Chapter 2

INTER-JURISDICTIONAL TAX COMPETITION – A SURVEY

The main purpose of this chapter is to review the major theoretical and empirical works relating to inter-jurisdictional tax competition (IJTC). Although the Tiebout’s (1956) theory of efficient local public goods provision appears to be the precursor to the development of separate theory on IJTC, it was Oates (1972) who originally conceived the idea of competitive tax setting behavior among sub-national governments. After his original description of IJTC, a large number of theoretical studies have emerged to analyze IJTC in a variety of frameworks characterized by i) benefit or non-benefit levies by competing jurisdictions; ii) small or large number of competing jurisdictions; iii) varying possibilities of mobility of tax bases (such as capital, firms, consumption/sale and residents and capital) across sub-national governments. It is beyond the scope of this study to review all of these. Since the present study is concerned with sales tax competition among state governments, it reviews the major theoretical as well as empirical works on IJTC, which are of direct interest to this study.

The Chapter proceeds as follows. Section 2.1 describes the meaning of IJTC. Section 2.2 briefly explains various approaches analyzing the welfare implication of IJTC. The public choice models and the economic models of IJTC are reviewed in Sections 2.3 and 2.4. Section 2.5 provides a brief review of major empirical studies on the topic that are of direct interest to us. The final Section 2.6 presents the concluding remarks of this chapter.
2.1. Meaning of Inter-jurisdictional “Tax Competition”

The federal finance literature defines the tax policy interaction as the influence of the tax choice of one government on that of others. It considers two types of tax policy interaction in a federation: vertical and horizontal tax interactions. The former, also referred to as inter-governmental tax interaction, can emerge when governments at different levels impose a tax on the same base (Goodspeed, 1998). It encompasses interaction between different levels of governments in choosing their tax levels (e.g., tax interaction between national and state governments, between state and local governments, and between special grade and selection grade municipalities). The latter, also known as the inter-jurisdictional tax interaction, entails interactions between governments at the same level in choosing their tax rates (e.g. competition among state governments and among local government).¹

Two forces-spillover and resource-flow effects-can identify the underlying causes of inter-jurisdictional tax interaction (Brueckner, 2002). The spillover effect exists when each jurisdiction chooses its tax level, but the jurisdiction is also directly affected by the taxes chosen elsewhere. The “political choice” or “yardstick competition” interpretation of tax interaction, as exemplified by Hettich and Winer (1988), Inman (1989), Breton (1991) and Besley and Case (1995), has been the dominant explanation for tax interaction due to spillovers. To them, citizens/voters of a given jurisdiction use the tax burden in the neighboring jurisdictions as the yardstick when they evaluate the fiscal performance of their own government. Since self-interested rulers have to be elected to office by voters, they will in general choose the tax level, taking into account this comparison aspect of

¹ Policy interaction among sub-national governments may emerge with respect to many other policy instruments - public expenditures, welfare benefit levels, environmental standards, and growth control measures.
citizens. Thus, the tax policy interaction among jurisdictions exists. In this case, the relevant spillover is the information spillover.²

The resource-flow effect view considers that the tax interaction emerges due to the mobility of tax bases across jurisdictions in response to increase/decrease in tax burden.³ In the presence of resource-flow, a jurisdiction is not affected directly by the tax levels in other jurisdictions. But the jurisdiction is affected by the amount of a particular "resource" (tax base) that resides within its territory. Because the distribution of this resource among jurisdictions is affected by tax choices of all, a jurisdiction is indirectly affected by the tax choices of all. The "tax competition" literature considers the mobility aspect of resources as the basis for tax interaction among sub-national governments.

² The spill over framework is also used to explain the policy interactions among sub-national governments with respect to public service/expenditure and environmental regulation policies. Interdependence in choosing public expenditure may emerge as a result of benefit spillovers, where residents of one jurisdiction consume the public goods provided by neighboring jurisdictions. Such spillovers affect the provision of public goods or public expenditures by sub-national governments. The major theoretical works on this aspect include Williams (1966), Pauly (1970), Boskin (1973), Oates (1972) and Broadway et al. (1989). Empirical works on the topic include Case et al. (1993), Murdoch et al. (1993) and Kelejian and Robinson (1993). Policy interaction with respect to environmental standards emerges because of pollution spillovers (see Wilson (1996) for a survey). Any increase in pollution abatement expenditure within a jurisdiction will benefit others due to benefit spillovers from such expenditures, assuming that pollution disperses evenly across jurisdictions so that pollution levels are the same everywhere and depend on the total abatement expenditures across all jurisdictions (Fredriksson and Millimet, 2002).

³ The resource-flow framework also considers interactions in the choice of welfare benefit levels, growth control measures, public services/expenditures and environmental standards. The choice of welfare benefit levels among jurisdictions would become interdependent when the poor residents migrate across jurisdictions in response to inter-jurisdictional differentials in welfare benefits. In the presence of poor mobility, jurisdictions compete to avoid the in-migration of poor residents (or welfare recipients) from other jurisdictions by way of choosing lower welfare benefit levels. This type of competitive behavior is called welfare competition (see Brueckner (2000) for a survey). Brueckner (1998) analyzes interaction in the choice of growth controls among cities in USA. In his model, the mobile resource is the population of renters and this population is controlled by each community through limitations on density and new construction. The goal of each city is to raise house prices, generating capital gains for homeowners. The optimal stringency of growth controls in a given city depends on their stringency elsewhere. In the resource-flow version of expenditure policy interaction, jurisdictions compete to attract mobile capital/firms by providing public services/inputs (Keen and Marchand, 1997).
(Oates, 1972; Zodrow and Mieszkowski, 1986; Mintz and Tulkens, 1986). In the tax competition models, jurisdictions finance their provision of public goods with a tax on a mobile base like capital or consumption. Since the tax base can migrate due to favorable/unfavorable tax treatment, the allocation of tax base among jurisdictions depends on tax levels in all jurisdictions. Therefore, each jurisdiction will have an incentive to keep its tax level low in an attempt to preserve existing tax base or to attract new tax base. Thus, inter-jurisdictional “tax competition” (IJTC) refers to the “rivalrous” tendency of governments. The governments compete for retaining or increasing the tax base at the expense of others (Kenyon and Kincaid, 1991). Competitions among the states to attract/retain sales or “cross-border shoppers,” and investments/business by way of lowering tax rates and offering tax incentives/concessions clearly fit into this definition.

2.2. Alternative Approaches on the Welfare Implications of IJTC

Broadly, two approaches emerge in the literature to analyze IJTC: public choice approach and economic approach. The first approach, developed by political scientists, views the problem from public choice perspective while the second approach, formulated by economists, analyzes IJTC by utilizing the theory of competition among firms in a market economy. These approaches use different frameworks/criteria and provide two contrasting conclusions about the welfare effects of IJTC. The public choice approach finds IJTC as a welfare-improving force whereas the economic approach considers it as a welfare-worsening phenomenon. Since the economic approach is relevant for the study,

---

we give a brief account of public choice approach in Section 2.3 and focus much on the economic approach in Section 2.3.

2.3. The Public Choice Perspective of LJTC

Brennan and Buchanan (1980) propounded this approach. Drawing on the microeconomic theory of monopoly, they treat the government as a monolithic agent, a "Leviathan," that seeks to maximize its own revenue in pursuit of its own "aggrandizement" by way of maximizing the tax revenues. A federal structure of governments, according to them, can play a major role in limiting such self-seeking revenue maximizing behavior. This occurs because competition among decentralized governments in a federation for "fiscal resources" arising from the ability of "persons and [economic] resources" to move across jurisdictions in response the fiscal decisions of the governments places a powerful constraint on the government's access to taxation.\(^5\)

If a government is inefficiently providing low-quality services with high taxes, mobile economic resources (e.g., capital) will leave the jurisdiction. This will lead to a decline in income and employment of the immobile factors (e.g., land/labor). The voters will be worse off and they will punish the government in the election. However, since the government wants it to be re-elected, it will be forced to act efficiently (i.e., it will try to provide better services at a low cost).

Thus, Brennan and Buchanan's (1980) analysis indicates three major welfare-enhancing properties of LJTC: (a) it insures against excessive taxation by the governments through "taming the Leviathan", (b) it raises the efficiency of the government sector by

\(^{\text{5 To some extent, the undesirable expansionary tendencies of the government is restricted by the democratic process whereby voters can punish selfish and wasteful governments in the elections. However, as Downs (1957) has argued, voters are rationally ignorant and are only imperfectly informed of what is going on in the political arena.}}\)
making it more responsive to the needs of their constituents, and (c) it improves the allocation of the mobile private factors of production. Therefore, LIJC can serve as welfare-enhancing 'disciplinary' function in the public as well as in the private sector.

After Brennan and Buchanan's pioneering work, many theoretical as well as empirical studies emerged on the topic. However, conclusions of these studies on the welfare implications of LIJC are mixed and largely inconclusive (Eppler and Zelenitz 1981; Rauscher, 1998; Oates 1985, 1989). Thus, this approach fails to suggest in a concrete way that the LIJC improves welfare by way of disciplining the fiscal behavior of the government. Another major defect of this approach is that it considers governments as "Leviathans," implying that they are revenue maximizers (i.e., they are concerned with maximizing their own welfare rather than the well being of their constituents). Such an extreme view of the public sector is unrealistic.

2.4. The Economic Approach⁶ on LIJC

As mentioned earlier, the economic approach posits that the role of the government is equivalent to business firms (or sellers) and the role of mobile economic resources (people/persons/households, capital and goods) is analogous to the role of consumers (Kenyon and Kincaid, 1991). Under this approach, two types of conceptual frameworks have emerged to analyze LIJC. The first approach utilizes the perfect market framework while the second approach use the imperfect market condition. Let us briefly review these approaches below.

⁶ It is of significance to point out that though both the public choice and economic approaches consider the "exit" of tax bases as a source of tax interaction, the concern about the exit under the two approaches differs fundamentally. The public choice approach is concerned about the depressing effect that the exit of economic resources/tax bases has on the local economy and the resulting political opposition and dissatisfaction among affected groups of voters. In contrast, the economic approach is concerned with the effect the exit has on the local tax base/revenues and the resulting economic consequences rather than on the political fortunes of the rulers.
The famous Tiebout (1956) model of efficient local public goods provision provides a useful benchmark for the application of perfect competition model for the study of UTC. The economy in the Tiebout world consists of a large number of local governments and households (whom he calls "consumer-voters"). Each governmental unit offers a diverse array of local public goods (with no interregional benefit spillovers) for a price charged in the form of benefit taxes; households would pay taxes that exactly equal the value they placed on the publicly provided goods received. The households thus face a choice analogous to a perfectly competitive market for private goods: they decide which of many local governments to locate in, based on their preferences for the public good - tax (price) packages offered in various governments. Given this choice, the households just as they choose among sellers of private goods select a jurisdiction that provides the benefit tax-public good bundle best suited to their preferences. The resulting public goods provision from this process of 'voting with one's feet' ensures both "allocative efficiency" (provision of the right amounts of public goods) and "productive efficiency" (provision of public goods at the lowest possible cost).  

Following the Tiebout (1956), two sets of theoretical models have emerged to examine the economic consequences of UTC. The first one is a straightforward application of the Tiebout framework while the second one deviates from the Tiebout

---

7 Local governments in the Tiebout model primarily include metropolitan areas or cities with many suburban governments, which he calls as 'communities' in general. However, the model also applies, albeit to a lesser extent, to subnational governments of higher degree such as States (see footnote 9 in Tiebout (1956)).

8 No income redistribution takes place in the Tiebout (1956) system of local governments as it is taken care of by the national/federal government.
framework in many important aspects. Together these models are called perfectly
compulsive models of tax competition.\textsuperscript{10}

\textit{Tiebout-Based Perfectly Competitive Models:} The theoretical models, developed by
Fischel (1975), White (1975) and Oates and Schwab (1991), extend the Tiebout
framework to include mobile business firms/capital. In these models firms are assumed
to be "shop around" among a large number of jurisdictions, in the same manner that
mobile residents are able to "vote with their feet" in the Tiebout model. While choosing
their location, firms pay a tax amount exactly equal to the costs that their operations
impose on the jurisdiction of its location. These costs include the costs incurred in
providing various "public inputs" to the firms such as roads, police and fire protection.

Taxes are thus fees for goods and services provided to the firms. In equilibrium, the
governments provide public inputs to each firm up to the point where the marginal
product of the public input equals its tax price and the equilibrium is efficient.\textsuperscript{11} Thus,
under the perfect market condition, LTC promotes the efficient geographic allocation of

\textsuperscript{9} The second one is dominant in the literature.
\textsuperscript{10} The underlying framework of both these strands of models is as follows. The
economy contains a large number of jurisdictions engaging in tax-based
competition for a mobile tax base (say capital). A single jurisdiction is not
enough to increase its tax base significantly at the cost of others (i.e., by
altering its tax rate). The situation is similar to the status of
firms/sellers in a perfect market. Therefore, the impact of any single
jurisdiction, say $i$, on any other jurisdiction $j$'s tax rate is negligible
because $i$ has a negligible share of the total tax base in the economy. Thus
whether or not other jurisdictions allow their tax rates to adjust to changes
in tax rates of $i$, the impact becomes increasingly irrelevant from the
viewpoint of $i$'s own behavior (Wildasin, 1983; Oates and Schwab, 1988). Thus,
the competitive models seem to reasonably approximate the actual tax setting
behavior of large number of small suburban governments within a metropolitan
area (Oates and Schwab, 1991).

\textsuperscript{11} To see this point clearly, suppose we replace the local governments with
perfectly competitive profit-maximizing firms that produce and supply local
public goods to firms at marginal cost. Local taxes, in this setting, play the
same role as prices. They do not distort economic decisions. As a result, firms
would continue to hire the public input until the marginal product of the
public input equaled its price. In this way, firms would pay the full cost of
providing the public input.
resources (firms), the efficient provision of local public goods and the efficient operation of sub-national governments.

However, these "efficient tax competition models" are criticized for their restrictive assumptions. Like the Tiebout model, they are devoid of income redistribution by sub-national governments (Kenyon, 1997). As a result only benefit taxes are levied and there are no ability-to-pay (non-benefit) taxes. Benefit taxes reflect social marginal cost and therefore help firms/capital to choose jurisdictions efficiently. However in a world with concern for redistribution or equity, fairness requires levying taxes according to the ability-to-pay principle.\(^\text{12}\) Non-benefit taxes distort private sector behavior as they generate externalities so that tax prices diverge from social marginal cost. This creates incentives for inefficient location decisions by firms.

Another unrealistic assumption is the absence of "interregional spillover/externalities" associated with tax/public service in one jurisdiction on the residents of other jurisdictions (Oates and Schwab, 1991). If production and consumption generate externalities, one cannot expect that perfect competition will lead to efficient allocation of resources. Similar issues arise when the tax decisions taken by one jurisdiction to increase the welfare of its own residents influence the welfare of residents in other regions due to the presence of externalities (Gordon, 1983).\(^\text{13}\) For instance, when a jurisdiction raises its tax rate on mobile capital, it drives capital out from

\(^\text{12}\) In addition, the sub-national governments in the real world federal economies hardly impose benefit levies and instead rely heavily on non-benefit taxes such as income and sales taxes due to the impracticability of applying benefit principle of taxation because of the apparent impossibility of measuring benefits from public service provision (see Chapter 1).

\(^\text{13}\) As the discussion that follows unfolds, these externalities are identified with various names in the IJTC literature. Wildasin (1989) describes externalities generated though tax decisions as "fiscal externalities", Mintz and Tulkens (1986) as "public consumption effect," and "private consumption effect" and Depaters and Myers (1994) as "pecuniary externality."
that jurisdiction to other jurisdictions, causing their capital base to increase and, hence, their tax revenues to rise. Since the jurisdiction that raises the tax does not account for this beneficial externality it under-utilizes its capital tax and thus under-provides local pubic goods. Hence, the neglect of such external effects will seriously affect the welfare results of LTC.

Oates (1972) demonstrates that in an idealized Tiebout setting characterized by a high degree of mobility of “individuals and capital”, the use of non-benefit taxes such as income and sales taxes by "highly decentralized" level of governments results in allocative, distributional and production distortions. Such distortions emerge mainly due to location inefficiency. The location inefficiency exists when the location of economic resources is guided solely by the goal of obtaining a favorable tax treatment rather than by economic rationale.

As an example, Oates considers a case where local governments finance their expenditures with a proportional income tax. Since the jurisdiction consists of wealthy as well as poor residents, the proportional income tax leads to two types of distortions. Firstly, the system provides an incentive for wealthy residents to move towards low income tax jurisdiction, as they have to pay a higher tax than poor. Such relocation decisions are inefficient because they lead to allocative distortion – the wealthy resident’s location will no longer depend on economic rationality but on tax considerations. Secondly, distributive distortion arises when the jurisdiction attempts to redistribute income between rich and poor residents by taxing the wealthy more than the poor. This is because of the exit of the wealthy residents from high tax jurisdiction to lower ones.

Regarding, production distortion, Oates (1972) shows that business tax differentials
among jurisdictions would lead to both inefficient location of capital (or business investment) and the adoption of "inefficient factor proportions" in the production. The former effect is due to the fact that an increase in the tax on the use of capital in one jurisdiction will tend to discourage the employment of capital there and to divert its use to other locations. The later effect is due to substitution of taxed factors of production (capital) by non-taxed one’s (say labor) by firms.

To avoid these distortions, Oates suggests the benefit levies by sub-national governments instead of non-benefit taxes. Failing to do so, according to Oates, would give rise to what he calls "tax competition" whereby "[l]ocal officials, in an attempt to attract new investment to stimulate local employment and income, compete with neighboring jurisdictions by holding down local tax rates (Oates, 1972, p.142)." The result of such competition "may well be a tendency toward less than efficient levels of output of local public services. In an attempt to keep tax rates low to attract business investment, local officials may hold spending below those levels for which marginal benefits equal marginal costs, particularly for those programs that do not offer direct benefit to local business (Oates, 1972, p.143)."

The defect of Oates's (1972) seminal analysis is that his ideas on IJTC are not derived from a full theoretical model. Rather they are largely conjectural and descriptive, strengthened to certain extent by some observed tax setting behavior among state and local governments in the United States. Hence, it was not until the early 1980s, starting with Beck (1983), that public finance specialists began to develop a set of theoretical models, which are now known as "perfectly competitive capital tax competition models," that verify and extend Oates’s conjectures on IJTC. These models are devoid of the two
defective assumptions of the Tiebout-based perfectly competitive tax competition models mentioned above. They incorporate non-benefit taxes (mainly property taxes) as a tax instrument in the hands of the competing jurisdictions and account for the inter-jurisdictional externalities generated by the tax decisions of the competing jurisdictions.

**Perfectly Competitive Capital Tax Competition Models:** The fundamental idea behind these models can be summarized as follows. The economy consists of a large number of small but identical sub-national jurisdictions. Each jurisdiction is so small that it cannot influence the economy-wide net-of-tax return on capital by altering its tax levels on capital. As a result, the impact of any single jurisdiction, say $i$, on any other jurisdiction $j$'s tax rate is negligible because $i$ has a negligible share of the capital stock in the economy (Wildasin, 1988). Therefore, strategic behavior among jurisdictions is absent.

Within each jurisdiction, perfectly competitive firms produce a single private good, employing two factors of production namely capital and labor, given constant returns to scale technology. The economy's capital and labor stock are fixed in supply. Capital is perfectly mobile across jurisdictions, but labor is completely immobile between jurisdictions. All residents of each jurisdiction are identical in the sense that they own an equal share of the economy's labor and capital endowments. The assumption of perfect capital mobility implies that the residents are free to invest their capital

---

14 The jurisdictions are identical in the sense that they possess identical production technologies and contain identical amount of factor endowments and residents.

15 A perfectly competitive private market is not characterized by conscious rivalry among the producers because each producer supplies such a small part of the total market. Yet this market is certainly characterized as competitive. It is this thought process that forms the basis of perfectly competitive capital tax competition models. Accordingly, each local government faces a situation similar to the price-taking firm in a perfectly competitive market. For example, each jurisdiction may be convinced that it cannot raise taxes too high without risking out-migration of capital.

16 However, both capital and labor are perfectly mobile between private firms within any jurisdiction.
endowment in any jurisdiction of their preference. Labor immobility means that residents live and work in the same jurisdiction. The utility of a representative resident of any single jurisdiction depends on his/her consumption of the private good as well as a public good supplied by the jurisdiction’s governments. The representative consumer finances the consumption of the private good with the wage and capital income from his/her endowments of labor and capital. The jurisdictions finance public goods provision with a unit property tax on the capital employed within its borders.

The choice problem confronting a jurisdiction is to choose the unit tax rate on capital to maximize the representative resident’s utility subject to a budget constraint requiring that tax revenue equal expenditures on public goods. While doing so, the jurisdiction realizes that an increase in its tax rate on capital benefits other jurisdictions, although not greatly, by causing a flow of capital to other jurisdictions that increases their tax revenues/base. This occurs because, under the assumed fixity of the total capital stock, when a jurisdiction raises its tax rate on capital (assuming other’s rates are intact), the net-of-tax return on capital in that jurisdiction falls below that available in other jurisdictions. As a result, the capital relocates to other jurisdictions to take advantage of tax differentials now prevailing. A rise in a given jurisdiction’s tax rate thus creates a positive externality to other jurisdictions by way of raising their capital stock. It is this sort of externality, which Wildasin (1989) interprets as “fiscal externality,” that tends to result in inefficiently low levels of capital taxes and the resulting inefficiently small levels of spending on local public goods provision. Thus, from the standpoint of any single jurisdiction, it is not possible for it to raise taxes without risking out capital flight.

---

17 The public good is treated as publicly provided private good with no spillover effects. This is to avoid the possibility of under-provision of public goods due to benefit spillovers from public goods provision. Moreover, the public good is distributed uniformly among a jurisdiction’s residents.
The seminal papers that apply this framework to analyze UTC include Beck (1983), Wilson (1985&1986) and Zodrow and Mieszkowski (1986).\textsuperscript{18} The three major results arrived from these models are: competition for mobile capital leads to (i) a distortion in the allocation of capital, (ii) capital taxes that are lower than otherwise, and (iii) a lower level of public services than is optimal.

\textit{(ii) Strategic/Imperfect Tax Competition Models}

Starting from the seminal work of Mintz and Tulkens (1986), a set of theoretical models, known as "strategic tax competition models," have come up to analyze the outcome of UTC behavior in a world with only a few numbers of competing state/local jurisdictions.\textsuperscript{19} These models use the Nash non-cooperative equilibrium to explain the strategic tax-setting behavior of sub-national governments. They postulate that the number of jurisdictions engaged in tax competition is "few" enough to enable each jurisdiction to affect significantly the size of the tax base in other jurisdictions by altering its tax rate. As a result, an increase (decrease) in the tax base of other jurisdictions in response to a fall (rise) in the tax rate of any single jurisdiction is sufficiently large to influence the well being of the residents of other jurisdictions. Thus, jurisdictions in these models behave as tax rate-fixers rather than tax rate-takers. Therefore, any single jurisdiction before choosing its tax rate on a tax base take in to account the tax rates in other jurisdictions, leading to strategic tax behavior (Wildasin, 1988, 1991; De Paters and Myers, 1994). In other words, in the case of small number of large jurisdictions, the jurisdictions recognize the interdependency among them and therefore react to the actions

\textsuperscript{18} See also Oates and Schwab (1988) for another, but less general, treatment of capital tax competition of this category.
\textsuperscript{19} A good example is competition among State governments that share a common border for mobile tax bases such as "cross-border" shoppers or wealthy residents.
of others in a strategic way. Such explicit interplay of tax choices generate externality that is treated as the source of distortion in tax choices.

"Commodity Tax Competition" Models: As mentioned earlier, Mintz and Tulkens (1986) is the pioneering analysis of LTC in the context of small number of jurisdictions. Interestingly, they consider the commodity tax competition.\(^20\) Now, a few theoretical works have been developed based on the Mintz and Tulken's (1986) analysis, which have generally been called as "commodity tax competition models." Let us give a brief account of commodity tax competition model. Suppose that there are two identical jurisdictions and each jurisdiction comprises a single consumer or a fixed number of identical consumers. The consumer consumes a public good provided by the government and a private good, and supply labor. The public good is financed by levying an origin-based commodity tax on private good consumption.\(^21\) The consumer in each jurisdiction

\(^{20}\) In addition to developing a game-theoretic approach to analyze LTC, Mintz and Tulkens's (1986) model is the first one of this kind that incorporates resident/individual mobility in the tax competition analysis, an aspect that the capital tax competition models fail to take into account. Since in the real world citizens of a region normally show a tendency to move/migrate across regions for various purposes such as inhabiting, employment and shopping, it is appropriate to incorporate such elements into the tax competition analysis and examine the effects. See McGuire (1991) for another important analysis of individual mobility, where jurisdictions compete to attract "wealthy residents" by offering varying tax-expenditure bundles.

\(^{21}\) Under origin-based (or source-based) commodity taxes, governments impose taxes on goods purchased/sold within (though not necessarily consumed within) its boundary. As such, assuming free mobility of individuals across states, the residents of a state can avoid the higher tax burden on any good by purchasing it in the other low-tax states. Therefore, the tax competition arises from the ability of any state to attract consumers from other states by altering its tax rate. Against this, destination-based (or resident-based) commodity taxes involve taxing goods where they are consumed (though not necessarily purchased within the geographical boundary of a state). In other words, destination-based commodity taxes allow governments to collect taxes on all of their residents' goods consumption. This could be done through the use of border adjustment, under which the tax is collected from domestic firms, but a tax rebate is given for exports of these goods to other states and a tax is collected on imports (i.e. cross-border purchases). Under such circumstances, residents of a state cannot avoid the tax burden by resorting cross-border purchases, which could effectively prevent tax competition problem. However, such border adjustments are administratively difficult to enforce, as it requires costly, and sometimes even impossible to monitoring by governments of

28
can purchase the private good either in his/her own jurisdiction or in the other jurisdiction after incurring necessary transportation costs and local tax. If tax rate differences are sufficiently large enough to overcome transportation costs etc., the residents living in a high tax jurisdiction will find it lucrative to purchase the commodity from a low tax jurisdiction by way of cross-border shopping.

The objective of any jurisdiction here is to choose its optimal commodity tax rate on the private good consumption and quantity of public good so as to maximize the utility of its representative resident subject to balancing a budget constraint, which requires that tax revenues equal public good expenditures. Mintz and Tulkens (1986) characterize the equilibrium outcome of this optimization problem in terms of Nash equilibrium (NE) of a non-cooperative game with two jurisdictions as “players,” and the commodity tax rates as “strategies.” The payoffs are the welfare of their representative residents. Accordingly, the NE is arrived when each jurisdiction chooses its tax rate optimally given the tax rate of other jurisdiction and letting expenditure levels adjust to satisfy government budget constraint. Thus the model shows that the consumption in each jurisdiction depends on the tax rate in that region and that of the other competing region.

Mintz and Tulkens (1986) also demonstrate that the optimal rate of any single jurisdiction under NE of a non-cooperative game, which they call as ‘non-cooperative fiscal equilibrium’ (NCFE) is inefficiently low. This is because an increase in one jurisdiction’s commodity tax rate creates a beneficial externality to other jurisdictions.

---

22 For an application of Nash Equilibrium concept to examine equilibrium level of public good provision by sub-national governments, see Williams (1966), Pauly (1976), Boskin (1973) and Broadway et al. (1989).
through an increase in the consumption of private good there. Possibility of such tax base
outflow stimulates strategic tax setting behavior among the jurisdictions.\textsuperscript{23}

\textbf{Strategic Capital Tax Competition Models:} Following Mintz and Tulkens (1986),
Wildasin (1988) has developed the strategic capital tax competition. Employing a simple
model of tax competition between small numbers of jurisdictions that levy a tax on
mobile capital, he describes the Nash equilibrium.\textsuperscript{24} He also shows that such equilibrium
leads to inefficiently low level of taxes on capital and under-provision of public goods.
The reason is that when a jurisdiction increases its capital taxation it decreases the net-of-
tax price of capital. In this way a jurisdiction affects the well being of the residents of
other jurisdictions through the price of capital but does not account for these external
effects in its decision-making. De Pater and Mayers (1994) describes such external
effects in terms of "pecuniary externality." For extensions of capital tax competition
models under strategic case, see Hoyt (1991) and De Pater and Mayers (1994).

\textbf{Asymmetric Capital Tax Competition Models:} The models discussed above are labeled
as "asymmetric tax competition" models as they consider identical jurisdictions.
Bucovetsky (1991) was the first to consider two non-identical jurisdictions: a "large"

\textsuperscript{23} Mintz and Tulkens (1986) show that the equilibrium tax rates in the competing
jurisdictions under NCPRE are Pareto inefficient, due to two externalities: (i) a beneficial "public consumption effect," which occurs when a rise in a
jurisdiction's tax rate increases the amount of shopping made by its residents
in the other (low-tax) jurisdiction, thereby increasing the latter's tax base, and (ii) a detrimental "private consumption effect," which occurs when an
increase in a jurisdiction's tax rate affects private good purchases of the
other jurisdiction's residents in that jurisdiction due to tax-induced rise in
the price of private good there. However, there may exist situations where a
NCPRE is efficient. According to Mintz and Tulkens (1986) this occurs when
transport costs are so high that no cross-border shopping occurs, either in
equilibrium or in response to small tax changes. For elaborations on and
extensions of Mintz and Tulkens's (1986) model see de Crombrugghe and Tulkens
(1990), Kanbur and Keen (1993), Haufler (1998), Lockwood (2001) and Nielsen

\textsuperscript{24} The basic structure of the Wildasin's (1988) model is the same as the
perfectly competitive capital tax competition models discussed above with the
difference lying only in the number of competing jurisdictions.
jurisdiction and a "small" jurisdiction differentiated by their (population) size. Considering a standard capital tax competition model with capital mobility and labor immobility across jurisdictions he shows that the Nash equilibrium outcome would place the residents of small jurisdiction "strictly better off" than those residing in larger one. Two factors attributed this result: (i) the capital inflows into the large jurisdiction are less responsive to tax reductions by it. The intuition is that as the other jurisdiction is small a reduction in tax rate by large jurisdiction results only a small outflow of capital from the small jurisdiction to the large jurisdiction, and (ii) any unilateral increase in tax rates on capital involves certain costs in the form of erosion of tax base and such costs are perceived to be less for large jurisdiction than for small jurisdiction. This is because each unilateral tax increase in the large jurisdiction loses it less capital per capita.

These considerations suggest that the large jurisdiction has only less incentive to compete vigorously for capital through tax rate reductions and therefore in equilibrium ends up with higher tax rate on capital. As a result, the large jurisdiction confers a positive externality on the small jurisdiction. That is, higher tax rates in large jurisdiction increase the capital supply to small jurisdiction. This externality implies that, in equilibrium, the residents of the small jurisdiction are better off than their counterparts in the large jurisdiction. In other words, at equilibrium, one region benefits at the cost of the other.

Asymmetric Commodity Tax Competition Models: Following Bucovetsky (1991), a number of studies analyze how differences in population size of neighboring jurisdictions affect equilibrium commodity taxes in the presence of cross-border shopping. The first study on the topic is Kanbur and Keen (1993). Using a model of spatial competition they
show that unequal population densities of two adjoining countries produce a particular pattern of equilibrium taxes: a sparsely-populated nation has an incentive, ceteris paribus, to impose commodity taxes that are lower than those imposed by an adjoining densely-populated nation. However, their analysis has certain weaknesses. In their model the governments care only about maximizing tax revenues. They assume that firms producing a private good in the economy operate under a perfectly competitive market conditions. The implication of this is that consumer price always equals marginal cost. Finally, their analysis deals only with commodity tax competition between two countries. This raises the question of what would be the impact of size difference on equilibrium commodity taxes when two sub-national jurisdictions within a federation compete for cross-border shoppers.

Trandel (1994) extends Kanbur–Keen analysis in three ways: (a) considering competition among adjoining states within a federation with different population sizes, (b) incorporating the possibility that firms possess market power, and (c) including the possibility that governments maximize resident welfare rather than tax revenue. In Trandel's (1994) model, consumers are distributed non-uniformly between two adjoining states. Each state has a firm that produces an identical private good. No additional firms can enter the market and no existing firm can relocate. Each state imposes a per unit origin-based retail tax on the sale of the private good, and the firm charges a tax inclusive price for the good. The residents in one state can shop at a firm located in the neighboring

---

11 In Kanbur and Keen (1993) model the revenue maximizing behavior of the government is not due to the Leviathan tendencies as discussed in the beginning but because citizens in their model are assumed to place a very high marginal value on a public good that is financed by tax revenue.

12 It is to be pointed out that the conditions within a federation are very different from those available in the international context. For instance, mobility within a country is relatively easier comparing mobility between countries.
state. The cost to a consumer of buying from any single firm has two components: the price charged by that firm and cost of traveling to that firm. Consumers patronize the store that offers them the most attractive purchase-price, travel-distance combination.

With this setting, Trandel explores a Nash equilibrium in tax rates under the following four varying assumptions about the behavior of state governments and firms: (i) states set taxes to maximize tax revenues and firms set prices under perfect market conditions where prices equal marginal cost; (ii) states set taxes to maximize tax revenues and firms employ market-power-derived pricing that results in prices that exceed marginal cost; (iii) states set taxes to maximize the welfare of its residents and firms employ prices equal marginal cost and (iv) states set taxes to maximize the welfare of its residents and firms charge the profit maximizing prices. Trandel's conclusion is that in all of these situations, in (Nash) equilibrium, a relatively sparsely populated state that adjoins a relatively densely populated state imposes relatively, a low commodity taxes as compared to its densely populated neighbor due to non-uniform distribution of consumers. The unequal distribution of consumers tends to reduce the number of consumers paying a tax to sparsely populated state. Increasing the number of consumers from whom it collects tax is thus particularly important to the sparsely populated state. Consequently, the sparsely populated state finds it relatively more attractive to cut its tax in equilibrium in order to gain new taxpayers or "border crossers" from large state. The

---

27 The cost of traveling is arrived by multiplying the distance the consumer travels to reach the firm and the cost of travel per unit of distance.

28 The marginal cost pricing assumption can be interpreted as the outcome of a process in which free entry within each state has driven profit to zero.
tax cut leads the firm located within the sparsely populated state to reduce its price, thus increasing the number of consumers from whom the state collects a tax.\footnote{However, Nielsen (2002) points to a case whereby cross border shopping runs from a small region to a large region. This occurs when the marginal cost of public funds in the small region exceeds that in the large region by a sufficient amount. Higher marginal cost requires the government in the smaller region to fix higher commodity taxes that may induce cross-border shopping from the small to large region. Greater marginal costs of public funds may arise either from citizens in the smaller region valuing public goods more than citizens in larger region, or from other available taxes being more distortionary in the small region.}

Trandel also shows that equilibrium taxes are higher when firms are assumed to set prices (or possess market power) and states are tax revenue maximizers than they face the condition that price equals marginal cost. The reason is that price-setting behavior of firms lessens the impact that a tax increase has on final consumer prices. As a result, a revenue maximizing state can increase its tax without losing as many taxpayers as it would under marginal-cost pricing. With the negative effect of a tax increase thus reduced, the equilibrium state taxes can raise.

However, when states strive for maximizing the welfare of its residents, the market power of firms has little effect on the average tax level. Rather, it increases the gap between the welfare-maximizing taxes imposed by two states. That is, the tax imposed by densely populated state rises and that imposed by sparsely populated state falls. The intuition is that the price-setting behavior by firms reduces the extent to which a tax increase is passed on to consumers, and therefore lessens the effect of given tax change on consumer behavior. With the negative effect of a tax increase thus reduced, welfaristic states respond by accentuating the difference between their taxes.

In addition, he finds that (a) when state governments are revenue maximizers the equilibrium tax rates in both states increase as the cost of travel increases. The reason is that a rise in cost of travel per unit of distance strengthens the power that states possess
over consumers, so that the equilibrium revenue maximizing tax levels rise, (b) the gap
to Nash equilibrium tax rates rises between the states as the cost of travel rises.
This occurs because a rise in travel cost, ceteris paribus, increases the likelihood that any
consumer shops at the store located nearest him. A rise in travel cost per unit of distance
therefore effectively increases the importance of the differentiation between the states,
and thus increases the difference between their taxes, (c) As the population densities of
the states become more unequal then the incentive facing the states in setting the tax rates
becomes more unequal. Consequently, the difference between the equilibrium taxes
increases.

**Other Models:** Various other models, which are basically variants of either the perfectly
competitive or strategic models, are available in the literature. Models developed in
Wilson (1995), Braid (1996) and Brueckner (2000) consider a simultaneous movement of
capital and residents/labor across jurisdictions as against previous models, which
consider either capital or resident mobility. The results emerged from these models are
similar to that of the earlier models if only capital is taxed.

Moreover, the capital tax competition models discussed so far deal with
competition among sub national governments for mobile capital investments that may be
made in small increments. But in practice most often these governments compete to win
over projects with huge investments. This type of competition is termed as “bidding for
firms.” Models dealing with this competition differ from earlier models in two ways.
First, they conjecture that governments compete for large investments through offering
firm-specific tax incentives (e.g., tax holidays, tax credits, investment subsidies) rather
than across-the-board incentives. Second, the central policy issue concerning this strand
of literature is no longer the effect of tax competition on the efficient provision of public goods, but is the question of efficiency of such tax incentives in terms of promoting efficient firm location decisions. Major contributions dealing with modeling this type of tax competition include Black and Hoyt (1989), by King et al. (1993) and Biglaiser and Mezzetti (1997).

To sum up, in almost all above economic models of IJTC, the equilibrium in the presence of tax competition is not efficient: tax levels are low and the public output is under-provided. Jurisdictions levy a tax on mobile economic resource (tax base) within their boundaries. Since policymakers in each jurisdiction regard their tax base as responding to tax rates in a somewhat elastic manner, they hold down taxes to such an extent that public goods will be provided at sub-optimal levels. In asymmetric tax competition models also the equilibrium is inefficient although the welfare of residents of the small jurisdiction is better off than those in large jurisdiction.

2.5. Empirical Studies Related to IJTC

Numerous empirical studies have emerged to test the implications of the theoretical models of IJTC, including the effects of tax competition on tax rates and revenues. Although most of them are concerned with state and local governments in the United States, a few studies analyze the issue in other countries. Based on their objectives, the existing empirical studies on IJTC can broadly be grouped as: (i) studies measuring the extent of tax rate differentials and relating those differentials to tax

---

30 These models deal with two major issues. First, they examine the case when the governments do not possess complete information about the investment decisions of firms. Second, these models examine the case when firms possess market power. These two aspects are ignored in the models of Fischel (1975), White (1975), and Gates and Schwab (1991), where it was assumed that governments possess complete information about firms' investment decisions and firms have no market power.

31 The only exception is the Tiebout-oriented perfectly competitive capital tax competition models.
competition, (ii) studies testing the existence/presence of tax competition, (iii) studies examining the effect of rate differentials on tax bases/revenues, and (iv) studies examining the impact of state-local taxes/incentives on firm/investment location and economic growth. In the following sections, we review major works belong to first three categories, as the fourth category is not relevant to the study.

(i) Studies on the Effect of Competition on Tax Differentials

It was only after Case et al. (1993) that the sound empirical works have emerged to analyze the competitive policy setting behavior of governments. However, the early empirical studies have verified the presence/absence of IJTC indirectly using various measures of tax rate differentials among sub-national governments. Dispersion measures such as range or standard deviation (SD) or coefficient of variation (CV) in the tax rates are used to quantify the rate differentials. Accordingly, evidence of smaller tax differential at a point of time or a narrowing of the tax differentials over a period of time is considered as a proof of the presence of tax competition. The intuition is that in the presence of tax competition, jurisdictions in their attempt to prevent tax-engendered losses of mobile tax bases to other competing jurisdictions prefer to follow or "mimic" the tax policies of their competitors. Therefore, tax differences among jurisdictions might be less.

One of the earliest attempts on these lines was by Wheaton (1983) who computed the SD in the effective aggregate business tax rate for U.S. states in 1977. He found a quite a bit of variability in the rates. ACIR (1976) computed the SD in the corporate income tax rate for U.S. states in 1976 and found larger variations in the tax rates. Feenberg and Rosen (1985) computed the SD in the combined average income and sales
tax rate at $20,000 of income for U.S. states for the year 1983 and showed a small variability in the rates. McGuire (1986) concludes after reviewing these studies, "states do not appear to have incorporated the general structure and burden levels of the income, sales and property taxes into their economic development strategies. If they had we would expect that such [tax] competition would have greatly narrowed the differentials (p.373)." A major criticism leveled against these studies is that they consider the tax competition as a static concept (i.e., they consider rate differentials in a particular year). However, tax competition is a dynamic process where strategic actions provoke counteractions.

Therefore, Fisher (1991) looks at the CV among U.S. state governments in the per capita state own-source revenues and per capita taxes in four different time periods (1971, 1975, 1980 and 1986) to see whether tax competition has increased overtime. He finds a widening inter-state variation both in per capita own-source revenues and per capita taxes over time. Based on this, he concludes, "in a period when it is perceived that there was an increasing amount of interstate economic and fiscal competition, the differences among states in revenues ....... have not narrowed (p.265)." Fisher and Navin (1992) also examine the inter-state differences in the effective tax rates at 5-year intervals between 1962 and 1987 for the U.S. state governments using CV measure. They find that the CV increased from 12% in 1962 to 17% in 1987. Therefore, they conclude that "the increase in relative differences [CV] is not consistent with any of the [tax]

---

32 Specifically, the CV in the per capita own source revenue increased from 23% in 1971 to 61% in 1986 and in case of per capital taxes the same has increased from 21% to 36% during the same period.

33 The effective tax rate is defined as the ratio of state own-source revenue to state personal income.
mimicking theories (p.446)." Instead they attribute the results to the Tiebout (1956) view that states and localities respond to changes in demand for public services.34

Vaillancourt (1992a) analyzes the degree of "tax harmonisation" among the state governments in Canada and the United States for two years 1976 and 1986, using CVs in statutory and effective rates of personal income tax, corporate income tax and retail sales tax, and in effective rates of property and total taxes.35 In the case of statutory rates, he finds that in U.S., the rates of personal income tax, retail sales tax converged while the rate of corporate income tax diverged between 1976 and 1986. In Canada, the statutory rates of personal income tax converged and corporate income tax and retail sales tax diverged during the same period. However, all effective rates in U.S. converged. But in Canada, all effective rates except retail sales tax converged.

Vaillancourt (1992b)37 also analyzes the degree of tax harmonization between six Australian states for the years 1977-78 and 1987-88, using CV in payroll taxes, land taxes and municipal rates, stamp duties, tobacco products franchise fee and total taxes. He considers the statutory as well as effective rates (calculated as the ratio of tax revenues over a revenue base).38 In case of statutory rates, payroll taxes, land taxes and stamp duties diverged but franchise fees converged over the years. As regards effective rates,

34 The Tiebout (1956) view of competition suggests that sub-national governments will offer different levels or mixes of taxes and services in order to attract the optimal population for each jurisdiction. If tastes, incomes, or unit production costs differ geographically, then fiscal differences arise naturally and represent an equilibrium in the sense that different demands are being satisfied. A narrowing of fiscal differences would be expected if demand or production cost difference were reduced (Fisher and Navin, 1992).
35 Degree of tax harmonization represents nothing but the extent of tax differentials.
36 Vaillancourt (1992a) does not motivate his study in terms of tax competition. His analysis is aimed only at quantifying the extent of tax differentials among States and therefore cannot be interpreted in terms of evidence for or against tax competition.
37 Like Vaillancourt (1992a), this paper also motivates the analysis as a study of degree of dispersion among States rather than tax competition.
38 However, for total taxes only effective rates were considered.
payroll taxes, land taxes, stamp duties and tobacco franchise fees diverged and total taxes converged between 1977-78 and 1987-88.

These studies are criticized for the fact that the particular time intervals chosen may obscure dynamics in intervening periods. A few studies try to avoid this limitation by analyzing a time series of dispersion measures of tax levels that captures a complete sequence of policy moves. One such study is by Rao and Vaillancourt (1994) who estimate the degree of tax disharmony between 14 major Indian states over 1975-76 to 1990-91. They compute the CV in the percentage of tax revenues to Net State Domestic Product/State income (effective tax rates) in respect of four major taxes namely sales tax, state excise duty, tax on motor vehicles, passengers and goods, and stamps & registration fees as well as total tax revenue.\(^\text{39}\) They show a steadily increasing trend in the degree of inter-state tax disharmony in respect of total taxes over the years. The CV in aggregate state tax revenue-State income ratios increased from 19% in 1975-76 to 23% in 1980-81 and then to 26% in 1990-91. The major source of this increase in CV lies in the steadily increasing degree of tax disharmony in the effective rate of sales taxes and to some extent, taxes on motor vehicles and goods and passengers. The CV in the effective sales tax rates increased from 25% in 1975-76 to 28% in 1980-81 and then to 34% in 1990-91. In case of effective rates in respect of taxes on motor vehicles and goods and passengers the CV increased from 34% in 1975-76 to 38% in 1980-81 and then decreased slightly to

\(^{39}\) In addition to this main exercise, Rao and Vaillancourt (1994) also compute CV in the statutory tax rates in the 14 major states in respect of 20 groups of commodities for a single year, 1991. The CV in the statutory rates of these commodities show a high degree of both inter-commodity variations in the tax rates within each of the states as well as inter-State variation in the tax rates for each of the commodity groups.
36% in 1990-91.  

In sharp contrast to the traditional method, Rao and Vaillancourt (1994) attribute their findings of widening inter-state disharmony in the effective sales tax rates to acute inter-state sales tax competition.

However, there are two major defects in identifying tax competition with tax differentials or convergence of tax levels. First, tax differentials among sub-national jurisdictions could emerge not only due to competition but also due to historical, economic, social and political factors (internal and external) in each jurisdiction. For instance, changes in income, population, domestic political situation (internal factors), amounts of grant-in-aid from federal government, and national economic condition (external factors) may all contribute to the differences in the tax levels among jurisdictions. Moreover, the varying levels of demand for public goods and the cost of supplying them among jurisdictions may also contribute to differing tax prices across jurisdictions. Under such circumstances the inability to separate out tax competition effect of tax differentials from that of others cast shadow over the conclusion about tax competition arrived by studies measuring tax differentials. Second, tax competition is a phenomenon involving response by a jurisdiction to changes in the tax levels in other jurisdictions. The flipside is that the absence of such response implies jurisdictions’ are making their tax choices independent of the choices of others and hence there is no possibility of competitive tax setting behavior among jurisdictions. Thus, inter-jurisdictional tax choices are interdependent in the presence of tax competition. Such

---

40 The CV in effective tax rates of stamp duty remained more or less at the same level between 1975-76 and 1990-91 while that of state excise duty declined from 67% to 56% during the same period.
41 Specifically their claim is that although in many countries tax competition has resulted in convergence in the tax rates and has thus reduced tax disharmony, in India “tax competition indulged by the States . . . has tended to create a divergence in the effective tax rates and thus, has enhanced the degree of tax disharmony (pp.16).” In the absence of other supportive evidence this conclusion has to be treated with caution.
interdependency never enters into the analysis of tax competition based on dispersion measures. Therefore, only an econometric specification is needed to capture such interdependencies.

(ii) Studies Testing the Presence of Tax Interdependence

Case et al. (1993) was the first to provide econometric methodology to test the presence of policy interaction/interdependence among sub-national governments. Although their methodology investigate interdependence in the determination of spending by state governments, their framework is relevant to test the existence of tax competition. They specify the expenditure reaction function that relates the expenditure of a given state to a weighted average of spending levels in competing states. The coefficient associated with weighted average of expenditure levels in competing states measures the degree of interdependence/interaction among states in expenditure levels.

Case et al. (1993) examine the extent to which states in the United States are interdependent in making their spending decisions for the period 1970-1985. The socioeconomic characteristics, among others, included in the expenditure reaction equation are population density, per capita state income, per capita grants from federal government and proportion of black population. They estimate the expenditure equation using Maximum Likelihood method in order to resolve econometric issues such as endogeneity and spatial error dependence. They find that the expenditure levels of its neighbors positively and significantly affect a state’s level of expenditure.

42 In fact, Case et al. (1993) use the term “neighbors” to refer states with which a given state competes/interacts while choosing its expenditure variable. Their neighbor concept does not necessarily refer to geographic proximity. They refer to “similarly situated states” as neighbors, whether they are in geographic proximity or not. Thus, in their formulation neighbors may be selected on the basis of geographical proximity, similarity in income, racial composition, or any other dimension. As this is confusing, we employ a more general term namely competitors, under which neighbors means only geographical neighbors.
Following Case et al. (1993), a number of studies such as Case (1993), Ladd (1992), Besley and Case (1995), Heyndels and Vuchelen (1998), Revelli (2001), Brett and Pinkse (2000), Brueckner and Saavedra (2001) and Hayashi and Boadway (2001) examine the existence of tax policy interactions among sub-national governments. The central policy issue addressed in these studies is whether sub-national governments take into account the tax rates/levels of other jurisdictions when making their own tax decisions. Although they use a similar empirical specification, the theoretical underpinnings of these studies differ fundamentally. Particularly, they motivate their empirical analysis under different assumptions about the possible sources of tax interaction. Some studies use the “yardstick competition” phenomenon and others use “tax competition” framework. What is lacking, however, in these two sets of empirical literature is a concrete proof of their claim that the interaction is due to yardstick competition or tax competition. But they provide evidence favoring/disfavoring tax interaction among sub-national governments with the premise that interaction may be due either to “voice” mechanism or to “exit” mechanism. Moreover, whereas the studies based on yardstick competition framework employ terms such as “tax copycatting,” “tax mimicking” and “tax mimicry” to describe tax interaction, studies using the tax competition framework interpret the interactive tax behavior as “strategic tax competition,” and “strategic interaction” among competing jurisdictions.

Table 2.1 summarizes the major studies examining tax policy interdependence among sub-national governments using both the aforementioned frameworks. Most of the

---

43 Exceptions include Besley and Case (1995) who estimate an auxiliary equation that relates voter approval of an incumbent to taxes in neighboring jurisdictions (expecting a positive coefficient) under yardstick competition framework, and Brett and Pinkse (2000) who use tax competition framework to estimate an equation relating a jurisdiction’s tax base to its tax rate (expecting a negative sign).
<table>
<thead>
<tr>
<th>Study and Year</th>
<th>Tax</th>
<th>Government Type and Study Period</th>
<th>Tax Interaction Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ladd (1992)</td>
<td>Total, property, residential property, general sales and &quot;other&quot; tax burdens</td>
<td>Counties in the USA, 1978 &amp; 1985</td>
<td>Positive &amp; Significant for total, property, residential property tax burdens and positive &amp; insignificant for general sales and &quot;other&quot; tax burdens</td>
</tr>
<tr>
<td>Case (1993)</td>
<td>Income tax burden</td>
<td>State governments in the USA</td>
<td>Positive and Significant</td>
</tr>
<tr>
<td>Heyndels and Vuchelen (1998)</td>
<td>Local income and property taxes</td>
<td>Municipalities in Belgium, 1991</td>
<td>Positive and Significant (for both taxes)</td>
</tr>
</tbody>
</table>

** Tax Competition Framework

<table>
<thead>
<tr>
<th>Study and Year</th>
<th>Tax</th>
<th>Government Type and Study Period</th>
<th>Tax Interaction Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brueckner and Saavedra (2001)</td>
<td>Property taxes</td>
<td>Cities in the Boston metropolitan area in USA, 1980 &amp; 1990</td>
<td>Positive and Significant</td>
</tr>
<tr>
<td>Hayashi and Broadway (2001)*</td>
<td>Corporate income taxes</td>
<td>Provinicial governments in Canada, 1963-1996</td>
<td>Positive and Significant</td>
</tr>
</tbody>
</table>

Notes: * Hayashi & Broadway (2001) also analyze interaction between federal and provincial governments. ** Revelli (2001) also tests for vertical interaction between country and district levels of governments.

Studies concern with state and local governments in the USA with few concerning other countries. None of the studies examine the issue from the perspective of a developing country. Further, no study has analyzed tax interaction in the sphere of commodity taxes using the tax competition framework. However, two studies (Ladd, 1992; Besley and Case, 1995) dealt with sales taxes under the yardstick competition framework. But they use tax burden measures rather than statutory tax rates. Interestingly, in all studies, the tax interaction parameter is positive and statistically significant, implying that tax choices are interdependent.
Studies on the Impact of Rate Differentials on Tax Base/Revenue

One of the major consequences of tax competition is its adverse effect on tax base/revenues of competing jurisdictions. As we know that the fear that higher tax rates on mobile tax bases would result in migration of tax bases to other jurisdictions to take advantage of the implied tax differentials would induce sub-national jurisdictions to fix inefficiently low level of taxes on such bases. Thus, the basic empirical question is: would the tax rate differential among jurisdictions cause migration of the tax base from higher tax jurisdictions to lower ones? If so, what impact has it on the tax base of the jurisdictions? Several empirical studies have investigated these questions in the context of sales tax, in which case tax base migration would take the form of cross-border flow of trade/consumption from high to low tax jurisdictions.

The earliest attempt to assess the impact of sales tax rate tax differentials on sales tax base was by McAllister (1961). He attempted to determine if the retail sales tax imposed in the state of Washington in the U.S. tends to cause persons in the Washington border cities of Pullman, Vancouver, and Walla Walla to trade across the border in, respectively, Moscow, Idaho; Portland, Oregon; and Milton-Freewater, Oregon. He examined sales distortion by pairing each Washington border city with a similar control city that has no adjacent lower-tax area. He conducted a random sample of residents in each pair of cities to determine shopping behavior patterns for several commodity groups. The Washington border residents included in the survey overwhelmingly reported that tax avoidance was a logical reason for shopping outside the state. From this he concluded that "... it difficult to escape the conclusion that a desire to gain a price
advantage by not paying Washington’s retail sales tax is one important reason why border residents will shop in non-tax states (p.374)."

A major defect of McAllister’s (1961) analysis is that they do not provide an estimate of the quantitative significance of sales loss due to sales tax rate differentials when other influences are taken into account. Harnovitch (1966) attempts to rectify this defect using a regression approach while analyzing the effect of the New York City sales tax rate on taxable City sales over the period 1948-1964. He regresses the change in the sales tax base/taxable City sales on changes in City disposable income and changes in the City sales tax rate. His analysis indicate that each increase in the City tax rate of one percentage point resulted in a decrease of about 6% in the City sales tax base. However, his analysis, is most relevant for those concerned with the impact of a jurisdiction’s own rate changes on its tax base. It does not consider the impact of tax rate changes made outside the New York City. If the tax base loss he discovers results from switching between taxed and untaxed commodities within the New York City, the results may be excess burden and misallocation of resources, but not necessarily a loss of tax base to other Cities.

Mikesell (1970) takes note of this defect and considers, among others, the influence of tax rate differentials between jurisdictions on a single jurisdiction’s tax base. While examining retail sales loss due to sales tax differentials among 173 central Cities in Standard Metropolitan Statistical Areas (SMSAs) in the U.S. for 1973 he regressed per capita City sales on per capita City income, the ratio of City to SMSA population, City area, and a sales tax rate differential variable (T). The tax differential variable captures

44 The tax base is constructed by multiplying sales tax collections by the reciprocal of the prevailing sales tax rate.
the effect of a sales tax rate differential between a City and its suburbs on per capita City sales. It is defined as \( T = 1 + t_c / 1 + t_s \), where \( t_c \) is the City sales tax rate and \( t_s \) is the suburban sales tax rate. Mikesell finds that a change of 1% in the tax differential variable results in a decrease in per capita City sales of about 6% to 7%. This "indicates a substantially lower level of per capita city retail sales in cities with an unfavorable sales tax differential than in cities facing no such differential (p. 213) (Mikesell, 1970)."

Mikesell (1971) examines whether per capita sales are lower in border counties of Illinois state in the U.S. than in non-border counties for the year 1963. He fitted a regression equation in which the dependent variable is the per capita total sales of the Illinois counties and the independent variables set includes, among other, a dummy variable that takes a value of one if a county is located in the border areas of the Illinois State and zero if otherwise. Mikesell (1971) finds a negative and statistically significant border dummy coefficient in the total sales, sales tax revenue, and shopping goods store sales regressions indicating that unfavorable rate differential does induce migration of sales to low-tax countries across broader. However the coefficient is not significant both in convenience goods store sales and the auto dealer sales equations. On the basis of the results, Mikesell (1971) concludes that "border location and, by inference, the sales tax rate differential appears to be both significant and important in the determination of per capita sales ...... suggesting that border residents may shop outside the state and consumers across the border are less willing to shop in the higher area (p.28)."

Fisher (1980), attempts to estimate the effect of sales tax rate differences between the District of Columbia (D.C.) metropolitan area and the surrounding Maryland and Virginia suburbs in the U.S. on sales tax revenues of the D.C over the years 1962-76. The
estimable form of his model relates the sales tax revenue of the D.C from a single commodity to its disposable personal income, its sales tax rate on that commodity, a sales tax rate differential variable similar to one used in Mikesell (1970) that captures the influence of tax differential between D.C. and its surrounding suburbs. The empirical results show a negative and statistically significant coefficient on the tax rate differential variable in the food sales revenue equation but not in the total sales tax and apparel revenue equations. Fisher's (1980) overall conclusion is that "[w]hile there is evidence that the tax rate difference on food does cause a revenue loss to the District, there is no strong evidence that tax rate differences on other commodities cause consumers to change the location of their purchases (p.185)."

Fox (1986) uses a different empirical specification to examine the effect of adverse tax differentials on the location of retail sales and employment in three metropolitan areas namely Chattanooga (C), Clarksville/Hopkinsville (CH), and Tri Cities (TC) located along the border of Tennessee State in the U.S. He extends the empirical specification used in the previous analysis of sales tax differentials in several ways. First, he considers the effect of tax differentials on both retail sales and employment along State borders. Second, his model is structured to examine relative demand as opposed to levels of demand by analyzing sales and employment on both sides of the State border. Previous works have considered economic activity on only one side. Finally, the effects of selective sales, property and state income taxes are also included in his model. The empirical implementation of these changes involve regressing the ratio of retail sales/employment of a metropolitan area (say i) in Tennessee State to the retail sales/employment of appropriate metropolitan area from other States (say j) on the ratios
of a set of control variables (per capita income and population) of \( i \) to the control variables of \( j \), the ratios of general and selective sales tax rates\(^45\) of \( i \) to those of \( j \), and property and state income tax rates of \( i \).\(^46\) The model is estimated for four separate data sets, two each for retail sales and employment. One sales data series is the annual sales tax base from 1965 to 1982.\(^47\) A second sales data series is taxable sales base by quarter from 1974.3 through 1982.4. These sales are disaggregated into four subcategories namely food purchased for consumption-at-home, food purchased from eating and drinking places, apparel, and furniture. The employment data are annual retail trade employment and annual non-farm private wage and salary employment for 1967 through 1982. The results of the estimates for annual sales tax base produce a negative and statistically significant coefficient on sales tax rate differential variable for CH and TC metropolitan areas, implying that increases in the Tennessee sales tax rate lead to statistically significant reductions in the Tennessee county’s share of the region’s total taxable sales.\(^48\) As regards the disaggregated sales data the results show a negative and statistically significant sales tax differential variable for furniture, food at home and apparel in case of TC, and for food at home and food away from home in case of CH.

\(^45\) The selective sales taxes considered in the analysis are tobacco tax and alcohol tax.

\(^46\) Symbolically, the generic estimable equation of Fox (1986) is of the form

\[
Q_i/Q_j = (Y_i/Y_j)^a(N_i/N_j)^b[\sum_{s=1}^{n_2}(1+t_i^s)/(1+t_j^s)]^c(l_i)^d(P_i)^e,
\]

where \( i \) and \( j \) are the two municipalities, \( a, b, c, d \) and \( e \) are the relevant coefficients, \( Q \) is the retail sales or retail employment, \( Y \) is the per capita income, \( N \) is the population, \( (1+t_i^s)/(1+t_j^s) \) is the tax rate differential variables with respect to general sales and two selective sales taxes, \( l_i \) is the state income tax rates, \( P_i \) is the property tax rates.

\(^47\) The annual sales tax base is calculated by dividing tax collection for sales which occurred in each year by the same tax rate which was effective at that time.

\(^48\) Fox (1986) does not perform the estimation using annual sales tax base data and taxable sales base data for Chattanooga due to data inadequacy. However, the retail employment effect is estimated for all the three metropolitan areas.
total employment the effect is negative and significant only for CH in former case and in case of later the effect is negative and statistically significant both in the CH and TC areas.

2.6 Concluding Remarks

This chapter has started with explaining the meaning of “tax competition” among sub-national governments. It has then reviewed two broad approaches developed in the literature to analyze the welfare implications of IJTC: public choice and economic approaches. The public choice view treats IJTC a welfare-enhancing phenomenon. On the other hand, the economic approach, in general, sees IJTC as a welfare-worsening force. The economic approach provides various models to analyze IJTC. The models differ in terms of the types (benefit or non-benefit) of taxes, types of tax bases, and size of competing jurisdictions. Of these, only the perfectly competitive tax competition models rooted in the Tiebout (1956) tradition treats IJTC as a welfare-enhancing force in a world with use of benefit taxes as well as absence of interregional externalities. All other models contend that IJTC in a system that deviates from the idealized Tiebout world, in equilibrium, would result in inefficiently low level of taxes on mobile tax bases, inefficient location of tax bases (resources) and under-provision of public goods. These results hold irrespective of the number of jurisdictions competing and whether the competition is for capital or consumption/trade.

Finally, it has reviewed the major empirical works on the topic. Only a few studies have emerged to test the implications of the theoretical models. Besides, no empirical study on the topic is practically existent in developing countries. Another major lacunae in the empirical literature is the absence of empirical studies analyzing the tax competition behavior of sub-national governments with respect to commodity taxes in developed as well as developing countries.