2014), Wildasin (2014), Agrawal and Hoyt (2014), Epple, Jha, and Sieg (2014), and Lovenheim and Walsh (2014). To show the similarities and differences across the three areas of subnational competition, we sometimes compare the papers published in the special issue to these papers.
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nexus in low-tax states has important implications for tax competition across the states.

2. **Competition in Business Taxes and Public Services: Are Production-Based Taxes Superior to Capital Taxes? (Gugl and Zodrow, 2015)**

   Many public services benefit businesses rather than residents. In this case, should state and local business taxes be based on production or the amount of capital that is utilized by the firm? Gugl and Zodrow (2015) explore how the provision of business public services is affected by the use of capital taxes and production taxes with tax competition. In a model where public services are provided to businesses, the authors show that the level of provision depends critically on the nature of the production function — how the marginal productivity of capital is affected by the public service. In many circumstances, a production tax is more efficient than a source-based tax. The paper’s implications are important for whether local public services should be financed through a property tax or through an origin-based Value Added Tax. Of course, this raises the question as to why production taxes are not often used. The results in the paper can be compared to Wildasin (2014) where labor mobility can cause city tax rates to be inefficiently high.

3. **State Tax Policy and Entrepreneurship (Bruce, Liu, and Murray, 2015)**

   Much of the prior literature studying the effects of taxes on businesses has focused on the extensive margin — business entry into or out of a jurisdiction and small-firm births. More elusive is the effect of taxes on the level of entrepreneurial performance. Using panel data from 1978 to 2009, Bruce, Liu, and Murray (2015) study how state tax policies affect entrepreneurial performance by using nonfarm proprietors’ income and employment as indicators. The results indicate that the effect of tax policy on entrepreneurial performance is economically small — contrasting with previous studies that have found significant effects on start-ups and on the location decisions of plants. Combining the previous literature with this study suggests that tax base mobility is critically influenced by tax policy, but productivity is not. The authors’ conclusion is that tax policy has no meaningful role on productivity, but has significant implications for participation and location; which margin is most important may depend on the intensity of fiscal competition. The focus from a short-term political perspective may be on the more visible extensive margin and not the longer-term effects on the intensive margin.

B. **Urban Competition**

Two of the papers in this special issue focus on policy competition within urban areas. The session highlighted the breadth of fiscal competition: one paper focuses on infrastructure and one on regulatory and zoning restrictions. Both papers emphasize the importance of borders — state and local — within an MSA.
1. **Decentralized Road Investment and Pricing in a Congested, Multi-Jurisdictional City: Efficiency with Spillovers (Brueckner, 2015)**

Brueckner (2015) examines road investment and pricing in a city with multiple jurisdictions: a suburb, a midcity, and a city center. This theoretical paper investigates the efficiency of decentralized decision-making (where jurisdictions separately make road capacity and pricing decisions). The key feature of the model is that residents of the suburban jurisdiction must use the roads of the “midcity” jurisdiction, which is located closer to the city center, on their way to work at central jobs. The road-capacity choice of the midcity jurisdiction involves a spillover, benefiting suburban residents. Spillovers normally lead to inefficient outcomes under decentralization, but the remarkable result of the paper is that decentralization is efficient in this case. The model characterizes the socially optimal population distribution across the zones of the city.\(^{23}\) To get this outcome, Brueckner shows that the optimal capacity requires financing by budget-balancing user fees, again emphasizing the importance of how revenues are generated. The institutions for collecting revenues have important implications, as in Hatfield (2014).

2. **Border Effects in Suburban Land Use (Jacob and McMillen, 2015)**

Fiscal competition can affect local growth controls (Brueckner, 1998) and regulatory policies. Jacob and McMillen (2015) argue that local jurisdictions manipulate land use through zoning regulations by setting these regulations as a function of distance to the border. In doing so, the jurisdiction assures that land uses with negative externalities (for example, industrial areas with pollution) are more likely to be at borders. To analyze this question, the authors study whether municipalities tend to bunch non-residential parcels at suburban boundaries. Using data on land use for every parcel in Cook County, Jacob and McMillen (2015) find that distance to the border is a significant explanatory factor for the location of low-price industrial properties. Suburban land regulations can induce negative effects on neighboring jurisdictions under the assumption that these low-priced properties are the ones that generate externalities. The paper is noteworthy in the area of subnational competition both because of the coverage of parcel level data and because it suggests that jurisdictions behave strategically with respect to regulatory policy — a fiscal instrument not ordinarily analyzed from a fiscal competition perspective.

C. **Education Competition**

The special issue contains one paper on education competition, with a focus on school choice.

\(^{23}\) The model developed in Agrawal and Hoyt (2014) implies that state tax policies affect the distribution of residents and employment in a metropolitan area that spans multiple states.
1. *School Accountability and School Choice: Effects on Student Selection across Schools (Hart and Figlio, 2015)*

In earlier work, Figlio and Hart (2014) show that student achievement improves in choice-dense areas when private school vouchers are introduced, and that students who use these vouchers tend to be lower performing students from poor schools. In this paper, Hart and Figlio (2015) make use of matched birth and school records in Florida to obtain the most thorough picture to date of exactly which families select into and out of certain schools once the state provides information about school quality to the general public. Their findings indicate that when Florida began grading schools on an A–F scale, the most sophisticated and highly educated families were the most likely to shift to the higher graded schools.\(^{24}\) The consequence is that information revelation about school quality promotes segregation by socio-economic status. Noteworthy is that the responses are larger for “A” schools that have nearby alternatives that are poorer-performing. This suggests that the spatial location of schools is also important to how individuals react. As with Lovenheim and Walsh (2014), the extent to which schools compete with one another is predicated on parents having information about relative school attributes.

VI. THE ROLE OF SUBNATIONAL COMPETITION IN PUBLIC ECONOMICS

Subnational public finance is the study of open economy public finance. Increases in globalization, capital flows, and information flows make subnational public finance an important area of research, as standard models need to incorporate open economy concerns (for example, mobility as a response to income tax rates). Open economy issues are especially important for state and local governments (Hines 1996; Becker, Egger, and Merlo 2012; Rohlin, Rosenthal, and Ross, 2014), but would also apply at the national level if factors are mobile internationally — as noted by studies that analyze the effect of tax rates on international mobility of corporations (Devereux and Griffith, 1998) and superstar athletes (Kleven, Landais, and Saez, 2013). Given increases in economic integration, researchers seeking to incorporate open economy concerns can build on the work in the fiscal competition literature. Variation at the local level can also be used to study the effect of federal and local tax policy on economic outcomes (Chetty, Friedman, and Saez, 2013; Chetty et al., 2014).

As we have already noted, public finance economists often estimate the degree of behavioral response to the income tax by estimating the elasticity of taxable income (Saez, Slemrod, and Giertz, 2012). Some interesting similarities and differences in the nature of the behavioral response arise with the fiscal competition literature. The broad public economics literature has devoted considerable attention to marginal changes in behavior (intensive responses) such as the choice of hours of work. At the same time, models of optimal taxation must also account for discrete changes in behavior (extensive changes in the number of hours worked). For a discussion of the value of a grade, see Figlio and Lucas (2004).
responses) such as participation in the labor force (Saez, 2002). Whether the extensive margin or intensive margin response dominates may have important implications for the tax system. The fiscal competition literature has similarities. While fiscal competition can occur over a marginal change in dollars of investment or shopping, discrete changes in behavior such as the location of a “million-dollar plant” (Greenstone, Hornbeck, and Moretti, 2010) or the choice of residence are often the focus of the fiscal competition literature. For example, Gordon and Cullen (2012) show that the optimal income tax rule must be modified in an open economy by supplementing the reported income elasticity with migration elasticities that pick up these extensive responses.

Public finance economists have recently begun to study how lines (Gillitzer, Kleven, and Slemrod, 2014) and notches (Slemrod, 2013) — discrete changes in tax liabilities that result from incremental changes in a tax base characteristic — affect behavior, and how one can obtain information on behavioral elasticities from the resulting bunching. Decentralization results in lines and notches, as well as bunching behavior. Although geographic borders are not usually a policy choice over which the tax authority has control, 25 geographic borders create lines in the tax system that result in discontinuous changes in tax liability. These discontinuous tax changes have effects similar to notches in the U.S. income tax system, given that individuals and firms want to bunch on the low-tax side of the notch, all else equal. One example is the case of sales tax differences at borders. When crossing from high-tax Massachusetts to low-tax New Hampshire, the excess mass of firms just over the New Hampshire side of the border becomes apparent. As spatial techniques continue to improve, these “border notches” provide the researcher with a unique approach to identify fundamentally important elasticities. We note, though, that bunching at a border is fundamentally different than bunching in the individual income tax code. In the case of borders, physical space is congestible; this is not the case for a particular level of taxable income. Integrating contestability into now-standard models of bunching (Kleven and Waseem, 2013) is an important task for future research.

Chetty, Looney, and Kroft (2009) highlight important behavioral concerns with respect to the salience of the tax system. Salience issues also arise with respect to models of fiscal competition. As some of the papers on education highlight, how do parents obtain information about policies or school quality across jurisdictions? Are people more or less informed about local tax issues than federal tax issues? For example, if tax differentials at state borders are more salient than tax differentials at municipal borders, then tax competition at the state level may be more intense than at the local level. At the same time, individuals may have more information on tax and spending policies in nearby municipalities than in towns in other states. This has important implications for determining the nature of competition among towns. 26

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25 Annexation or amalgamation is an exception where geographic borders become a policy choice (Reingewertz, 2012). School district border changes may occur with mergers (Gordon and Knight, 2009).
26 Janeba and Osterloh (2013) present survey results that indicate the nearest municipalities perceive each other as important competitors.
VII. CONCLUSION

The study of competition at the subnational level is extremely broad, encompassing the nature and level of taxation and the choice of revenue instruments including property taxes, business income taxes, wage taxes, personal income taxes, consumption/sales taxes, and even user fees (Hatfield, 2014; Brueckner, 2015) as revenue sources. In addition, it applies across much of the public service side of government, including spending on education, public services, welfare payments, and infrastructure, and more broadly environmental and zoning regulatory policies. Many open questions remain. What resources are mobile and how mobile are these resources? Are only some types of labor (high-skilled, young, or low-skilled, etc.) mobile? Are these factors mobile in the short run or only in the long run? If factors are mobile, to where are they mobile? This last question is especially important to identifying the competitors of state and local governments.

Fiscal competition remains a fruitful area of research. Thus far, the existing literature has only partially addressed the fact that jurisdictions set multiple tax instruments, choose spending priorities, and establish fiscal zoning policies simultaneously. To what extent and how do these instruments interact? How does the nature of the competition change if we assume that governments compete by selecting tax rates, if they select transfer/expenditure levels, or if they select both?

In addition, issues relating to dynamics are important. Most theoretical models of fiscal competition are static, yet the processes by which jurisdictions interact and affect behavior are dynamic. Future research, including theoretical models, may benefit from incorporating dynamics (Wildasin, 2011).

Issues of fiscal competition are not constrained to the developed world. Tax and regulatory competition can also be important in developing countries (Liu and Martinez-Vazquez, 2014; Agostini, Brown, and Zhang, 2010). Increased access to tax and spending data in developing countries will provide researchers with the ability to study fiscal competition in an environment where tax policy is subject to intense tax evasion. Does fiscal competition differ in such an environment?

Information technology is also putting new pressures on state and local governments, perhaps intensifying competition. This is especially the case for local governments, where the local sales tax is the second largest own source of revenue. The past several years have seen dramatic changes in how jurisdictions define nexus and court battles with online vendors (Bruce, Fox, and Luna, 2015). Information technology will also affect other tax bases and the provision of public services, for example by allowing people to make better choices on schools through online “grades” of school quality (Hart and Figlio, 2015; Lovenheim and Walsh, 2014). Will the competition from e-tail firms online intensify tax competition? Will increased information concerning school quality amplify mobility and if so what are the consequences for our school? These, among other questions, remain the frontier of open economy public economics — the study of fiscal competition.
For the 50th anniversary of the *National Tax Journal*, Slemrod (1997) created a list of the most-cited articles published in the *National Tax Journal*. Slemrod (1997, p. 751) notes, “…the bulk of articles concern bread-and-butter state and local finance issues such as education expenditures, the effect of fiscal policy on industry location, and the responsiveness of state revenue to economic growth.” In recent years, the trend has likely turned away from these issues. However, we hope that this article and special issue helps to rejuvenate interest in these “bread-and-butter” issues of public economics. We have much to learn.

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