

Viard, Alan D.; Lirette, Ryan

Working Paper

State taxation of interstate commerce and income flows: The economics of Neutrality

AEI Economics Working Paper, No. 2014-07

Provided in Cooperation with:

American Enterprise Institute (AEI), Washington, DC

Suggested Citation: Viard, Alan D.; Lirette, Ryan (2014) : State taxation of interstate commerce and income flows: The economics of Neutrality, AEI Economics Working Paper, No. 2014-07, American Enterprise Institute (AEI), Washington, DC

This Version is available at:

<https://hdl.handle.net/10419/280519>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



AMERICAN ENTERPRISE INSTITUTE

State Taxation of Interstate Commerce and Income Flows: the Economics of Neutrality

Ryan Lirette
Goodwin Procter, LLP

Alan D. Viard
American Enterprise Institute

State Taxation of Interstate Commerce and Income Flows: The Economics of Neutrality

Ryan Lirette

Goodwin Procter LLP

Alan D. Viard

American Enterprise Institute

September 2014

Abstract

Although the U.S. Supreme Court has long held that the Commerce Clause of the U.S. Constitution prohibits state taxes that discriminate against interstate commerce, it has failed to provide a clear explanation of which taxes are discriminatory. In this paper, we provide an economic analysis that distinguishes neutral and discriminatory state taxation of interstate commerce. We show that state taxes discriminate against interstate commerce if the combined tax burden on inbound and outbound transactions exceeds the tax on intrastate transactions. The analysis reveals that current state individual income tax systems systematically discriminate against interstate commerce.

The views expressed are ours alone and do not represent those of the institutions with which we are affiliated. We have received helpful comments from Kevin Hassett and from seminar participants at the Tax Economists Forum of Washington, D.C., the Northwestern University Law School, and the American Enterprise Institute. We are solely responsible for any errors or omissions.

1. Introduction

Article I, § 8, cl. 3 of the U.S. Constitution states, “The Congress shall have Power ... To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes.” Although phrased as a grant of power to Congress, the U.S. Supreme Court has interpreted it to include a dormant aspect that restricts state authority to burden interstate commerce in the absence of congressional authorization. Throughout its history, the Court has struggled to articulate rational principles for determining which state policies, including taxes and subsidies, should be invalidated under this Dormant Commerce Clause (DCC), sometimes called the negative commerce clause. Although the Court shifted its DCC jurisprudence in 1977 to focus on real economic effects, intense criticism of the incoherence and unpredictability of DCC jurisprudence has continued.

In its 1977 *Complete Auto* decision, the Court outlined a four-pronged test, under which a state tax is consistent with the DCC if it is “applied to an activity with a substantial nexus with the taxing State, is fairly apportioned, does not discriminate against inter-state commerce, and is fairly related to the services provided by the State.”¹ This paper provides an economic interpretation of the requirement that state taxes not discriminate against interstate commerce.

The Court and commentators have repeatedly emphasized the inadequacies of the Court’s interpretation of the DCC, both before and after *Complete Auto*. In 1959, the Court referred to its DCC jurisprudence as a “quagmire” and “tangled underbrush.”² In 1977, the Court unanimously stated that its case-by-case approach to the DCC has left “much room for controversy or confusion and little in way of precise guides to the States.”³ In 1986, Chief Justice Burger

¹ *Complete Auto Transit, Inc. v. Brady*, 430 U.S. 274, 279 (1977).

² *Northwest States Portland Cement Co. v. Minnesota*, 358 U.S. 540, 457-458 (1959).

³ *Boston Stock Exchange*, 429 U.S. 318, 329 (1977).

referred to the “cloudy waters” of DCC doctrine.⁴ In 1997, three justices stated, “The negative Commerce Clause ... makes little sense and has proved virtually unworkable in application. In one fashion or another, every Member of the current Court and a goodly number of our predecessors have at least recognized these problems, if not been troubled by them.”⁵ Shaviro (1993, 56) states that “legal doctrine in the state and local tax area is shot through with uneasy juxtapositions and outright contradictions.” Zelinsky (2002, 36) complains that “the indeterminacy of the nondiscrimination principle goes beyond the incoherence of the tax/subsidy distinction to the futility in this context of the very concept of nondiscriminatory taxation.”

Fortunately, economic analysis provides a straightforward way to identify state taxes and subsidies that discriminate against interstate commerce.

2. Defining Neutrality

We define a tax or subsidy system to be neutral with respect to interstate commerce if there is a set of possible price changes that could occur in response to the tax or subsidy, such that the tax or subsidy (including the price changes) would not give sellers or buyers in either state an incentive to switch from interstate to intrastate transactions. As discussed below, the system should then be deemed to be neutral, without any demonstration that those price changes will actually occur in response to the tax or subsidy.

One might think that it would be very complicated to determine which tax and subsidy systems satisfy that property. It turns out, though, that the property can be expressed in terms of a simple nondiscrimination condition that applies to both taxes and subsidies. The

⁴ *Wadair Canada Inc. v. Florida Dept. of Revenue*, 477 U.S. 1, 17 (1986) (Burger, C.J., concurring in part and concurring in the judgment).

⁵ *Camps Newfoundland/Owatonna, Inc. v. Town of Harrison*, 520 U.S. 564, 610-611 (1997) (Thomas, J., dissenting) (joined by Rehnquist, C.J., and Scalia, J.).

nondiscrimination condition is closely related to the internal consistency test that the Supreme Court has used in some DCC cases.

As shown below, neutrality arises when each state's combined tax treatment of its inbound and outbound interstate transactions is as favorable as its tax treatment of its intrastate transactions. If each state follows that nondiscrimination condition, then neutrality prevails, even if different states set different tax rates or impose different mixes of taxes on their inbound and outbound interstate transactions. Although disparities across different states' tax systems may result in taxation of specific interstate transactions by more than one state, such "multiple taxation" is not discriminatory. Moreover, the nondiscrimination condition also applies to subsidies, with subsidy rates expressed as negative tax rates.

3. Framework for Analysis

We consider a framework with two states, A and B. There are four types of transactions, two intrastate and two interstate. One type of intrastate transaction involves a state-A buyer and state-A seller and the other type involves a state-B buyer and a state-B seller. One type of interstate transaction involves a state-A buyer and state-B seller. This is an inbound interstate transaction from the perspective of state A and an outbound interstate transaction from the perspective of state B. The other type of interstate transaction involves a state-B buyer and state-A seller, which is an inbound interstate transaction from the perspective of state B and an outbound interstate transaction from the perspective of state A.

In some cases, particularly those involving the purchase and sale of goods, inbound transactions are referred to as imports and outbound transactions are referred to as exports. We

will sometimes use those terms when discussing taxes and subsidies that apply to the purchase and sale of goods.

The framework is sufficiently general, however, to encompass a much broader array of transactions. Accordingly, we place no restrictions on what the buyers are buying and the sellers are selling. We also do not restrict whether the buyers and sellers are individuals, households, businesses, nonprofit organizations, or other entities. And, we do not restrict what it means for a buyer or seller to be “in” a particular state, so that the analysis encompasses the full variety of ways in which states may distinguish among transactions based on affiliations that the parties may have, or not have, with the state. Because the analysis treats inbound and outbound transactions symmetrically, it does not matter which party is referred to as the buyer and which is referred to as the seller.

We use t to refer to state A’s tax rates and T to refer to state B’s tax rates. It is convenient to quote the rates in tax-inclusive form, which expresses the tax as a fraction of the total price, including the tax itself. For example, consider a transaction where the buyer pays a total price of \$100, of which \$20 is sent to the government for tax and \$80 is retained by the seller. The tax rate is 20 percent on a tax-inclusive basis because the \$20 tax is 20 percent of the \$100 total price. (The tax rate would be 25 percent, if quoted in tax-exclusive form because the \$20 tax is 25 percent of the \$80 net-of-tax price.) The substantive results are unaffected by how the tax rates are quoted.

As a preliminary matter, intrastate transactions can be taxed by only the state in which they occur. State A cannot tax state B’s intrastate transactions and state B cannot tax state A’s intrastate transactions due to lack of nexus. Let t_{AA} be the tax rate that state A imposes on its intrastate transactions and T_{BB} be the tax rate that state B imposes on its intrastate transactions.

Each of the two categories of interstate transactions can be taxed by both states. Let T_{AB} be the tax rate that state B imposes on interstate transactions featuring a state-A buyer and a state-B seller and let t_{AB} be the tax rate that state A imposes on those same transactions. Similarly, let t_{BA} be the tax rate that state A imposes on interstate transactions featuring a state-B buyer and a state-A seller and let T_{BA} be the tax rate that state B imposes on those same transactions.

4. Deriving the Nondiscrimination Conditions

To determine the effects of taxes on interstate commerce, it is necessary to allow for price changes that may occur as buyers and sellers respond to the taxes. For a tax system to be neutral, the tax system, including the price changes resulting from it, should not impair the incentives to engage in interstate commerce that buyers and sellers would have in the absence of taxes.

Let P_{AA} be the price (including all taxes) that buyers pay in state A's intrastate transactions with the two states' tax systems in place, expressed as a ratio of the price that they would pay if there were no taxes. Let P_{BB} be the corresponding ratio of the price that buyers pay in state B's intrastate transactions, P_{AB} be the corresponding ratio for the price that state-A residents pay on purchases from state-B residents, and P_{BA} be the corresponding ratio for the price that state-B residents pay on purchases from state-A residents.

For the two systems to avoid creating an incentive for anyone to switch from interstate to intrastate transactions, four conditions must hold, two pertaining to buyers and two pertaining to sellers.

First, the tax systems must not give state-A buyers an incentive to make intrastate purchases from other state-A residents rather than interstate purchases from state-B residents. So,

the price that state-A buyers pay for interstate purchases must rise by no more than the price they pay for intrastate purchases,

$$(1) \quad P_{AB} \leq P_{AA}.$$

Second, the tax systems must not give state-B buyers an incentive to make intrastate purchases from other state-B residents rather than interstate purchases from state-A residents. So, the price that State-B buyers pay for interstate purchases must rise by no more than the price they pay for intrastate purchases,

$$(2) \quad P_{BA} \leq P_{BB}.$$

Third, the tax systems must not give state-A sellers an incentive to make intrastate sales to other state-A residents rather than interstate sales to state-B residents. So, the after-tax payoff that state-A sellers receive from interstate sales must fall by no more than their after-tax payoff from intrastate sales,

$$(3) \quad P_{BA} (1 - T_{BA})(1 - t_{BA}) \geq P_{AA} (1 - t_{AA}).$$

Fourth, the tax systems must not give state-B sellers an incentive to make intrastate sales to other state-B residents rather than interstate sales to state-A residents. So, the after-tax payoff that state-B sellers receive from interstate sales must fall by no more than their after-tax payoff from intrastate sales,

$$(4) \quad P_{AB} (1 - t_{AB})(1 - T_{AB}) \geq P_{BB} (1 - T_{BB}).$$

We now solve for the sets of tax rates for which possible prices exist that meet all four conditions.

Begin by using inequality (2) to rewrite inequality (3) as $P_{BB} (1 - T_{BA})(1 - t_{BA}) \geq P_{AA} (1 - t_{AA})$, which implies $P_{BB} \geq P_{AA} \frac{1 - t_{AA}}{(1 - T_{BA})(1 - t_{BA})}$. Similarly, use inequality (1) to rewrite inequality (4) as $P_{AA} (1 - t_{AB})(1 - T_{AB}) \geq P_{BB} (1 - T_{BB})$. Combining this inequality with the immediately preceding

inequality yields $P_{AA}(1 - t_{AB})(1 - T_{AB}) \geq P_{AA} \frac{1 - t_{AA}}{(1 - T_{BA})(1 - t_{BA})} (1 - T_{BB})$. Multiplying both sides of this inequality by $\frac{(1 - T_{BA})(1 - t_{BA})}{P_{AA}}$ yields the following inequality,

$$(5) \quad (1 - t_{AB})(1 - T_{AB})(1 - T_{BA})(1 - t_{BA}) \geq (1 - t_{AA})(1 - T_{BB}).$$

Possible prices that allow conditions (1) through (4) to hold exist if, and only if, the two states' tax rates satisfy condition (5). Inequality (5) therefore describes the set of tax rates for which the two states' combined tax systems do not discriminate against interstate commerce. If the inequality holds as an equality, the combined tax systems provide neutral treatment of interstate commerce. If the inequality is strict, then the combined tax systems favor interstate commerce.

Condition (5) holds as long as states A and B, respectively, satisfy the following nondiscrimination conditions,

$$(6) \quad (1 - t_{BA})(1 - t_{AB}) \geq (1 - t_{AA}).$$

$$(7) \quad (1 - T_{BA})(1 - T_{AB}) \geq (1 - T_{BB}).$$

As explained below, each nondiscrimination condition requires that the state's combined treatment of inbound and outbound interstate transactions be as favorable as its tax treatment of intrastate transactions. At first glance, it may seem surprising that the nondiscrimination condition depends on a combination of the taxes on two different transactions, inbound and outbound, engaged in by two different groups. But, as the above derivation indicates, the taxes on the two transactions interact to determine the possible price changes that can maintain incentives for interstate commerce.

Also, each state's nondiscrimination condition is independent of the other state's condition. So long as state A obeys condition (6) and state B obeys condition (7), then condition

(5) holds, even if the two states impose completely different levels of taxes or different mixes of taxes on inbound and outbound transactions. Neither state need adjust its tax policies to accommodate the other state's policies.

If state A exactly meets condition (6), so that $(1 - t_{BA})(1 - t_{AB}) = (1 - t_{AA})$, and state B exactly meets condition (7), so that $(1 - T_{BA})(1 - T_{AB}) = (1 - T_{BB})$, then condition (5) also holds as an equality, $(1 - t_{AB})(1 - T_{AB})(1 - T_{BA})(1 - t_{BA}) = (1 - t_{AA})(1 - T_{BB})$. There is then a unique set of relative prices⁶ at which each group's incentives for interstate commerce are maintained. Those relative prices are given by

$$(8) \quad P_{AA} = P_{AB} = \frac{1}{1-t_{AB}}, \quad P_{BA} = P_{BB} = \frac{1}{1-T_{BA}}.$$

It is easy to see that conditions (1) and (2) hold as equalities at these prices. Condition (3) also holds as an equality, with state-A sellers receiving after-tax payoffs of $I - t_{BA}$ on sales to either state-A buyers or state-B buyers. Condition (4) similarly holds as an equality, with state-B sellers receiving after-tax payoffs of $I - T_{AB}$ on sales to either state-A buyers or state-B buyers. So, each of the four groups has the same incentive to engage in interstate commerce with the taxes as it did without them. Neutrality is achieved.

Under neutral tax systems, equation (8) indicates that the prices paid by each state's buyers (from sellers in either state) rise to reflect the tax that the buyers' state imposes on their purchases from the other state. The after-tax payoffs received by each state's sellers (from sales to buyers in either state) fall to reflect the tax that the sellers' state impose on their sales to the other state.

⁶ The absolute level of prices (which would be determined by how the Federal Reserve's monetary policy responds to the state tax systems) does not matter. For example, commerce neutrality would still prevail if all prices were twice as large, or twice as small, as those set forth in (8).

Without more information about the economy, it cannot be ensured that imposing taxes that satisfy conditions (6) and (7) will cause the exact prices given in equation (8) to prevail. Income effects, the state governments' use of the tax revenue, and other factors may affect prices in various ways. It is likely that prices will be near these values, though, because conflicting incentives would otherwise result. Suppose, for example, that P_{AA} was higher than the value stated in (8) while the other prices were equal to the values stated by that equation. Then, state-A sellers would have an incentive to switch into intrastate transactions and state-A buyers would have an incentive to switch away from them. But, it is impossible for state-A sellers to increase their intrastate transactions while state-A buyers reduce their intrastate transactions because they are the same transactions.

In any event, tax systems that satisfy the nondiscrimination conditions (6) and (7) should be viewed as neutral, regardless of the resulting price effects. These tax systems make it *possible* that nobody is given an incentive to switch from interstate to intrastate transactions. States should not bear responsibility for whether prices change in a way that brings that possibility to fruition. The validity of a tax system cannot depend upon a judicial determination of how it actually affected prices; any effort to untangle the effects of the taxes from all of the other relevant factors, in order to determine what would have happened if the taxes had never been imposed, would be complicated and inconclusive.

If at least one state violates its nondiscrimination condition, then (assuming no offsetting preference for interstate commerce by the other state) inequality (5) is violated. Then, at *every* possible set of prices, at least one of the inequalities (1) through (4) is violated and at least one group's incentive to engage in interstate commerce is impaired. In that case, the state tax system unambiguously discriminates against interstate commerce. Because there are no possible prices

at which incentives to engage in interstate commerce are maintained, the tax system can be condemned as discriminatory without any determination of how it affected prices.

It is useful to rewrite the nondiscrimination conditions (6) and (7) by subtracting one from both sides of each condition and multiplying by negative one (thereby reversing the direction of each inequality). The resulting conditions are

$$(9) \quad t_{BA} + t_{AB} - t_{BA}t_{AB} \leq t_{AA}.$$

$$(10) \quad T_{BA} + T_{AB} - T_{BA}T_{AB} \leq T_{BB}.$$

For each state, the combined tax burden on inbound and outbound transactions (measured as the sum of the two tax rates minus an interaction term discussed below) must be less than or equal to the state's tax on its intrastate transactions. The need to look at the combined tax burden on inbound and outbound transactions has also been noted by Slemrod, Hansen, and Procter (1997), Mason and Knoll (2012), and other authors.

The nondiscrimination conditions have simple implications for destination and origin taxes and subsidies.

5. Destination and Origin Taxes and Subsidies

The nondiscrimination condition is satisfied if state A imposes a uniform tax on all purchases by state-A buyers, both their intrastate purchases from state-A sellers and their interstate purchases from state-B sellers. Such a tax is called a *destination* tax, because it applies to transactions that are destined to reach buyers in the taxing state. Then, $t_{AB} = t_{AA}$ and t_{BA} is zero, so condition (6) and the equivalent condition (9) hold as equalities. Equation (8) then calls for the prices paid by state-A buyers to rise to reflect the destination tax.

The nondiscrimination condition is also satisfied if state A imposes a uniform tax on all sales by state-A sellers, both their intrastate sales to state-A buyers and their interstate sales to state-B buyers. Such a tax is called an *origin* tax, because it applies to transactions that originate with sellers in the taxing state. Then, $t_{BA} = t_{AA}$ and t_{AB} is zero, so condition (6) and the equivalent condition (9) hold as equalities. Equation (8) then calls for prices to remain unchanged.

A combination of destination and origin taxes also satisfies the nondiscrimination condition. For example, state A may impose both a 20 percent destination tax on all purchases by state-A buyers and a 10 percent origin tax on all sales by state-A sellers. For each tax to be neutral, so that the combination can be neutral, however, intrastate transactions must be subject to *both* taxes, because each intrastate transaction involves both an in-state buyer and an in-state seller. Intrastate transactions must therefore face a 28 percent tax rate; after the destination tax takes 20 percent of the buyer's total payment, the origin tax takes 10 percent of the remaining 80 percent, or another 8 percent of the total payment. (Equivalently, the origin tax takes 10 percent of the total payment and the destination tax takes 20 percent of the remaining 90 percent, or another 18 percent of the total payment.) Because t_{BA} is .2, t_{AB} is .1, and t_{AA} is .28, condition (6) and the equivalent condition (9) hold as equalities. The interaction term, $-t_{BA}t_{AB}$, in condition (9) reflects the fact that the second tax is imposed only on the amount remaining after the first tax and must be included to correctly measure the combined tax burden.

So, a state may uniformly tax all purchases by in-state buyers, including both intrastate transactions and imports from other states. Or, it may uniformly tax all sales by in-state sellers, including both intrastate transactions and exports to other states. But, a state cannot tax all purchases and add on an export tariff, nor can it tax all sales and add on an import tariff. If the state imposes a tax on all purchases by in-state buyers as well as a tax on all sales by in-state

sellers, it must fully apply *both* taxes to intrastate transactions, which feature both an in-state buyer and an in-state seller.

The nondiscrimination conditions apply without change to subsidies. Because subsidies are merely negative taxes, the subsidy rates enter the nondiscrimination conditions as negative tax rates. Accordingly, subsidies are neutral if, and only if, the combined subsidies to inbound and outbound transactions are at least as large as the subsidy to intrastate transactions. A destination subsidy that applies uniformly to both inbound and intrastate transactions is neutral, as is an origin subsidy that applies uniformly to both outbound and intrastate transactions. Combinations of destination and origin subsidies are also neutral. But, a subsidy that applies only to intrastate transactions and excludes both inbound and outbound transactions is discriminatory.

The nondiscrimination conditions turn out to be closely related to the internal consistency test that the Supreme Court has used in some of its DCC decisions.

6. Internal Consistency

Under the Supreme Court's internal consistency test, state A's tax system is valid if interstate transactions would be subject to the same total nationwide tax burden as intrastate transactions *under the assumption that every state adopted that tax system*. When phrased in that form, the test appears to be an abstraction or formalism disconnected from economic reality, as it is based on the outcomes that would occur under an unrealistic assumption about the taxes adopted by other states.

The proper justification for the internal consistency test, however, is that is identical to the nondiscrimination condition in most circumstances. A tax imposed by state A generally satisfies the internal consistency test if, and only if, it satisfies the nondiscrimination condition.

Each interstate transaction is an outbound transaction in one state and an inbound transaction in another state. If every state adopted state A's tax system, each interstate transaction would pay, in one state, the tax that state A imposes on outbound transactions and would also pay, in another state, the tax that state A imposes on inbound transactions. Of course, each intrastate transaction would face tax in its state equal to the tax that state A imposes on intrastate transactions. When the test compares those two hypothetical nationwide tax burdens, therefore, it is actually comparing the combined tax burden that state A imposes on inbound and outbound transactions to the tax that state A imposes on intrastate transactions, which is precisely the comparison made by the nondiscrimination condition.

Unfortunately, the Court's phrasing of the test obscures its underlying economic logic. When a state adopts an internally consistent tax system, for which the combined tax on inbound and outbound transactions matches the tax on intrastate transactions, the tax system is neutral, regardless of what any other states do. The fact that intrastate and interstate transactions would bear equal nationwide tax burdens if every state copied the tax is a consequence, not the cause, of its neutrality. The Court's rhetoric suggests that the imposition of the tax by any state should be deemed nondiscriminatory because there would be no discrimination if every state imposed the tax. But, the causality actually runs in the opposite direction – there would be no discrimination if every state imposed the tax because the imposition of the tax by any state is nondiscriminatory.

The internal consistency test diverges from the nondiscrimination criterion, however, if state A makes its tax depend on other states' taxes. (For example, state A might provide a credit for taxes paid to other states or might impose retaliatory taxes that apply only to transactions involving states that adopt certain taxes that state A wishes to deter.) Then, the actual state-A tax

burdens that enter the nondiscrimination condition depend on other states' actual taxes and may differ from the hypothetical tax burdens that state A would impose if other states copied state A's tax system.

7. Application to State Individual Income Taxes

The above analysis applies to state individual income taxes without modification. Nevertheless, it is useful to sketch out the application in that context because it illustrates the dramatic divergence of actual state income tax systems from the nondiscrimination conditions.

In line with the above analysis, let t_{AA} be the tax rate that state A imposes on income earned by its residents within the state, T_{BB} be the tax rate that state B imposes on income earned by its residents within the state, t_{AB} be the tax rate that state A imposes on income that state-B residents earn in state A, T_{AB} be the tax rate that state B imposes on the remainder of that income after state A's tax is collected, T_{BA} be the tax rate that state B imposes on income that state-A residents earn in state B, and t_{BA} be the tax rate that state A imposes on the remainder of that income after state B's tax is collected.

Although we refer to "wages," "work," and "employers" for simplicity, the analysis applies to all forms of income. Let W_{AA} be the wage that state-A employers pay to their state-A-resident employees with the two states' tax systems in place, expressed as a ratio of the wage that they would have paid if there were no taxes. Let W_{AB} be the corresponding ratio for the wage that state-A employers pay to their state-B-resident employees, W_{BA} be the corresponding ratio for the wage paid by state-B employers to their state-A-resident employees, and W_{BB} be the corresponding ratio for the wage paid by state-B employers to their state-B-resident employees.

As before, four conditions must hold for the tax system to be neutral.

First, the tax systems must not give state-A employers an incentive to hire state-A residents (intrastate commerce) rather than state-B residents (interstate commerce). So, the wage that state-A employers have to pay state-B residents must rise by no more than the wage they have to pay state-A residents,

$$(11) \quad W_{AB} \leq W_{AA}.$$

Second, the tax systems must not give state-B employers an incentive to hire state-B residents (intrastate commerce) rather than state-A residents (interstate commerce). So, the wage that state-B employers have to pay state-A residents must rise by no more than the wage they have to pay state-B residents,

$$(12) \quad W_{BA} \leq W_{BB}$$

Third, the tax systems must not give state-A residents an incentive to work in state B (interstate commerce) rather than in state A (intrastate commerce). So, the after-tax wage that state-A residents earn from working in state B must fall by no more than the after-tax wage that they earn from working in state A,

$$(13) \quad W_{BA} (1 - T_{BA}) (1 - t_{BA}) \geq W_{AA} (1 - t_{AA}).$$

Fourth, the tax systems must not give state-B residents an incentive to work in state A (interstate commerce) rather than in state B (intrastate commerce). So, the after-tax wage that state-B residents earn from working in state A must fall by no more than their after-tax wage from working in state B,

$$(14) \quad W_{AB} (1 - t_{AB}) (1 - T_{AB}) \geq W_{BB} (1 - T_{BB})$$

Algebraic manipulations similar to those done before show that inequalities (11) through (14) can all hold only if the two states' tax rates satisfy the following condition,

$$(15) \quad (1 - t_{AA})(1 - T_{BB}) \geq (1 - t_{BA})(1 - T_{BA})(1 - T_{AB})(1 - t_{AB}).$$

Inequality (15) is satisfied if state A's taxes and state B's taxes satisfy, respectively, the following two conditions,

$$(16) \quad (1 - t_{BA})(1 - t_{AB}) \geq (1 - t_{AA}).$$

$$(17) \quad (1 - T_{BA})(1 - T_{AB}) \geq (1 - T_{BB}).$$

If each state exactly meets its nondiscrimination condition, there is then a unique set of relative wages at which all workers and employers' incentives for interstate commerce are maintained, given by

$$(18) \quad W_{AA} = W_{AB} = \frac{1}{1 - t_{AB}}, \quad W_{BA} = W_{BB} = \frac{1}{1 - T_{BA}}.$$

Under neutral tax systems, equation (18) indicates that the wages paid by each state's employers (to workers who live in either state) rise to reflect the tax that the employers' state impose on wages paid to nonresident workers. The after-tax wages received by each state's residents (from employers in either state) fall to reflect the tax that the residents' state impose on out-of-state wages.

As before, the nondiscrimination conditions can be rewritten as

$$(19) \quad t_{BA} + t_{AB} - t_{BA}t_{AB} \leq t_{AA}.$$

$$(20) \quad T_{BA} + T_{AB} - T_{BA}T_{AB} \leq T_{BB}.$$

In each state, the combined tax burden on nonresidents' in-state income and residents' out-of-state income cannot exceed the tax burden on residents' in-state income.

At first glance, it may seem surprising that the nondiscrimination condition depends on a combination of the taxes on two different groups, nonresidents earning in-state income and residents earning out-of-state income. For example, it may not be immediately clear why a state loses the right to tax residents' out-of-state income when it taxes nonresidents' in-state income at

the same rate as residents' in-state income. But, the various taxes interact to affect the wage changes needed to maintain incentives to engage in interstate commerce. To be more specific, when the state taxes nonresidents' in-state income, nonresidents' in-state wage must rise to maintain their incentive for in-state work, which then requires that residents' in-state wage also rise to maintain in-state employers' incentive to hire nonresidents. To maintain residents' incentive to work out-of-state in the face of that rise in their in-state wage, their out-of-state income cannot be taxed. The two taxes are therefore intertwined in equilibrium.

8. Residence and Source Taxation

Consider an example in which, in the absence of taxes, wages are \$10,000 in both states for residents of each state. We explain two nondiscriminatory income tax systems and how they may be combined.

A. Residence Taxation

The nondiscrimination condition is satisfied if state A impose a uniform residence-based tax on all income earned by its residents (whether in-state or out-of-state) with no tax on nonresidents' income. Because $t_{AA} = t_{BA}$ and t_{AB} is zero, condition (16) and the equivalent condition (19) hold as equalities. Equation (18) then calls for all wages to remain unchanged.

Suppose that state A imposes a residence-based tax at a 6 percent rate. If all wages remain unchanged at \$10,000, then the tax does not give anybody an incentive to switch from interstate to intrastate transactions.

- The tax does not give state-A residents an incentive to work in state A rather than in state B because they clear \$9,400 either way, receiving a \$10,000 wage and paying \$600 tax (6 percent of \$10,000).

- The tax does not give state-B residents an incentive to work in state B rather than in state A because they clear \$10,000 either way.
- The tax does not give state-A employers an incentive to hire state-A residents rather than State-B residents because they pay \$10,000 either way.
- The tax does not give state-B employers an incentive to hire state-B residents rather than State-A residents because they pay \$10,000 either way.

B. Source Taxation

The nondiscrimination condition is also satisfied if state A imposes a uniform source-based tax on all income earned within the state (whether by residents or nonresidents) with no tax on out-of-state income. Because $t_{AA} = t_{AB}$ and t_{BA} is zero, condition (16) and the equivalent condition (19) hold as equalities. Equation (18) then calls for the wage paid by state-A employers to rise to offset the source-based tax.

Suppose that state A imposes a source-based tax at a 5 percent rate. Then, if wages paid by state-A employers (to residents of both states) rise to \$10,526 and wages paid by state-B employers (to residents of both states) remain at \$10,000, the tax does not give anybody an incentive to switch from interstate to intrastate transactions:

- The tax does not give state-A residents an incentive to work in state A rather than in state B, because they clear \$10,000 either way. If they work in state A, they earn \$10,526, on which they pay \$526 tax (5 percent of \$10,526); if they work in state B, they earn \$10,000 tax-free.
- The tax does not give state-B residents an incentive to work in state B rather than in state A. They face the same payoffs as state-A residents.

- The tax does not give state-A employers an incentive to hire state-A residents rather than state-B residents because they pay \$10,526 either way.
- The tax does not give state-B employers an incentive to hire state-B residents rather than state-A residents because they pay \$10,000 either way.

C. Combining Residence and Source Taxation

State A may also adopt a combination of residence-based and source-based taxation, provided that residents' in-state income, which has both residence and source within the state, is fully subject to *both* taxes. For example, if state A imposes a 5 percent source-based tax on income earned within the state and a 6 percent residence-based tax on its residents' income, then condition (19) requires that residents' in-state income be taxed at a 10.7 percent rate $(.05 + .06 - (.05)(.06) = .107)$. In other words, the source-based tax must take 5 percent of residents' in-state income and the residence-based tax must take 6 percent of the remaining 95 percent, or another 5.7 percent. (Equivalently, the residence-based tax must take 6 percent of the income and the source-based tax must take 5 percent of the remaining 94 percent, or another 4.7 percent.)

The intuition is clear. The residence-based tax is nondiscriminatory only if it applies to residents' in-state income on the same terms as their out-of-state income *and* the source-based tax is nondiscriminatory only if it applies to residents' in-state income on the same terms as nonresidents' in-state income. If residents' in-state income is taxed only once, then the state cannot be combining two nondiscriminatory tax systems.

Suppose, then, that state A imposes a 5 percent source-based tax on income earned within the state and a 6 percent residence-based tax on its residents' income, with the required 10.7 percent tax on residents' in-state income. Then, if the wages paid by state-A employers (to residents of both states) rise to \$10,526 and the wages paid by state-B employers (to residents of

both states) remain at \$10,000, as called for by equation (18), the tax system does not give anybody an incentive to switch from interstate to intrastate transactions:

- The tax system does not give state-A residents an incentive to work in state A rather than in state B because they clear \$9,400 either way. If they work in state A, they earn \$10,526, on which they pay \$1,126 tax (10.7 percent of \$10,526), leaving them with \$9,400. If they work in state B, they earn \$10,000, on which they pay 6 percent residence-based tax, leaving them with \$9,400.
- The tax system does not give state-B residents an incentive to work in state B rather than in state A because they clear \$10,000 either way. If they work in state A, they earn \$10,526, on which they pay \$526 source-based tax (5 percent of \$10,526), leaving them with \$10,000. If they work in state B, they earn \$10,000 tax-free.
- The tax system does not give state-A employers an incentive to hire state-A residents rather than state-B residents because they pay \$10,526 either way.
- The tax system does not give state-B employers an incentive to hire state-B residents rather than state-A residents because they pay \$10,000 either way.

This combination tax system also satisfies the internal consistency test. If every state copied the tax system, then income earned by one state's resident in another state would be subject to 6 percent residence-based tax in the first state and 5 percent source-based tax in the second state, the same nationwide burden as that imposed on income earned by a state's resident within the state.

It is important to distinguish discrimination against interstate commerce from the taxation of a particular interstate transaction by more than one state, a phenomenon often called "multiple taxation." The two are not the same.

9. Multiple Taxation Need Not Imply Discrimination

Multiple taxation arising from disparities between different states' nondiscriminatory tax systems does not systematically impede interstate commerce. So long as state A's tax system satisfies inequality (16) and state B's tax system satisfies inequality (17), then inequality (15) is satisfied, even if the two states' tax systems are dramatically different. In other words, if each state imposes a tax system that would be nondiscriminatory if the other state had imposed no taxes, then the combination of their tax systems is also nondiscriminatory.

When both states have adopted nondiscriminatory tax systems, neither is obliged to alter its tax policy to accommodate the other's independent policy decision. Indeed, there would be no logically compelling way to decide which state must accommodate the other. Therefore, neither state need provide a credit for taxes paid to the other state.

To be sure, double taxation on particular transactions generally results if different states choose disparate tax systems. Nevertheless, there is no discrimination against interstate commerce. Wages can still adjust, in accord with equation (18), so that nobody's incentive to work or hire across state lines is impaired.

Suppose, for example, that state A imposes a 6 percent residence-based tax and state B imposes a 5 percent source-based tax. Then, income earned by state-A residents in state B is subject to both taxes and bears a 10.7 percent burden, with state B taking 5 percent of total earnings and state A taking 6 percent of the remaining 95 percent. At the same time, income earned by state-B residents in state A is not taxed by either state. If wages paid by state-A employers (to residents of either state) remain at \$10,000 and wages paid by state-B employers (to residents of either state) rise to \$10,526, as called for by equation (18), then the two states'

taxes, despite the resulting double taxation, do not give anybody an incentive to switch from interstate to intrastate transactions:

- The two states' taxes do not give state-A residents an incentive to work in state A rather than in state B because they clear \$9,400 either way. If they work in state A, they earn \$10,000 and pay \$600 under state A's 6 percent residence tax, leaving them with \$9,400; if they work in state B, they earn \$10,526, pay \$526 under state B's 5 percent source tax, and also pay \$600 under state A's 6 percent residence tax, leaving them with \$9,400.
- The two states' taxes do not give state-B residents an incentive to work in state B rather than in state A because they clear \$10,000 either way. If they work in state A, they earn \$10,000 tax-free; if they work in state B, they earn \$10,526 and pay \$526 under state B's 5 percent source tax, leaving them with \$10,000.
- The two states' taxes do not give state-A employers an incentive to hire state-A residents rather than state-B residents because they pay \$10,000 either way.
- The two states' taxes do not give state-B employers an incentive to hire state-B residents rather than state-A residents because they pay \$10,526 either way.

It may seem surprising that state-A residents working in state B face no impairment of incentives from the double taxation that they face. But, wages rise in state B to compensate for its source-based tax (because the state-B residents with whom state-A residents are competing also face that tax) and they cannot escape the burden that they bear under state A's residence-based tax by working in state A.

10. Policy Implications

The conditions set forth above for state income taxes are the same as the conditions that apply to state taxes on the purchase and sale of goods. In the latter context, a state's combined tax on imports and exports cannot exceed its tax on intrastate transactions. A state may uniformly tax all purchases by in-state buyers, including both intrastate transactions and imports from other states. Or, it may uniformly tax all sales by in-state sellers, including both intrastate transactions and exports to other states. But, it cannot uniformly tax all purchases and then add an export tariff, nor can it uniformly tax all sales and then add an import tariff. If the state imposes a tax on all purchases by in-state buyers as well as a tax on all sales by in-state sellers, it must fully apply *both* taxes to intrastate transactions, which feature both an in-state buyer and an in-state seller.

So, too, a state may uniformly tax all income earned by its residents, in-state and out-of-state. Or, it may uniformly tax all income earned within the state, by residents and nonresidents. But, it cannot uniformly tax all income earned within the state and then add a tax on residents' out-of-state income, nor can it uniformly tax all income earned by residents and then add a tax on nonresidents' in-state income. If a state taxes all income earned by its residents and all income earned within the state, it must fully apply both taxes to income earned by residents within the state.

Actual state practice, as described by Hellerstein, Stark, Swain, and Youngman (2009, 397), however, is dramatically different from the neutral tax systems described above. States typically tax residents' in-state income, nonresidents' in-state income, and residents' out-of-state income at roughly equal rates. The combined tax on nonresidents' in-state income and residents' out-of-state income is then roughly double the tax burden on residents' in-state income, in glaring violation of conditions (16) and (19). The perception seems to be that the single tax on

residents' income somehow "balances out" both the tax on nonresidents' in-state income *and* the tax on residents' out-of-state income.

States do, however, generally provide credit for taxes paid by their residents to other states on their out-of-state income, up to the amount of tax imposed on that income by state granting the credit. In other words, the residence state foregoes its tax on residents' out-of-state income to the extent that the source state has taxed it.

These credits are apparently intended to prevent multiple taxation. As shown above, however, multiple taxation is not a problem. If each state had a neutral tax system, there would be no need for any state to offer a credit for taxes paid to other states.

When states have discriminatory systems, as all states with income taxes currently do, these credits do not fully correct the problem. If a state uniformly taxes residents' and nonresidents' in-state incomes, the nondiscrimination condition requires that it not tax residents' out-of-state income at all, regardless of whether or not another state taxes that income. Nevertheless, foregoing tax on that income to the extent that other states have taxed it is a partial remedy for the discrimination. It falls short of a complete remedy, though, because the state continues to collect residual tax on residents' out-of-state income to the extent that the source state does not tax it, even though it is already taxing nonresidents' in-state income at the same rate as residents' in-state income.

References

Hellerstein, Walter, Kirk J. Stark, John A. Swain, and Joan M. Youngman. 2009. *State and Local Taxation: Cases and Materials*, 9th edition. St. Paul, MN: Thomson-Reuters.

Mason, Ruth, and Michael S. Knoll. 2012. "What is Tax Discrimination?" *Yale Law Journal* 121(5): 1014-1116.

Shaviro, Daniel. 1993. *Federalism in Taxation: The Case for Greater Uniformity*. Washington, D.C.: AEI Press.

Slemrod, Joel, Carl Hansen, and Roger Procter. 1997. "The Seesaw Principle in International Tax Policy." *Journal of Public Economics* 65(2): 163-76.

Zelinsky, Edward A. 2002. "Restoring Politics to the Dormant Commerce Clause: The Case for Abandoning the Dormant Commerce Clause Prohibition on Discriminatory Taxation." *Ohio Northern University Law Review* 29(1); 29-88.