

Articles

TAX CANNIBALIZATION AND FISCAL FEDERALISM IN THE UNITED STATES

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ABSTRACT—We began this project pondering a riddle. Most state governments have adopted what we—and many others—view as clearly suboptimal tax policies, especially in regard to the taxation of corporate income and capital gains. Yet, with the notable exception of those who oppose progressivity and the taxation of capital, state-level tax policymakers have had remarkably little appetite for reform.

This Article provides one major explanation for this riddle by identifying and demonstrating a phenomenon that we label as “tax cannibalization.” We argue that flawed state-level tax policies derive in part from perverse incentives inadvertently created by the federal government.

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INTRODUCTION

It has long been recognized that the design of federal tax law strongly influences state tax policy choices.¹ What has not been appreciated is how the current structure of federal tax law incentivizes state governments to

¹ See, e.g., Brian Galle, *Federal Fairness to State Taxpayers: Irrationality, Unfunded Mandates, and the "Salt" Deduction*, 106 MICH. L. REV. 805, 805 (2008) ("Finally, I note that § 164, and therefore the Alternative Minimum Tax, can have serious effects on federal–state relations . . ."); Louis Kaplow, *Fiscal Federalism and the Deductibility of State and Local Taxes Under the Federal Income Tax*, 82 VA. L. REV. 413, 413 (1996) ("Whether state and local taxes are deductible is believed to have important effects on revenue, tax equity, and the operation of state and local governments."); Ruth Mason, *Delegating Up: State Conformity with the Federal Tax Base*, 62 DUKE L.J. 1267, 1274 (2013) ("[T]he federal government wields substantial passive influence over state taxation by defining the tax base."); David A. Super, *Rethinking Fiscal Federalism*, 118 HARV. L. REV. 2544, 2593 (2005) ("[I]nterdependencies between the federal and state tax structures . . . are a crucial but poorly understood feature of fiscal federalism.").

adopt tax policies that inflict costs on the federal government, at the expense of national welfare.² In other words, the federal government currently incentivizes state governments to adopt tax structures that literally devour the federal government's tax revenues. To date, there has been little appetite for reform.³

This Article's explication of the tax cannibalization problem builds on recent economics literature on vertical externalities. The economics literature has used the term "vertical externalities" to indicate when some of the costs or benefits of a state-level tax policy decision affect the federal government rather than the state making the tax policy decision (or vice versa).⁴ Over the past two decades, economists have developed several theoretical accounts of vertical externalities.⁵ Yet this economics literature has primarily focused on the questions of whether different tiers of government tax too much or too little and promote too much or too little distribution.⁶ The economics literature has not as of yet analyzed the

² A full discussion of the "nuttness" of current state-level tax policy would require a massive addition to the length of this article and would distract from our primary argument and analysis. Suffice it to say that tax experts generally agree that most states currently tax corporate income and capital gains in ways that are excessively and unnecessarily harmful to the national economy. Even those who support state governments taxing capital income and corporate income—as a theoretical matter—generally agree that the ways in which state governments currently tax these bases are perverse. For further explanation and discussion on these points, see, for example, DAVID BRUNORI, *STATE TAX POLICY: A POLITICAL PERSPECTIVE* (3d ed. 2011); Charles E. McLure Jr., *The Nuttness of State and Local Taxes—And the Nuttness of Responses Thereto*, 25 ST. TAX NOTES 841, 848–53 (2002).

³ To begin to understand this riddle, consider, for instance, that the federal government has taxed capital gains at a lower rate than ordinary income for most of the history of the federal income tax. A primary reason for this is because, in the absence of dramatic accompanying reforms, it is thought that taxing federal capital gains at the current top ordinary income rates would substantially exceed the revenue-maximizing federal capital gains tax rate (such that *lowering* the tax rate would then *increase* revenues) due to selective realization responses. Yet most state governments tax capital gains and ordinary income at the same rates, and—in stark contrast to the situation at the federal level—there is only minimal discussion of the problem of selective realization responses in state-level tax policy debates. For further discussion of this problem, see *infra* Section II.D. For an example of the lack of attention to this problem in state-level tax policy debates, see REPORT OF THE COMMISSION ON THE 21ST CENTURY ECONOMY (2009), http://www.cotce.ca.gov/documents/reports/documents/Commission_on_the_21st_Century_Economy-Final_Report.pdf [<https://perma.cc/GW7D-5WXJ>] (discussing revenue volatility and other state-focused problems associated with taxing capital gains and corporate income in California, but not discussing in any significant way how selective realization undermines efficient revenue generation).

⁴ Robin Boadway & Jean-François Tremblay, *Reassessment of the Tiebout Model*, 96 J. PUB. ECON. 1063, 1074 (2012).

⁵ For reviews of this literature, see *id.* at 1074–75; Yaniv Reingewertz & Ohad Raveh, *Corporate Tax Shocks as Drivers of Vertical Tax Externalities: Evidence from Narrative Federal Tax Shocks 2–6* (Oct. 12, 2015) (unpublished manuscript) (on file with the *Northwestern University Law Review*).

⁶ In addition to this primary focus, certain articles in this economics literature have more specifically examined cigarette, alcohol, and gasoline excise taxes in the United States and a number of

implications of vertical externalities for the important, more design-oriented questions of what state governments choose to tax or how state governments structure and implement their tax systems.

Likewise, the prior tax legal literature contains only limited discussion of how vertical externalities might result in tax cannibalization; the literature has instead focused on questions related to whether different tiers of government tax too much or too little and promote too much or too little distribution.⁷ Thus, neither the prior tax legal nor the economics literature has analyzed the implications of vertical externalities for critical questions related to how the design of federal tax law biases state governments' tax policy decisions.⁸ This Article begins to fill that gap.

In theory, the tax cannibalization problem *may* occur whenever state governments and the federal government levy taxes on overlapping tax bases. We demonstrate that the tax cannibalization problem currently *does* occur with respect to state-level taxes on corporate income and capital gains, and possibly also ordinary income.⁹ Specifically, we show that state governments' current top tax rates on these bases impose large, wasteful costs through tax cannibalization.

topics related to the structure of fiscal federalism in Canada and Switzerland. See Reingewertz & Raveh, *supra* note 5, at 2–6, for a review of the literature.

⁷ See, e.g., John R. Brooks II, *Fiscal Federalism as Risk-Sharing: The Insurance Role of Redistributive Taxation*, 68 TAX L. REV. 89, 113 (2014) (briefly mentioning vertical externalities as part of a background review of the recent economics literature on the question of whether state and local governments should attempt to promote distribution); Mason, *supra* note 1, at 1339 n.300 (mentioning vertical externalities in one sentence in a footnote). By contrast, the tax legal literature has far more extensively engaged with the related—but distinct and much larger—economics literature on the question of whether taxation by one tier of government might either “crowd in” or “crowd out” taxation by another tier of government. For an excellent discussion of this topic, see Brian Galle, *Does Federal Spending “Coerce” States? Evidence from State Budgets*, 108 NW. U. L. REV. 989 (2014). For explanation of why this topic is distinct from our inquiry, see *infra* note 42.

⁸ Notably, recent law review articles on fiscal federalism topics by leading tax legal scholars make almost no mention of vertical externalities (the source of the tax cannibalization problem), despite vertical externalities having profound implications for the questions addressed by these articles. E.g., Mason, *supra* note 1, at 1339 n.300 (mentioning vertical externalities only as a one-sentence aside); Kirk J. Stark, *The Federal Role in State Tax Reform*, 30 VA. TAX REV. 407 (2010) (not mentioning vertical externalities).

In particular, no prior scholarship evaluates the upward vertical externalities that currently result from state-level tax rates on corporate income, capital gains, or ordinary income—the focus of this Article. By contrast, one (as of yet unpublished) economics article does evaluate the downward vertical externalities produced by the federal government's corporate income tax rates. Reingewertz & Raveh, *supra* note 5. Yet the upward vertical externalities produced by state-level corporate income tax rates (that we focus on) are dramatically larger than the downward vertical externalities (which are the focus of that economics article)—as we explain *infra* note 117.

⁹ We mostly treat the capital gains and ordinary income components of the personal income tax as separate tax bases, referring to these simply as “capital gains” and “ordinary income.” However, we sometimes refer to these two tax bases collectively as the “personal income tax.” By contrast, we treat the corporate income tax as being a single tax base, referred to as “corporate income.”

Extrapolating from the existing empirical literature, we develop a model showing that a typical state's top corporate income and capital gains tax rates generate surprisingly large economic waste.¹⁰ We propose federal-level reforms that could eliminate much of this economic waste while still maintaining the current levels for state governments' revenues and distribution. Through enacting these reforms, the federal government could produce a "win, win, win" for the federal government, state governments, and taxpayers.

Let us now briefly elaborate the nature of the tax cannibalization problem with an example of state-level corporate income taxes. State-level corporate income taxes are currently vulnerable to a variety of distortionary responses that shrink the states' corporate income tax bases. These distortionary responses include various forms of tax avoidance and tax gaming. It is useful to divide these distortionary responses into two conceptual categories.

The first conceptual category consists of distortionary responses that involve taxable activity relocating to other states. We label this category as "horizontal distortions." Because horizontal distortions involve taxable activity relocating across state lines, but remaining within the United States, horizontal distortions do not necessarily shrink the federal government's corporate income tax base. Important examples of horizontal distortionary responses to state-level corporate income tax rates include corporate taxpayers shifting their physical presence and sales activities from states that levy higher corporate income tax rates to states that levy lower corporate income tax rates.¹¹

The second conceptual category consists of the remaining distortionary responses that do *not* involve taxable activity relocating to other states. We label this category as "vertical distortions." In contrast to horizontal distortions, vertical distortions do typically shrink the federal government's corporate income tax base. Important examples of vertical distortionary responses to state-level corporate income tax rates include corporate taxpayers shifting real investment activities abroad, corporate taxpayers shifting reported profits to subsidiaries in foreign jurisdictions, corporate taxpayers shifting from equity financing to debt financing, and

¹⁰ By "large economic waste," we mean, for instance, that raising a marginal \$1.00 of revenue from a typical state's top corporate income tax rate generates between \$0.50 and \$0.95 of "deadweight loss" (that is, destroyed economic well-being), relative to raising that marginal \$1.00 from an alternative form of taxation. For further discussion, see *supra* Section III.C.

¹¹ For discussion of these horizontal distortionary responses and estimates of their magnitude, see Xavier Giroud & Joshua Rauh, *State Taxation and the Reallocation of Business Activity: Evidence from Establishment-Level Data* (Nat'l Bureau of Econ. Research, Working Paper No. 21534, 2015).

business taxpayers shifting from the use of corporate forms to partnership forms.¹²

Vertical distortionary responses are the primary source of the tax cannibalization problem. Because vertical distortionary responses shrink both the state government's corporate income tax base *and* the federal government's corporate income tax base, vertical distortionary responses to *state-level* corporate income tax rates deprive the *federal* government of tax revenue.

Moreover, the federal government levies much higher tax rates on the bases of corporate income, ordinary income, and capital gains, than do any state governments. Consequently, the federal government suffers much greater harm from vertical distortionary responses to state-level tax rates on these bases than do the state governments setting these tax rates.

When vertical distortionary responses to a state government's tax rate deprive both the federal government and *other* states' governments of revenue, in the aggregate, we refer to this as "tax cannibalization." Throughout the remainder of this Article, we explain how tax cannibalization currently biases state governments' tax policy decisions and thereby results in large-scale economic waste.

Indeed, we approximate that—because of tax cannibalization—the top corporate income and capital gains tax rates in some states currently exceed their national revenue-maximizing levels. In other words, reducing these tax rates could actually increase the overall tax revenues raised (in the aggregate) by the acting state government, the federal government, and other state governments.

There are at least three reasons why the tax cannibalization problem is especially severe in the context of fiscal federalism in the United States.¹³ First, state governments mostly piggyback on the federal government's tax-base-definition rules for corporate and personal income taxes. Second, the federal government currently levies tax rates on these bases that are amongst the highest in the world. Third, under the federal government's current tax-base-definition rules, the corporate income and capital gains tax bases are rather vulnerable to tax avoidance and tax gaming responses. The combination of these three factors results in state-level tax rates on corporate income and capital gains generating very large tax cannibalization.

¹² For discussion of these vertical distortionary responses and estimates of their magnitude, see Ruud A. de Mooij & Sijf Ederveen, *Corporate Tax Elasticities: A Reader's Guide to Empirical Findings*, 24 OXFORD REV. ECON. POL'Y 680 (2008).

¹³ We elaborate and support these claims below; our purpose here is signposting.

Because this tax cannibalization primarily harms the federal government, rather than state governments, state policymakers have little incentive to reform their tax systems to alleviate this tax cannibalization. There is great potential for state-level tax reforms that could patch some of the holes in the federal and state corporate and personal income tax bases. We yearn for state governments to operate as laboratories of democracy by devising improved approaches to taxation. But none of this is likely to happen unless the federal government acts to better coordinate the tax policy incentives of state and federal governments. Under the current structure of federal tax law, state governments lack motivation to implement reforms that would alleviate the tax cannibalization problem.

Two decades ago, Professor Daniel Shaviro concluded that “the interaction between taxation and federalism is more important than ever,”¹⁴ and we argue that this conclusion holds even more so today. As economic transactions become increasingly global, the harm from misaligned tax policy grows ever greater. We argue that tax cannibalization is a major cause of dysfunctional fiscal federalism in the United States, and that the federal government can and should act to alleviate this problem.

Because of tax cannibalization, the federal government has a large and direct stake in state government tax policy decisions—in a manner that has not heretofore been recognized.¹⁵ Instructing policymakers about the nature and current magnitude of tax cannibalization thus offers the potential for greatly improving the structure of fiscal federalism in the United States.

This Article proceeds in four Parts, plus a Technical Appendix. Part I elaborates on the economics literature on vertical externalities. Part II demonstrates that tax cannibalization is currently substantial—perhaps so large that some state-level tax rates exceed their national revenue-maximizing levels. Part III demonstrates how tax cannibalization biases state governments’ tax base choices. Part IV explains how the federal government could alleviate the tax cannibalization problem.

¹⁴ Daniel Shaviro, *An Economic and Political Look at Federalism in Taxation*, 90 MICH. L. REV. 895, 895 (1992).

¹⁵ For instance, the problem is not mentioned in recent testimony by the leading state and local tax scholar before Congress. See *Tax Reform: What It Means for State and Local Tax and Fiscal Policy: Hearing Before the S. Comm. on Fin.*, 112th Cong. 46–78 (2012) (statement of Walter Hellerstein, Francis Shackelford Professor of Taxation, University of Georgia Law School).

I. VERTICAL AND HORIZONTAL EXTERNALITIES IN THE THEORY OF FISCAL FEDERALISM

There is an extensive and longstanding literature on fiscal federalism, both in legal and economics scholarship.¹⁶ This literature has examined numerous aspects of state-level tax policy and interactions between federal- and state-level tax policy. Nevertheless, until relatively recently, this literature has mostly overlooked the importance of vertical externalities.¹⁷ As economists Michael Keen and Christos Kotsogiannis explain in their seminal article on the topic: “[s]trikingly, the vertical externalities that are thus at the heart of federal tax architecture have—until recently—been largely neglected in the theory of fiscal federalism, which has focused instead on horizontal externalities arising from mobility of the tax base between the states.”¹⁸

To the extent that a state government levies taxes that are higher than those levied by other states, taxpayers may relocate economic activity across state lines to reduce their tax burdens. These horizontal distortions have long been understood to be a major cost of state-level taxation, in terms of lost economic welfare.¹⁹ When any individual state raises its tax rates, this may drive some economic activity to relocate to other states, thereby reducing the revenue generated by the tax hike as well as harming the economy of the state raising its tax rates.

Due to these horizontal distortions, the “classic theoretical result” of the fiscal federalism literature is that both distribution policy and the taxation of mobile capital are best left to the federal rather than the state governments.²⁰ The rationale for this result is that state governments carrying out these activities generate all of the same problems as when the federal government does so, in addition to inducing horizontal distortions related to economic activity being relocated to other states. Classic

¹⁶ Stark, *supra* note 8, at 409.

¹⁷ Reingewertz & Raveh, *supra* note 5, at 2 (“[V]ertical tax externality . . . is a relatively new topic in the fiscal federalism literature.”).

¹⁸ Michael J. Keen & Christos Kotsogiannis, *Does Federalism Lead to Excessively High Taxes?*, 92 AM. ECON. REV. 363, 363 (2002).

¹⁹ Recent estimates suggest that horizontal distortions reduced overall national real income and welfare by about \$110 billion in 2012—which represents “considerable spatial misallocation from tax dispersion relative to the initial levels of tax revenue in GDP.” Pablo D. Fajgelbaum et al., *State Taxes and Spatial Misallocation* 3, 28 (Nat’l Bureau of Econ. Research, Working Paper No. 21760, 2015).

²⁰ Brooks, *supra* note 7, at 111; see also Kirk J. Stark, *Fiscal Federalism and Tax Progressivity: Should the Federal Income Tax Encourage State and Local Redistribution?*, 51 UCLA L. REV. 1389, 1394 (2004) (“[I]n a federal system of governments, redistributive policies should be undertaken exclusively by the most central level of government.”).

prescriptions of the fiscal federalism literature thus include that state governments should tax only less mobile factors,²¹ such as real property.

Of course, numerous commentators have noted that state governments, in reality, depart quite dramatically from these classic prescriptions.²² Indeed, the economics literature on vertical externalities was partially developed to explain and justify why state governments (both in the United States and in other fiscal federations across the world) depart from the classic prescriptions of the fiscal federalism literature.²³ Nevertheless, to date, most of the literature on vertical externalities has been highly theoretical, analyzing fiscal federations at an abstract and general level rather than focusing on the institutional structures of specific fiscal federations.²⁴

The remainder of this Part elaborates on the prior literature on vertical externalities so that this Article can then build on that literature to evaluate the implications for state and federal government fiscal interrelations. For explanatory purposes, we start by analyzing vertical externalities within a simple theoretical setup, and then we gradually incorporate additional complications and institutional detail.

A. *A Simple Analytic Starting Point*

We begin with a relatively simple hypothetical that is drawn from the basic model used to demonstrate vertical externalities in the economics literature.²⁵ Imagine that a fiscal federation consists of only a single state, but with both a federal-level government and a state-level government separately empowered to set their own tax rates. Further imagine that both the federal-level government and the state-level government care only about their own tax revenues and do not care about the tax revenues raised

²¹ Kirk J. Stark, *The Quiet Revolution in U.S. Subnational Corporate Income Taxation*, 23 ST. TAX NOTES 775, 783 (2002) (“As public finance economists have long emphasized, in deciding which taxes should be assigned to different levels of government, special care should be taken to avoid assigning mobile tax bases to lower levels of government.” (footnote omitted)).

²² See, e.g., McLure, *supra* note 2, at 567.

²³ See Roger H. Gordon & Julie Berry Cullen, *Income Redistribution in a Federal System of Governments*, 96 J. PUB. ECON. 1100, 1100 (2012) (“The resulting conventional wisdom is that the Federal government should take primary if not sole responsibility for redistribution. . . . Given this, why do we see states in the U.S. engaged so actively in redistribution?”).

²⁴ See *supra* notes 4–8 and accompanying text. Moreover, the few prior papers that have analyzed vertical externalities in relation to the institutional structures of specific fiscal federations have mostly focused on Canada. E.g., Masayoshi Hayashi & Robin Boadway, *An Empirical Analysis of Intergovernmental Tax Interaction: The Case of Business Income Taxes in Canada*, 34 CANADIAN J. ECON. 481 (2001); Sotiris Karkalakos & Christos Kotsogiannis, *A Spatial Analysis of Provincial Corporate Income Tax Responses: Evidence from Canada*, 40 CANADIAN J. ECON. 782 (2007).

²⁵ E.g., Gordon & Cullen, *supra* note 23, at 1101–03; Michael Keen, *Vertical Tax Externalities in the Theory of Fiscal Federalism*, 45 IMF STAFF PAPERS 454, 465–70 (1998).

by the other government. Finally imagine that there is only a single tax base accessible to these governments, and that this tax base is fixed. Thus, tax policy both for the federal and for the state government consists entirely of each government separately setting a tax rate to be applied to the shared tax base.

The overall tax rate on this base is then the combined federal and state tax rates. Because there is only one state, there are no horizontal distortions. All distortionary responses, such as tax avoidance and tax gaming, therefore reduce both federal- and state-level revenues.

When either the federal or the state government increases its tax rate, taxpayers' distortionary responses shrink the shared tax base. This tax base shrinkage then reduces the revenues raised by the other government, unless the other government compensates by increasing its own tax rate. Consequently, absent some agreement between the federal and state governments as to tax rates, the overall tax rate will be too high.²⁶

Put another way, there are both upward vertical externalities (because the federal government loses revenue whenever the state government raises its tax rate) and downward vertical externalities (because the state government loses revenue whenever the federal government raises its tax rate). There is thus a "common pool problem" with respect to the shared tax base. Unless the two governments reach an agreement to limit the overall level of taxation, each government will face incentives to overtax the shared base.

This excessively high taxation can be very costly from a social welfare perspective. The higher the overall tax rate, the more taxpayers can be expected to engage in distortionary responses that reduce their overall tax liabilities.²⁷ These distortionary responses generate what is synonymously called deadweight loss, "excess burden," "economic waste," or "distortionary costs."²⁸

The magnitude of these distortionary costs is thought to grow approximately with the square of the overall tax rate.²⁹ The reason is that

²⁶ Keen, *supra* note 25, at 466. By "too high," we mean that the overall tax rate will exceed the optimal level for maximizing either government's policy goals.

²⁷ See David Gamage, *How Should Governments Promote Distributive Justice?: A Framework for Analyzing the Optimal Choice of Tax Instruments*, 68 TAX L. REV. 1, 56–63 (2014).

²⁸ An illustrative example of such deadweight loss would be a corporation spending millions of dollars on lawyers and accountants so that its profits can be shifted to a lower tax jurisdiction. Such a maneuver is expensive but does not actually improve the economic performance of the corporation. It is as if the corporation has catapulted \$1 million dollars into the ocean in order to magically save \$10 million dollars in taxes.

²⁹ David Gamage, *The Case for Taxing (All of) Labor Income, Consumption, Capital Income, and Wealth*, 68 TAX L. REV. 355, 375–80 (2015).

raising the overall tax rate should generally induce both a greater number of distortionary responses and also more costly distortionary responses at the margin. Consequently, even a relatively small tax hike can generate large distortionary costs if the overall tax rate was already high prior to that tax hike.

To summarize, just as multiple fishermen might overfish a shared lake or ocean, multiple tiers of government can overtax a shared tax base. Then, because distortionary costs typically grow exponentially with the overall tax rate, this overtaxation can be very costly to national welfare.

B. *A More Complex Model Incorporating Multiple States*

There are, of course, fifty states plus the District of Columbia, each of which is empowered to set its own tax policies. How does introducing multiple states affect the analysis set forth in the previous Section?

The foundational articles in the economics literature on vertical externalities begin with a model wherein there are multiple states, but wherein each of these states is identical and the tax base is immobile across state lines.³⁰ The key implication of adding multiple states in this model is that the state governments may have different motivations from the federal government. Assume that every government cares only about the welfare of citizens who live within its own jurisdiction. The federal government may care about the impact of its tax rates on state revenues, such that there may not be any downward vertical externalities. But state governments will not care much about their tax rates' impact on federal government revenues, because the spending funded by federal revenues is spread across all of the states. This results in upward vertical externalities, with state governments incentivized to overtax. Again, this overtaxation can be very costly from the national welfare perspective.

More could be said about this basic model.³¹ However, it is more useful for this Article's purposes to proceed to discuss the next stage of the analysis in the foundational economics literature. Let us now relax the assumptions that states are identical and that the tax base is immobile across state lines. This generates the potential for horizontal distortions. To the extent that some states set their tax rates higher than other states, taxpayers may relocate economic activity from the higher tax states to the lower tax states.

³⁰ *E.g.*, Gordon & Cullen, *supra* note 23, at 1101–03; Keen, *supra*, note 25, at 461–70.

³¹ *See e.g.*, Alejandro Esteller-Moré et al., *Vertical Tax Competition and Consumption Externalities in a Federation with Lobbying*, 96 J. PUB. ECON 295 (2012) (discussing how lobbying and Leviathan policymakers can influence tax rates).

As noted previously, horizontal distortions can result in real national welfare costs, potentially making state-level taxation far more costly than federal-level taxation.³² Additionally, horizontal distortions can result in “horizontal externalities.”³³ When economic activity relocates from a higher tax state to a lower tax state, this shrinks the tax base of the higher tax state and reduces that state’s revenue. Yet, this also grows the tax base of the lower tax state, potentially increasing the revenue raised by that lower tax state.

The costs from state-level tax hikes inducing horizontal distortions may thus seem larger from the perspective of state governments considering tax hikes than from a national welfare perspective. Any individual state government may consider only the loss to its own revenues from tax hikes inducing horizontal distortions, ignoring the gain to other states’ revenues. Horizontal externalities thus potentially exert a downward pressure on the overall level of state taxation.

The economics literature on vertical externalities focuses on the questions of whether the overall level of taxation by different tiers of government is too high or too low and whether different tiers of government promote too much or too little distribution. This literature generally concludes that horizontal externalities and vertical externalities push state governments in conflicting directions.³⁴ When vertical externalities exceed horizontal externalities, the economics literature predicts that state governments will set their overall level of taxation too high from a national welfare perspective. Conversely, when horizontal externalities exceed vertical externalities, the economics literature predicts that state governments will set their overall level of taxation too low from a national welfare perspective.

When evaluating whether state governments set their overall levels of taxation too high or too low, the economics literature generally concludes that whether vertical externalities or horizontal externalities dominate is an empirical question.³⁵ The answer to this question varies across different institutional environments. In particular, the magnitude of vertical externalities is partially a function of how high the federal government sets its tax rates and of how the federal government constructs its tax bases. Accordingly, when considering whether state governments set their overall tax levels too high or too low, there is no universal answer to the question of whether horizontal externalities or vertical externalities dominate.

³² See *supra* note 19.

³³ Keen & Kotsogiannis, *supra* note 18, at 363.

³⁴ *E.g., id.*

³⁵ Keen, *supra* note 25, at 467–68.

Among other factors, the answer depends on how the federal government sets its tax policies.

Our focus in this Article is on state governments' incentives when selecting and designing tax bases, not on whether the overall level of state taxation or distribution is too high or too low. Thus, to cabin controversial questions about the proper size of governments, throughout most of this Article we will assume that state governments operate subject to both strict budget constraints and strict distribution constraints. In other words, we assume that state governments will raise the same level of overall revenues and promote the same amount of overall distribution, regardless of the structure of federal tax law.

By making these simplifying assumptions, we postpone for now engaging with some questions related to how tax cannibalization might affect the size of state governments. We later return to analyzing the implications of relaxing these simplifying assumptions.³⁶

C. *Incorporating Multiple Tax Bases*

Most of the economics literature on vertical externalities has examined only a single, fixed tax base.³⁷ In contrast, this Article evaluates the implications of vertical externalities for state governments' incentives when selecting amongst multiple, variable tax bases.

A handful of papers in the prior economics literature have examined the implications of vertical externalities when there are multiple (but fixed) tax bases. Most notably, an article by Michael Keen suggests that the risk of vertical externalities justifies efforts by a federal government to restrict state governments from taxing the same bases that are used by the federal government.³⁸ Because vertical externalities arise from state governments being empowered to overlap with the tax bases used by the federal government, the negative impact of vertical externalities could potentially be mitigated by restricting state governments from levying taxes that overlap with federal tax bases. However, neither Keen's article nor subsequent scholarship in the economics literature discusses the

³⁶ See *infra* Section IV.F.

³⁷ See William H. Hoyt, *Tax Policy Coordination, Vertical Externalities, and Optimal Taxation in a System of Hierarchical Governments*, 50 J. URB. ECON. 481, 492–93 (2001) (“With the exception of [one prior article], vertical fiscal externalities have been examined in the context of a single tax base, generally labor income, shared or ‘cooccupied’ by two different levels of government. . . . [This article goes further by considering] multiple (two) tax bases.”).

³⁸ See Keen, *supra* note 25, at 477.

implications of this general point with respect to specific forms of state-level taxation.³⁹

In addition to Michael Keen's work, a couple articles in the prior economics literature have noted that a federal government could correct for the impact of vertical externalities on state-level tax policy choices through some combination of: (a) subsidizing state-level use of tax bases that overlap less with the tax bases used by the federal government, and (b) penalizing state-level use of tax bases that overlap more with the tax bases used by the federal government.⁴⁰ Considering both vertical and horizontal externalities, then, this analysis suggests that the federal government perhaps should subsidize state governments' use of tax bases for which horizontal externalities overpower vertical externalities and penalize or restrict state governments' use of tax bases for which vertical externalities overpower horizontal externalities.

At least in theory, then, through the proper mix of subsidies, penalties, and restrictions, a federal government might correct for both the impact of vertical and horizontal externalities on state governments' tax policy choices. Nevertheless, it seems rather unlikely that a federal government would stumble upon this proper mix by accident. Accordingly, developing a better understanding of how vertical and horizontal externalities operate within the context of United States fiscal federalism is crucial for motivating the federal government to design its tax policies so as to alleviate the perverse incentives that tax cannibalization otherwise creates for state government tax decisionmaking.

In sum, whether vertical or horizontal externalities dominate with respect to any particular state-level tax policy choice depends on how the federal government sets its tax policies. This question cannot be answered in the abstract because the answer depends on the institutional structure of the fiscal federation being considered. Correspondingly, we focus this Article on how tax cannibalization manifests within the current structure of United States federal tax law.

³⁹ This is in part because Keen's analysis relies on traditional assumptions whereby formally different tax bases have been viewed as being effectively equivalent. *See id.* at 459–60 (“[T]here is an important distinction to be made between formal and effective concurrency. . . . For example, suppose that the states (and only the states) can levy a general sales tax, while the federal government (and only the federal government) can impose a proportional tax on wage income. Suppose too that these are the only taxes in the economy. Formal concurrency is then clearly zero. Yet it is well known that (at least with perfect capital markets) the two taxes are exactly equivalent: effective concurrency is complete.”). For a critique of these assumptions, see Gamage, *supra* note 29, at 403–04. For further discussion of how relaxing these assumptions reveals insights about vertical externalities, see *infra* Section III.B.

⁴⁰ Bev Dahlby, Jack Mintz & Sam Wilson, *The Deductibility of Provincial Business Taxes in a Federation with Vertical Fiscal Externalities*, 33 CANADIAN J. ECON. 677, 678–79 (2000); Hoyt, *supra* note 37, at 510–11.

II. STATE GOVERNMENTS' CURRENT TAX RATES GENERATE SUBSTANTIAL TAX CANNIBALIZATION

We now proceed to the core of our argument—analyzing ways in which the tax cannibalization problem manifests within the context of contemporary federal tax law. We demonstrate two major results in this Part. First, and primarily, we explain that vertical externalities almost certainly overpower horizontal externalities for the upper end of state tax rates on corporate income, capital gains, and ordinary income—*such that tax cannibalization is currently positive for these tax rates, and strongly so*. Second, we explain that this positive tax cannibalization is potentially so large to have biased at least some state governments to set certain of these tax rates above their national revenue-maximizing levels—*such that other governments may lose more than a dollar of net revenue from tax cannibalization per marginal dollar of revenue that these states raise from these tax rates*.

More precisely, in regard to our second point, we show that: *if the vertical distortions for the corporate income tax base are at or above the midpoints of the range reported in the existing empirical literature, then the current top corporate income tax rates in at least some states likely exceed their national revenue-maximizing levels*. Likewise, we show that: *if the vertical distortions for the capital gains tax base are at or above the midpoints of the range reported in the existing empirical literature, then the current top capital gains tax rates in at least some states likely exceed their national revenue-maximizing levels*. By contrast, we show that: *only if either the vertical distortions or the horizontal distortions for the ordinary income tax base are toward the high-points of the ranges reported in the existing empirical literature, would current top ordinary income tax rates then likely exceed their national revenue-maximizing levels in any state*.

Moreover, even if one assumed vertical distortions are substantially below the midpoints reported by the existing empirical literature, we show that tax cannibalization is still likely positive and substantial—such that it strongly biases state-level tax policy decisions. Building on the analysis in this Part, the next Part demonstrates biases that are more certain and that should hold more generally across the states—implying more profound and important policy implications.

Some preliminary clarifications are needed before we begin our analysis. First, both for the biases we demonstrate in this Part, and for the biases we demonstrate in the next Part, we assess bias as compared to a baseline of the national interest. Accordingly, we use the term “bias” as shorthand for expressing when the current structure of federal tax law results in state governments facing incentives that are perverse from the

standpoint of national welfare. We will later elaborate on why we adopt a national welfare perspective and so orient our discussion toward the federal government's interests (rather than, say, state governments' interests).⁴¹ For now, we emphasize that our inquiry is distinct from the related question of whether federal taxes might either "crowd out" or "crowd in" state taxes.⁴²

Second, we define the "national revenue-maximizing level" for a state tax rate as the point at which further hiking the tax rate would reduce the overall tax revenues raised by, in the aggregate, the state government setting the tax rate, the federal government, and other state governments.⁴³ The national revenue-maximizing level for a state tax rate thus incorporates both vertical and horizontal externalities. In contrast, the "acting state revenue-maximizing level" for a state tax rate only factors in the revenue effect to the state government setting the tax rate, and so does not incorporate either vertical or horizontal externalities. When vertical externalities overpower horizontal externalities, the national revenue-maximizing level for a state tax rate will be lower than the acting state revenue-maximizing level for that tax rate, and vice versa.

The concept that tax rates have revenue-maximizing levels has been very influential in tax policy debates.⁴⁴ This concept is often expressed in terms of the Laffer Curve, wherein "revenue first rises with the tax rate and then falls," with the revenue-maximizing level for a tax rate corresponding with the peak of its Laffer Curve.⁴⁵

⁴¹ See *infra* Section IV.F.

⁴² For example, were the federal government to replace its existing corporate and personal income taxes with a national sales tax, this would dramatically reduce the vertical externalities associated with state-level corporate and personal income taxes and would dramatically increase the vertical externalities associated with state-level sales taxes. This change to federal tax policy would thus quite clearly alter how state tax policy choices affect national welfare and the federal government's interests. However, in contrast, it is not at all clear how this federal policy change (considered on its own) would affect the actual policy decisions made by state governments. It is possible that this federal policy change might lead state governments to switch away from levying sales taxes ("crowding out"), but it is also possible that this federal policy change might lead state governments to switch to greater use of sales taxes ("crowding in"). For a discussion of the literature on this distinct, but related, question, see Galle, *supra* note 7.

⁴³ To contain the scope of our discussion, we do not consider local governments; nor do we evaluate property taxes—which are primarily used to fund local governments.

⁴⁴ See Dylan Mathews, *Where Does the Laffer Curve Bend?*, WASH. POST. (Aug. 9, 2010, 3:24 PM), http://voices.washingtonpost.com/ezra-klein/2010/08/where_does_the_laffer_curve_be.html [<https://perma.cc/45CE-B3MQ>].

⁴⁵ Jane G. Gravelle & Thomas L. Hungerford, *Corporate Tax Reform: Should We Really Believe the Research?*, 121 TAX NOTES 419, 422 (2008).

Governments that care about the welfare of their citizens should set tax rates well below their revenue-maximizing levels.⁴⁶ This is in part because the distortionary costs that result from a tax rate are thought to grow exponentially with the tax rate.⁴⁷ The detrimental impact to national welfare from these distortionary costs thus becomes disproportionately large as a tax rate approaches its national revenue-maximizing level.⁴⁸

Consequently, showing that a state tax rate has exceeded its national revenue-maximizing level has powerful implications. At least in theory, showing this implies that the federal government could promote overall national welfare simply by paying a state government to decrease its tax rate. Doing so would produce a “win, win, win”—for the federal government, for the state government, and for taxpayers. The federal government would “win” because the cost of paying the state government to reduce its tax rate would be less than the net revenue gain to the federal government (even after subtracting the cost of compensating other state governments for their revenue loss). The state government would similarly “win” because the amount of the payment received from the federal government would be more than the revenue the state government would relinquish by reducing its tax rate. Finally, taxpayers would “win” both because they would pay less in taxes and because overall distortionary costs would lessen.

Moreover, if the federal government cares to spend its revenue to promote national welfare, then the federal government can also produce a “win, win, win” by paying state governments to reduce tax rates even to somewhat below their national revenue-maximizing levels. For the goal of national welfare maximization, the optimal setting for state tax rates is their national welfare-maximizing levels, which should fall well below the setting for their national revenue-maximizing levels. To be sure, determining the national welfare-maximizing levels for tax rates requires contestable assumptions about the nature of welfare. Accordingly, showing that a tax rate has exceeded its national revenue-maximizing level is a more clear-cut result. Nevertheless, showing that a tax rate is set close to its national revenue-maximizing level is also a powerful result, as this implies that the tax rate has very likely exceeded its national welfare-maximizing level.

⁴⁶ Regulatory taxes (alternatively called corrective taxes or Pigovian taxes) are an exception to this general rule.

⁴⁷ See *supra* note 29 and accompanying text.

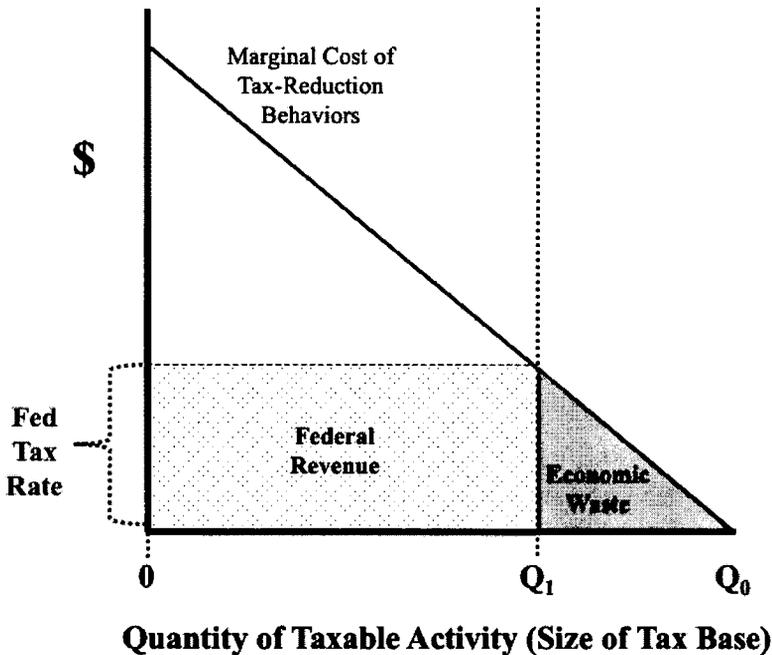
⁴⁸ See Gamage, *supra* note 27, at 43 (“[A]s tax rates are increased close to their revenue-maximizing points, the ratio of marginal distortionary costs per revenue raised approaches infinity.”).

In the remainder of this Part, we first explain some of our findings conceptually with illustrative graphs. Next, we proceed to discuss our model for approximating tax cannibalization. Finally, we apply that model to assess the current top state-level corporate income, capital gains, and ordinary income tax rates.

A. A Conceptual Explanation of Why Tax Cannibalization Is Positive and Large

Below, we graphically illustrate how taxpayers respond to taxation and how this generates economic waste. To begin with, in Figure 1, we show taxpayers responding to a federal tax rate through distortionary behaviors that reduce the size of the tax base—shrinking the tax base from Q_0 to Q_1 .⁴⁹ The gray triangle depicts the economic resources (or welfare) destroyed by the costs that taxpayers incur to engage in tax-reduction behaviors.

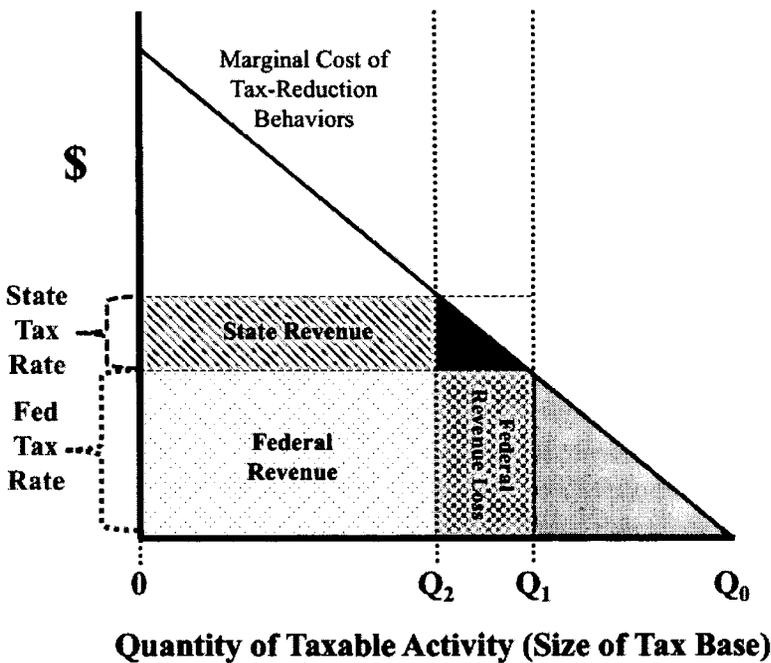
FIGURE 1: ONLY FEDERAL TAX RATE



⁴⁹ For further discussion of the logic underlying this Table, see Gamage, *supra* note 29, at 375–79.

So, then, what happens when we add a state-level tax that piggybacks on the federal tax base? As Figure 2 shows, below, adding a state-level tax raises the overall tax rate and thus induces taxpayers to engage in more tax-reduction behaviors that further shrink the tax base—from Q_1 to Q_2 .

FIGURE 2: STATE AND FEDERAL TAX RATES, WITH ONLY VERTICAL DISTORTIONS

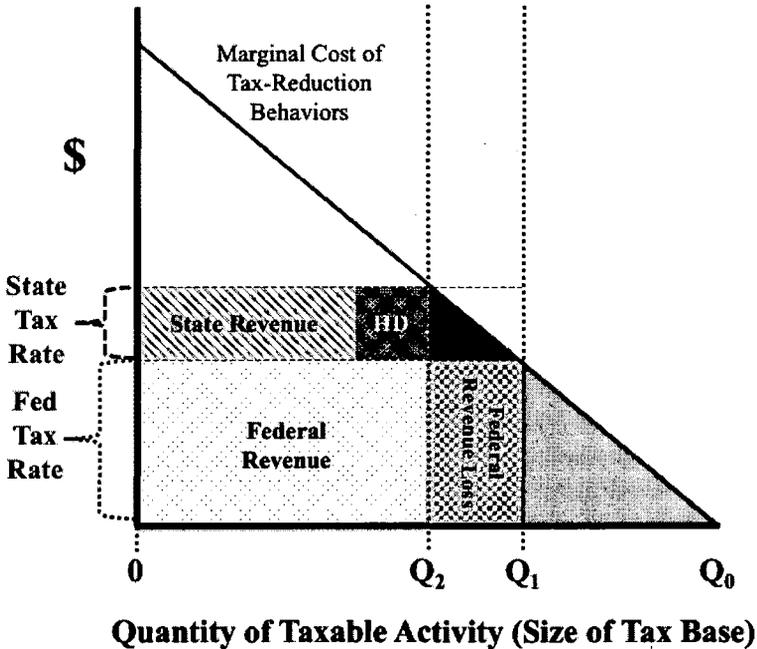


The additional economic waste that results from the state tax rate is depicted by the combination of the checkered rectangle (federal revenue loss) and the black triangle. Assuming that the state government does not care about the effect of the state tax rate on federal revenues, the checkered rectangle measures the vertical externalities generated by the state tax rate. Whereas the state government should care about the economic waste depicted by the black triangle, the state government may not care about the economic waste depicted by the checkered rectangle, because that economic waste takes the form of diminished federal government revenues.

The federal government currently levies tax rates on corporate income, ordinary income, and capital gains that are much higher than those levied by any state government. As Figure 2 illustrates, when the federal tax rate is larger than a state's tax rate, most of the economic waste generated by the state's tax rate affects the federal government (in the form of revenue loss) rather than the state government.

So far our figures have only shown vertical distortions, not horizontal distortions. Fully adding horizontal distortions to the figures would create excessive clutter. Accordingly, Figure 3, below, depicts only the key aspects of horizontal distortions—illustrating that horizontal distortions reduce the state-level tax base but do not similarly affect the federal-level tax base.

FIGURE 3: STATE AND FEDERAL TAX RATES, WITH BOTH VERTICAL AND HORIZONTAL DISTORTIONS



The gray square (labeled HD) shows horizontal distortions shrinking the state-level tax base but not the federal-level tax base.⁵⁰ Although not shown, some portion of this horizontal-distortions square should increase the tax base of other states, thereby generating horizontal externalities. To the extent that horizontal distortions generate horizontal externalities (in the form of increased revenue to other state governments), this can serve to alleviate the tax cannibalization problem. Yet horizontal distortions can also serve to exacerbate the tax cannibalization problem.

To understand why, tax cannibalization should be conceived of in terms of how it biases a state government's tax policymaking. To this end, we measure tax cannibalization as the aggregate revenue loss to other governments per dollar of tax revenue raised by an acting state government from its tax rate (in other words, the ratio of the revenue loss to other governments over the revenue gain to the acting state government). By measuring the size of the net externality in terms of the acting state's revenue gain, this ratio indicates what portion of the overall impact of a state's tax rate does *not* affect the acting state government directly. This ratio thus measures the extent to which tax cannibalization biases the acting state government's tax policymaking.

Accordingly, by shrinking the acting state's tax base, horizontal distortions reduce the denominator of this ratio and thereby potentially exacerbate the tax cannibalization problem. Put another way, the smaller that state-level revenues become as a result of horizontal distortions, the larger the ratio of vertical externalities over state-level revenues, and the greater the bias to state-government tax policymaking.

To see this on the figures, compare the checkered rectangle to the diagonal-patterned rectangle. Because the federal tax rate is much larger than the state tax rate, and because vertical distortionary responsiveness is shown as substantial, the checkered rectangle is rather large by comparison to the diagonal-patterned rectangle. This illustrates that federal-level revenue loss is rather large by comparison to state-level revenue gain. This portrays why tax cannibalization is such a major problem within the context of fiscal federalism. Further note that because the gray horizontal-distortions square shrinks only the diagonal-patterned rectangle, the checkered rectangle becomes even larger by comparison. This portrays how horizontal distortions can exacerbate the tax cannibalization problem.

⁵⁰ To the extent that taxpayers incur costs to engage in horizontal-distortionary tax-reduction behaviors, these costs might well shrink the federal tax base in addition to the state's tax base. To maintain simplicity, we do not show this aspect of horizontal distortions, nor do we incorporate this into our model. Incorporating this effect into our analysis would increase our approximations of the magnitude of the tax cannibalization problem, making this a conservative assumption for our purposes.

To further develop these insights, the remainder of this Part discusses and applies our model for drawing inferences from the existing empirical literature. Before proceeding, though, let us briefly foreshadow the key points of this analysis.

The existing empirical literature implies that there is substantial vertical distortionary responsiveness to tax rates on corporate income, capital gains, and (to a much lesser extent) ordinary income. By contrast, the empirical literature does not provide much in the way of solid evidence as to the possible magnitude of horizontal distortionary responsiveness to state-level tax rates on these bases. Nevertheless, because the empirical literature implies that the vertical distortionary responsiveness is substantial, and because federal-level tax rates on these bases are much larger than any state's tax rates, we infer that it is implausible that horizontal distortionary responsiveness could be large enough for horizontal externalities to counteract the impact of vertical externalities. As we will demonstrate, were horizontal distortionary responsiveness so large, this would imply that many state governments have currently set their state-level tax rates near or above their acting state revenue-maximizing levels. We do not know of any serious analysis suggesting that this is the case, and we think it exceedingly unlikely that this could be true without it being a major topic of academic and policy discussion.⁵¹ Overall, then, we conclude that tax cannibalization is very large for the current top state-level tax rates on corporate income and capital gains, and that tax cannibalization is rather large for the top state-level tax rates on ordinary income.

B. Our Model for Approximating Tax Cannibalization

We now discuss our model for approximating tax cannibalization. Our model is not designed to calculate the precise levels for national revenue-maximizing tax rates. Instead, our model relies on a number of simplifying assumptions and the model's outputs should be viewed as ballpark approximations. Nevertheless, these approximations still demonstrate that tax cannibalization is currently positive and large.

Our model uses five empirical inputs: (a) the effective marginal federal tax rate ("**Federal Tax Rate**" or TR_F), (b) the effective marginal tax rate of the other states to which taxable activity relocates through horizontal distortions ("**Other States' Tax Rate**" or TR_O), (c) the effective marginal tax rate of the acting state ("**Acting State's Tax Rate**" or TR_A), (d) the semi-elasticity of the vertical distortions induced by adjusting the acting state's tax rate ("**Vertical Distortions**" or VD), and (e) the semi-

⁵¹ For further explanation on this point, see *infra* note 75 and accompanying text.

elasticity of the horizontal distortions induced by adjusting the acting state's tax rate ("**Horizontal Distortions**" or *HD*).

The model then produces as outputs: (a) the acting state's revenue-maximizing level for its tax rate (TR_{ARM}), (b) the national revenue-maximizing level for the acting state's tax rate (TR_{NRM}), and (c) the marginal tax cannibalization at any specified level for the acting state's tax rate (*MTC*).

In the Technical Appendix accompanying this Article, we derive expressions for these outputs in terms of the five empirical parameters used as inputs. In the remainder of this Section, we clarify some aspects of our model and its key assumptions.

First, we define "marginal tax cannibalization" as the difference between the federal government's revenue loss and other state governments' revenue gain, all per marginal \$1.00 of revenue raised by the acting state from its tax rate.⁵² In other words, marginal tax cannibalization expresses the net dollars of revenue loss to other governments per incremental dollar of revenue raised by the acting state from its tax rate. Marginal tax cannibalization is thus positive when vertical externalities exceed horizontal externalities, and is negative when horizontal externalities exceed vertical externalities. Marginal tax cannibalization equals one at the national revenue-maximizing level for the acting state's tax rate (TR_{NRM}), and exceeds one above that level.

Proceeding to consider our model's inputs, the model uses semi-elasticity measurements as its inputs for vertical and horizontal distortions (*VD* and *HD*). These semi-elasticity measurements indicate the percentage shrinkage to a tax base induced by a one percentage point hike to the tax rate.

Semi-elasticity measurements are commonly used in the empirical literature on corporate income tax rates.⁵³ This is in contrast to elasticity measurements, which are more commonly used in the empirical literature on ordinary income and capital gains tax rates.⁵⁴

⁵² We limit our analysis to scenarios wherein the acting state's tax rate is below its acting state revenue-maximizing level (the peak of the Laffer curve), such that the marginal revenue the acting state raises from its tax rate is positive.

⁵³ E.g., Dhammika Dharmapala, *What Do We Know About Base Erosion and Profit Shifting? A Review of the Empirical Literature*, 35 *FISCAL STUD.* 421, 429 (2014); de Mooij & Ederveen, *supra* note 12, at 694–95.

⁵⁴ The reason for this difference is that semi-elasticity measurements are better suited to considering multiple governments' tax rates over the same time period, whereas elasticity measurements are better suited to considering a single government's tax rates over multiple time periods. The most reliable empirical estimates of corporate income tax responsiveness come from

Elasticity measurements indicate the percentage change to a tax base induced by a *percentage* change to the tax rate. Elasticity measurements can be converted into semi-elasticity measurements, and vice versa, but only with respect to a specific tax rate.⁵⁵ This is because both semi-elasticity and elasticity measurements can vary with tax rates, and the two sorts of measurements vary differently.⁵⁶ Either sort of measurement is thus only fully reliable when assessing small tax rate changes from tax rates close to those from which the measurements were estimated. Nevertheless, as is commonly done in the economics literature on corporate income tax rates, our model treats semi-elasticity measurements as fixed.⁵⁷ This simplifying assumption is necessary because we lack useful information about how either the semi-elasticity or the elasticity estimates reported by the existing literature might vary with tax rates.

Finally, perhaps our model's most significant simplifying assumption is that the model considers only a single tax base. The model then uses as inputs only a single federal tax rate, a single tax rate for the acting state, and a single tax rate for the other states. A more developed model would ideally use multiple tax rates for all of these, and also multiple corresponding measurements for vertical and horizontal distortions. This would be more exact because adjusting the tax rate on one tax base can affect other tax bases. However, we lack the empirical information needed to estimate the possible magnitude of these potential tax-base-interaction effects, and so there would be no reliable way to apply this more developed model based on the existing empirical literature.⁵⁸

studies of multiple governments' tax rates, whereas the most reliable empirical estimates of ordinary income and capital gains tax responsiveness come from studies of multiple time periods.

⁵⁵ 100 divided by the tax rate, all multiplied by the elasticity measurement, yields the equivalent semi-elasticity measurement with respect to that tax rate.

⁵⁶ Compare Dharmapala, *supra* note 53, at 429–30 (discussing how semi-elasticity measurements can vary with tax rates), with Seth H. Gertz, *The Elasticity of Taxable Income: Influences on Economic Efficiency and Tax Revenues, and Implications for Tax Policy*, in TAX POLICY LESSONS FROM THE 2000s 101, 129 (Alan D. Viard ed., 2009) (discussing how elasticity measurements can vary with tax rates).

⁵⁷ E.g., Dharmapala, *supra* note 53; de Mooij & Ederveen, *supra* note 12. It is more common in the literature on ordinary income and capital gains tax rates to treat elasticity measurements as fixed. In any case, because state tax rates are small in comparison to federal tax rates, we mostly assess what might be thought of as relatively small changes to the overall tax rate, thus limiting the impact of this simplifying assumption. As another (related) simplifying assumption, we assume that there are no interactions between measurements of vertical and horizontal distortions, such that it is valid to add our measurements together to calculate the aggregate marginal distortionary responses to state-level tax rates. Interactions between these measurements could point in either direction and we are not aware of any data for estimating possible interaction effects, so again this is a necessary simplifying assumption. For related discussion, see de Mooij & Ederveen, *supra* note 12, at 695.

⁵⁸ We suspect that fully incorporating tax-base-interaction effects would more likely than not reduce our model's approximations for the national revenue-maximizing levels for the acting state's tax

C. *Approximating Tax Cannibalization for State Corporate Income Tax Rates*

The largest source of uncertainty in our model's approximations comes from uncertainty about the empirical parameters for vertical and horizontal distortions. Looking first to corporate income tax rates, the existing empirical literature reports a range of possible estimates for vertical distortions and only reports suggestive evidence for horizontal distortions.

Vertical distortions are induced by the overall tax rate on corporate income—the aggregate federal and state tax rates. We thus look to the literature on federal-level corporate income tax rates for estimates of the vertical distortions induced by state-level corporate income tax rates.⁵⁹ A

rates, thus potentially magnifying our model's approximations of the tax cannibalization problem. The case for inferring this is probably strongest with respect to corporate income tax rates. This is primarily because hiking a state-level corporate income tax rate would almost certainly result in at least some amount of negative tax-base-interaction effects in terms of shrinking other federal-level tax bases, such as personal income tax bases. For instance, to the extent that hiking a state-level corporate income tax rate induces reduction to domestic capital stock or causes corporations to move jobs overseas, this would almost certainly result in at least some shrinkage to the federal personal income tax bases. Weighing against this, hiking a state-level corporate income tax rate could also have a positive tax-base-interaction effect on the federal personal income tax bases to the extent that the corporate income tax serves as a backstop to the personal income tax, but this positive effect is almost certainly much smaller than the negative effects under the current settings for the federal government's tax rates. Also weighing against this is that hiking a state-level corporate income tax rate could induce negative tax-base-interaction effects with respect to other state-level tax bases through horizontal distortions. However, because the federal government's tax rates on the personal income tax base are several times larger than any state's tax rates, and because negative horizontal tax-base-interaction effects would also reduce the acting state's revenue-maximizing tax rate and thereby additionally reduce that state's national revenue-maximizing tax rate, net negative horizontal tax-base-interaction effects would need to be improbably large relative to net negative vertical tax-base-interaction effects for these factors to imply that our model overestimates (rather than underestimates) tax cannibalization, at least with respect to corporate income tax rates. How these conflicting vectors might weigh out is less clear with respect to capital gains tax rates, primarily because there is much stronger evidence that capital gains tax rates serve as a significant backstop to ordinary income tax rates under the current federal rate structure. However, to the extent that capital gains tax rates induce even a small decrease to savings or investment behaviors, the negative tax-base interaction effects of this with respect to the federal government's other tax bases would quite possibly overpower the conflicting vectors (as with our discussion of corporate income tax rates above).

⁵⁹ State-level corporate income tax bases deviate from the federal government's corporate income tax-base-definition rules in some important ways (especially in regard to foreign source income), and so taxpayers might respond somewhat differently to state-level corporate income tax rates than to the federal rates. However, state-level corporate income taxes are vulnerable to all of the same major vertical distortionary responses as is the federal corporate income tax. (For instance, shifting reported profits to a foreign jurisdiction to reduce federal-level corporate income tax liabilities should also simultaneously reduce state-level corporate income tax liabilities.) Thus, state-level corporate income tax bases mostly overlap with the federal corporate income tax base, in the ways that are most important for our analysis. Moreover, we are not aware of any empirical literature helpful for assessing whether and how vertical distortionary responses to state-level corporate income tax rates might differ from

review of this literature by the economists Ruud de Mooij and Sjef Ederveen reports an estimated semi-elasticity for the overall vertical distortions induced by corporate income tax rates of 3.1.⁶⁰ This aggregate semi-elasticity measurement is further supported by research from the economist Kimberly Clausing.⁶¹

Other economists, however, have argued that these semi-elasticity measurements are probably too high. For instance, Dhammika Dharmapala reviews the empirical literature for the most important component of these reported semi-elasticity measurements (profit shifting) and reports an estimate for this component significantly smaller than the one relied upon by de Mooij and Ederveen.⁶² Also, Jane Gravelle and Thomas Hungerford have argued that aggregate semi-elasticities are likely much lower than those reported in the work of de Mooij and Ederveen or that of Clausing.⁶³ More recently, a draft paper by Laura Kawano and Joel Slemrod suggests that the aggregate semi-elasticity measurement might be around 2.⁶⁴

those to federal corporate income tax rates. As a simplifying assumption, we thus treat the vertical distortionary responses to federal- and state-level tax rates as being the same. Were we to try to relax this assumption (and thereby complicate our analysis), we might start with the observation that we have gathered from discussions with tax lawyers who advise on corporate tax planning transactions that the models used to evaluate the tax implications of tax planning by multinationals often rely on blended state-level tax rates rather than actual state-level tax rates. This suggests that the corporate tax rate set by each state government may have much smaller impact on state-level revenues, and much larger negative impact on the federal government and other state governments' revenues, than our model implies. To the extent so, our model may considerably underestimate the magnitude of the tax cannibalization problem for state-level corporate income taxes.

⁶⁰ De Mooij & Ederveen, *supra* note 12, at 695. In contrast to de Mooij and Ederveen, and to some of the other research we cite below, note that we list semi-elasticity estimates using positive numbers, thus interpreting these estimates as measurements of tax base shrinkage rather than as estimates of tax base growth. We translate the semi-elasticity estimates reported in the literature to our usage as appropriate. Also note that these estimates are based on international data, as is almost all of the useful empirical literature on corporate income tax responsiveness.

⁶¹ Kimberly A. Clausing, *The Revenue Effects of Multinational Firm Income Shifting*, 130 TAX NOTES 1580, 1584 (2011) ("That yields a semi-elasticity of [3.3] . . . consistent with studies reviewed in de Mooij and Ederveen . . ."). In a more recent draft paper Clausing reports that "[t]he semi-elasticities range from [1.85 to 4.61], with an average estimate of [2.92]." Kimberly A. Clausing, *The Effect of Profit Shifting on the Corporate Tax Base in the United States and Beyond* 11 (June 17, 2016) (unpublished manuscript), http://papers.ssrn.com/sol3/Papers.cfm?abstract_id=2685442 [<https://perma.cc/TM5-ZADT>] [hereinafter Clausing, *The Effect*].

⁶² Dharmapala, *supra* note 53, at 432. *But see* Clausing, *The Effect*, *supra* note 61, at 6–7 (arguing against Dharmapala's interpretation of the data).

⁶³ Gravelle & Hungerford, *supra* note 45, at 426 (finding smaller estimates of responsiveness than Clausing's).

⁶⁴ Kawano and Slemrod suggest that the revenue-maximizing tax rate for "large, open countries" might be 50%. Laura Kawano & Joel Slemrod, *How Do Corporate Tax Bases Change When Corporate Tax Rates Change? With Implications for the Tax Rate Elasticity of Corporate Tax Revenues* 23 (Aug. 29, 2015) (unpublished manuscript), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2559858 [<https://perma.cc/R3ZC-29AG>]. This implies a semi-elasticity of 2, as the revenue-maximizing tax rate

Turning to horizontal distortions, the existing empirical literature offers only suggestive evidence. The most relevant estimates for our purposes are probably those of Xavier Giroud and Joshua Rauh, who estimate the effect of state-level corporate income tax rates on the number of business establishments within a state and also on employment by business establishments within a state.⁶⁵ Their results for employment could be taken to suggest an overall semi-elasticity for state-level corporate income tax rates (including both vertical and horizontal distortions) of perhaps 5.8.⁶⁶ Especially relevant for our purposes is their finding that approximately half of their estimated effects result from economic activity relocating across state lines,⁶⁷ potentially implying that the horizontal distortions induced by state-level corporate income tax rates might be of similar magnitude to the vertical distortions. Based on the overall semi-elasticity estimate of 5.8, this could suggest that vertical and horizontal distortions might each be around 2.9⁶⁸—a result similar to de Mooij and Ederveen’s and Clausing’s estimates for vertical distortions.

is given by 100 divided by the semi-elasticity measurement, as explained in de Mooij & Ederveen, *supra* note 12, at 681. Note that Kawano and Slemrod stress the uncertainty in the research and how the factors they consider “attenuate” the larger semi-elasticity estimates implied by prior research (such as Clausing’s). Accordingly, although a semi-elasticity estimate of 2 can be inferred from their analysis, they do not directly report this or any other estimates.

⁶⁵ Giroud & Rauh, *supra* note 11.

⁶⁶ They report that “the elasticity of C corporation employment for a given establishment is 0.4 with respect to the state corporate income tax rate.” *Id.* at 4. This corresponds with a semi-elasticity of about 5.8 at what they report as the mean corporate income tax rate in their study of 6.85% (because $(100 / 6.85) \times 0.4 = \sim 5.8$). *Id.* at 19–20. The study’s estimates likely measure only a portion of the aggregate distortions induced by state-level corporate income tax rates (implying that this estimated overall semi-elasticity may be too low for our purposes). However, the study’s estimates are derived from a sample of firms for which responsiveness is likely to be especially high (implying that this estimated overall semi-elasticity may be too high for our purposes). *Id.* at 31–32. We thus view this estimate as being only suggestive for our purposes, although we view it as the best estimate currently available.

⁶⁷ *Id.* at 6.

⁶⁸ Some other studies support similarly large estimates for the aggregate distortions induced by state-level corporate income tax rates. See, e.g., James R. Hines, Jr., *Altered States: Taxes and the Location of Foreign Direct Investment in America*, 86 AM. ECON. REV. 1076, 1076 (1996) (“While it is not quite correct to extrapolate these figures to conclude that increasing a state tax rate from 6 percent to 8 percent would reduce total investment by 20 percent, the estimated effects are nevertheless large and important . . .”); Juan Carlos Suárez Serrato & Owen Zidar, *Who Benefits from State Corporate Tax Cuts? A Local Labor Markets Approach with Heterogeneous Firms 2* (Nat’l Bureau of Econ. Research, Working Paper No. 20289, 2014) (“We find that a 1% cut in local business taxes increases the number of local establishments by 3 to 4% over a ten-year period.”). Yet the findings of other studies suggest relatively small horizontal distortions. See Hines, *supra*, at 1079 (“Analysts typically find little or no effect of subnational taxes on the location of business activity.”). For a review of the literature, see Suárez Serrato & Zidar, *supra*, at 6 n.10. Overall, it is difficult to infer what these studies imply about the likely magnitude of horizontal distortions, so we show a relatively wide range in Table 1.

Regardless of what perspective one might take on the debates over this empirical evidence, our purpose in this discussion is only to explain what the range of estimates reported by the existing empirical literature implies about the possible magnitude of tax cannibalization. In Table 1, below, we show our model's outputs with respect to a range of vertical distortion measurements of between 2 and 3, and also 1 to depict the implications of a low-end measurement. We then show how the model's outputs vary with respect to a (wider) range of measurement for horizontal distortions, focusing on the range of between 0 and 4, but also showing 8 to depict the implications of a high-end outlier measurement.

Next, we turn to the other empirical input parameters in our model. We set the federal government's top statutory corporate tax rate of 35% as our input for the federal tax rate (TR_F).⁶⁹

We do not know of any data source or prior research that directly estimates a value for the other states' tax rate (TR_O). However, it stands to reason that the majority of taxable activity relocated through horizontal distortions moves to states with below-median tax rates. We thus use 4.4% as our input for the other states' tax rate,⁷⁰ an estimate equal to two-thirds of the approximate median state-level corporate income tax rate of 6.6%.⁷¹

Finally, for the acting state's tax rate (TR_A), state-level statutory corporate tax rates range from 12% (Iowa) to 0% (six states that do not levy corporate income taxes).⁷² Table 1 shows outputs for Pennsylvania's tax rate of 9.99% (the second highest) and for California's tax rate of 8.84% (the tenth highest).

Based on these inputs, Table 1 shows our model's outputs across a range of measurements for vertical and horizontal distortions:

⁶⁹ The appropriate value here is the effective marginal tax rate with respect to vertical distortions, not the effective average tax rate (which may be much lower). The statutory federal tax rate should thus be a reasonable proxy. Although statutory federal corporate tax rates are graduated, the vast majority of taxable corporate income is subject to this 35% statutory marginal tax rate. In any case, adjusting this parameter within the range of plausibility does not dramatically alter the results.

⁷⁰ This is somewhat arbitrary, but adjusting this parameter within the range of plausibility does not dramatically alter the results.

⁷¹ We derive the median rate from RAYMOND J. KEATING, SMALL BUSINESS & ENTREPRENEURSHIP COUNCIL, SMALL BUSINESS TAX INDEX 2014: BEST TO WORST STATE TAX SYSTEMS FOR ENTREPRENEURSHIP AND SMALL BUSINESS 8 (2014), <http://www.sbecouncil.org/wp-content/uploads/2014/04/BTI2014Final.pdf> [<https://perma.cc/DU5H-8ZXV>].

⁷² We take all our figures for state-level corporate tax rates from *State Corporate Income Tax Rates as of January 1, 2014*, TAX FOUND. (Mar. 22, 2013), <http://taxfoundation.org/article/state-corporate-income-tax-rates> [<https://perma.cc/XLS2-ADCW>].

TABLE 1: APPROXIMATING TAX CANNIBALIZATION FOR CORPORATE INCOME TAX RATES⁷³

		Horizontal Distortions (HD)						
		0	1	2	3	4	8	
Vertical Distortions (VD)	1.0	100.0	50.0	33.3	25.0	20.0	11.1	ActStRevMaxTR (%)
		65.0	34.7	24.6	19.6	16.5	11.1	NatRevMaxTR (%)
		\$0.38	\$0.37	\$0.36	\$0.34	\$0.31	-\$0.01	MargTaxCann (\$) at CA tax rate of 8.84%
		\$0.39	\$0.38	\$0.37	\$0.36	\$0.35	-\$0.02	MargTaxCann (\$) at PA tax rate of 9.99%
	2.0	50.0	33.3	25.0	20.0	16.7	10.0	ActStRevMaxTR (%)
		15.0	11.5	9.7	8.6	7.9	6.5	NatRevMaxTR (%)
		\$0.85	\$0.89	\$0.95	\$1.02	\$1.12	\$3.00	MargTaxCann (\$) at CA tax rate of 8.84%
		\$0.87	\$0.94	\$1.02	\$1.13	\$1.31	\$348.00	MargTaxCann (\$) at PA tax rate of 9.99%
	2.5	40.0	28.6	22.2	18.2	15.4	9.5	ActStRevMaxTR (%)
		5.0	4.8	4.7	4.7	4.6	4.5	NatRevMaxTR (%)
		\$1.12	\$1.20	\$1.31	\$1.45	\$1.64	\$7.28	MargTaxCann (\$) at CA tax rate of 8.84%
		\$1.17	\$1.28	\$1.43	\$1.65	\$1.99	N/A	MargTaxCann (\$) at PA tax rate of 9.99%
3.0	33.3	25.0	20.0	16.7	14.3	9.1	ActStRevMaxTR (%)	
	N/A	N/A	N/A	N/A	N/A	N/A	NatRevMaxTR (%)	
	\$1.43	\$1.56	\$1.72	\$1.95	\$2.29	N/A	MargTaxCann (\$) at CA tax rate of 8.84%	
	\$1.50	\$1.68	\$1.92	\$2.29	\$2.91	N/A	MargTaxCann (\$) at PA tax rate of 9.99%	

For the first takeaway from Table 1, note that marginal tax cannibalization (*MTC*) is positive for every cell except for the outliers, where vertical distortions are 1 and horizontal distortions are 8. This is because vertical externalities are greater than horizontal externalities so long as the ratio of the federal tax rate over the other states' tax rate ($\frac{TR_F}{TR_O}$) exceeds the ratio of horizontal distortions over vertical distortions ($\frac{HD}{VD}$).⁷⁴ With a federal tax rate of 35%, and with other states' tax rate of 4.4%, this means that horizontal distortions would need to be almost eight times larger than vertical distortions for horizontal externalities to exceed vertical externalities.

We thus infer that vertical externalities almost certainly exceed horizontal externalities for state-level corporate income tax rates. This is because a vertical distortions measurement of 1 seems improbably low based on the range reported in the existing empirical literature, and a horizontal distortions measurement of 8 seems improbably high.

The primary reason why a horizontal distortions measurement as high as 8 seems improbable is because this would imply that some state governments have set their current corporate income tax rates close to or above their acting state revenue-maximizing levels. This can be seen in the far right column of Table 1, where the TR_{ARM} values are all below Iowa's tax rate of 12% and where the values associated with the more plausible vertical distortions measurements are also at or below Pennsylvania's and

⁷³ When the acting state's tax rate exceeds the revenue-maximizing level for the acting state (TR_{ARM}), marginal tax cannibalization (*MTC*) becomes infinite. We thus put "N/A" in those boxes to indicate "Not Applicable." Also, when *VD* is 3, the federal tax rate is above its revenue-maximizing level, such that the TR_{NRM} is negative. We thus put "N/A" in those boxes also.

⁷⁴ In other words, vertical externalities exceed horizontal externalities (such that *MTC* is positive) so long as $\frac{TR_F}{TR_O} > \frac{HD}{VD}$. This is readily derived from Expression (C) in the Technical Appendix.

other states' tax rates. If any current state-level corporate income tax rate were set close to their acting state revenue-maximizing levels, we would almost certainly have heard some indications of this in discussions of the revenue estimates for state-level corporate income tax reforms.⁷⁵ That we have not heard any such indication cements our confidence that vertical externalities currently exceed horizontal externalities for state-level corporate income tax rates. More generally, because the federal government's corporate income tax rate is so much higher than state-level corporate income tax rates, horizontal distortions would need to be implausibly big relative to vertical distortions for tax cannibalization to not be positive.

So, then, is this positive tax cannibalization sufficiently large for any state-level corporate income tax rates to exceed their national revenue-maximizing levels? As Table 1 shows, if vertical distortions are 2 (as suggested by Slemrod and Kawano's analysis), and if horizontal distortions are also 2, then our model implies that the national revenue-maximizing state tax rate is 9.7%. Iowa's current top tax rate of 12%, Pennsylvania's of 9.99%, the District of Columbia's of 9.975%, and Minnesota's of 9.8%, would thus all exceed their national revenue-maximizing levels. At Pennsylvania's current tax rate, other governments would lose \$1.02 of revenue from tax cannibalization for every marginal \$1.00 raised by Pennsylvania.

By comparison, if horizontal distortions are 3, and vertical distortions are 2, then the national revenue-maximizing tax rate would fall to 8.6%, implying that the top corporate income tax rates currently levied in Illinois (9.5%), Alaska (9.4%), Rhode Island (9%), New Jersey (9%), Connecticut (9%), Maine (8.93%), California (8.84%), and Delaware (8.7%) would all also exceed their national revenue-maximizing levels. At Pennsylvania's current tax rate, other governments would then lose approximately \$1.13 of

⁷⁵ On this point, note that state governments are typically *very* concerned with how adjusting state tax rates affects the acting state's revenues (in contrast to federal or other states' revenues). Indeed, economists employed by state governments regularly devise revenue estimates to estimate the impact that proposals for raising or lowering state tax rates would have on the acting state's revenues, and these revenue estimates are often then critically reviewed by other economists working in think tanks, advocacy organizations, and academic institutions. In the conclusion to this Article, we explain that the prior invisibility of tax cannibalization likely arises at least in part from state governments lacking reasons to estimate how adjusting state-level tax rates affects federal revenues. The opposite is true for how state-level tax rates affect revenues in the acting state, as state legislatures need revenue estimates in order to pass budgets and to comply with balanced budget requirements, and other state financial officials similarly need estimates in order to monitor compliance with balanced budget requirements and to fulfill their responsibilities with respect to bond issuances. It would be strongly against the interests of a state government to set a tax rate above its acting state revenue-maximizing level, and state government officials know this well.

revenue from tax cannibalization for every marginal \$1.00 raised by Pennsylvania. Moreover, these approximations were all based on what we take to be a lower point in the range of reported estimates for vertical distortions.

We consider 2.5 to be a plausible midpoint estimate for vertical distortions, as this estimate is slightly less than halfway between Slemrod and Kawano's (2) and de Mooij and Edverdeen's and Clausing's (3.1). If vertical distortions are 2.5 or greater, then our model implies that top corporate income tax rates currently exceed their national revenue-maximizing levels in the majority of the states. Moreover, this result holds for any plausible measurement of horizontal distortions.

For example, if vertical distortions are 2.5 and if horizontal distortions are 3, then the implied national revenue-maximizing tax rate is 4.7%—well below the median state-level corporate income tax rate of 6.6%. At California's current tax rate of 8.84%, other governments would then lose \$1.45 of revenue from tax cannibalization for every marginal \$1.00 of revenue raised by California. At Pennsylvania's current tax rate of 9.99%, other governments would lose \$1.65 of revenue from tax cannibalization for every marginal \$1.00 of revenue raised by Pennsylvania.

Consequently, based on mid-range estimates from the empirical literature, our model implies that the current top corporate income tax rates in at least some states probably exceed their national revenue-maximizing levels. Indeed, this is quite possibly the case for the majority of states.

Furthermore, even much lower estimates for vertical distortions still imply that the tax cannibalization problem is positive and large. For instance, suppose one believed that the vertical distortions caused by state corporate income tax rates were as low as 1.⁷⁶ Suppose as well that one believed that horizontal distortions were three times the magnitude of vertical distortions. Even in such a case, at California's tax rate of 8.84%, other governments would then lose \$0.34 of revenue from tax cannibalization for every marginal \$1.00 of revenue raised by California.

An additional takeaway is worth emphasizing. Note that, in the leftmost column of Table 1, where horizontal distortions are 0, the acting

⁷⁶ For instance, because many large multinationals have already adopted water's-edge elections, an increase in the corporate income tax rate of one state may not impact all worldwide income for some firms. (We are grateful to Steve Sheffrin for making this point.) Or perhaps state-level tax rates are less salient than federal-level tax rates; for general discussions of tax salience, see David Gamage, *On the Future of Tax Salience Scholarship: Operative Mechanisms and Limiting Factors*, 41 FLA. ST. U. L. REV. 173 (2013); David Gamage & Darien Shanske, *Three Essays on Tax Salience: Market Salience and Political Salience*, 65 TAX L. REV. 19 (2011); Andrew T. Hayashi, Brent K. Nakamura & David Gamage, *Experimental Evidence of Tax Salience and the Labor-Leisure Decision: Anchoring, Tax Aversion, or Complexity?*, 41 PUB. FIN. REV. 203 (2013).

state's revenue-maximizing tax rate (TR_{ARM}) is equal to what the federal government's revenue-maximizing tax rate would be if the state-level taxes were all 0. The difference between each set of TR_{ARM} and TR_{NRM} values in the first column is thus 35, equal to the federal government's tax rate.

Now consider how the values for both TR_{ARM} and TR_{NRM} then become lower within each row as horizontal distortions become positive and larger. This depicts how state-level corporate income tax rates are less efficient than are federal-level corporate income tax rates, to the extent of horizontal distortions. Whereas the federal-level corporate income tax rate only induces vertical distortions, state-level corporate income tax rates induce both vertical and horizontal distortions. This illustrates the logic behind the "classic theoretical result" of the fiscal federalism literature—that taxation of mobile tax bases is most efficiently handled by the federal government.⁷⁷ Building on the newer vertical externalities literature, we show that state governments face incentives to tax these bases anyway—despite the relative inefficiency—because much of the cost from their doing so is borne by the federal government. Indeed, we further show that these incentives are so strong within the context of contemporary U.S. fiscal federalism that at least some state governments' current top corporate income and capital gains tax rates likely exceed their national revenue-maximizing levels.

D. *Approximating Tax Cannibalization for State Capital Gains Tax Rates*

The analysis for capital gains and for ordinary income tax rates is less straightforward, because the federal government and many state governments levy progressive schedules of tax rates on these tax bases. To keep the exposition manageable, we only show our model's approximations with respect to taxpayers within the top federal rate bracket.⁷⁸

⁷⁷ See *supra* note 20 and accompanying text.

⁷⁸ By comparison, our model's approximations for tax cannibalization are significantly lower for taxpayers within the 15% federal capital gains brackets, such that state-level capital gains tax rates are less likely to exceed their national revenue-maximizing levels with respect to these taxpayers. However, tax cannibalization almost certainly remains strongly positive for these taxpayers, with at least some state-level top tax rates quite probably still exceeding their national revenue-maximizing levels (depending on the measurements used for vertical and horizontal distortions). Thus, because the 15% federal capital gains bracket begins at relatively low income ranges, and because most states' capital gains brackets are at least mildly progressive, this caveat does not dramatically limit the applicability of our approximations for the top state-level capital gains tax rates. In any case, Table 2 shows marginal tax cannibalization approximations only for California and New Jersey, wherein the top capital gains tax brackets correspond closely enough with the top federal bracket to obviate this caveat with respect to those (and also some other) states. See *infra* note 93 and accompanying text.

Looking first to the vertical distortions input, some scholars have argued that taxing capital gains might substantially reduce savings or investment behaviors,⁷⁹ thereby potentially generating very large vertical distortions. Yet, we and some other scholars are skeptical.⁸⁰

The more convincing empirical evidence of sizeable vertical distortions for current capital gains tax rates is based instead on “selective realization responses.” Numerous studies have demonstrated that taxpayers’ decisions of whether to realize gains are very responsive to the capital gains tax rate, especially as a transitory matter but also persistently.⁸¹ Most notably, a recent paper by the staff of both the Joint Committee on Taxation and the Congressional Budget Office estimates an elasticity for distortionary responses from persistent selective realization of 0.75,⁸² which implies that the semi-elasticity for these vertical distortions is around 2.99.⁸³ We consider this to be a reasonable midpoint estimate from the existing empirical literature.⁸⁴

Turning to the horizontal distortions input, we are not aware of any existing research that reports estimates for the interstate-mobility-related effects of capital gains tax rates. The closest suggestive evidence that we are aware of comes from a handful of studies examining the interstate mobility responses of high-income taxpayers to state tax rates more generally. For instance, a paper by the economists Jon Bakija and Joel Slemrod finds that “a one percentage point increase” in the applicable state-

⁷⁹ See, e.g., Christophe Chamley, *Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives*, 54 *ECONOMETRICA* 607, 619 (1986); Kenneth L. Judd, *Optimal Taxation and Spending in General Competitive Growth Models*, 71 *J. PUB. ECON.* 1, 1 (1999).

⁸⁰ For discussion, see Gamage, *supra* note 29, at 414–17.

⁸¹ Tim Dowd et al., *New Evidence on the Tax Elasticity of Capital Gains*, 68 *NAT’L TAX J.* 511, 511–13 (2015).

⁸² *Id.* at 538 (“In this paper, we estimate the elasticities of long-run capital gains with respect to permanent and transitory tax changes. Adapting a model developed by Burman and Randolph (1994a, 1994b) and extended by Auerbach and Siegel (2000), we estimate elasticities of permanent tax changes in the range of -0.59 to -1.40, with most estimates about -0.75.”).

⁸³ This is based on a reference tax rate of 25.1%—the sum of the top federal tax rate of 20% (the rate for much of the time period from when this elasticity estimate was calculated) and the median top state-level tax rate of 5.1%. Then, 100 divided by 25.1, multiplied by 0.79, yields 3.15.

⁸⁴ Of course, some other research argues that these vertical distortions are lower. For instance, the economist Jane Gravelle reports that the elasticity for persistent selective realization responses is likely at or below 0.5, which implies that the semi-elasticity may be 2 or lower. JANE G. GRAVELLE, *CONG. RESEARCH SERV.*, R41364, *CAPITAL GAINS TAX OPTIONS: BEHAVIORAL RESPONSES AND REVENUES* (2010). Conversely, other research argues that these vertical distortions are higher. For instance, the economist Paul Evans reports a semi-elasticity estimate for selective realization responses of 10, calling this a “conservative” estimate as compared to his high-end semi-elasticity estimate of 29.78. PAUL EVANS, *IRET CAPITAL GAINS SERIES, THE RELATIONSHIP BETWEEN REALIZED CAPITAL GAINS AND THEIR MARGINAL RATE OF TAXATION, 1976–2004*, at 13 (2009), <http://iret.org/pub/CapitalGains-2.pdf> [<https://perma.cc/2YM2-363X>].

level estate tax rate “is associated with 1.4 percent to 2.7 percent decline in the number of federal estate tax returns filed in the state.”⁸⁵ This perhaps suggests that the semi-elasticity for horizontal distortions might be somewhere in the neighborhood of 1.4 to 2.7. Another paper reports results implying “that the effect of New York cutting its marginal tax rate on the top 1% of earners from 7.5% to 6.85% in 2006 was . . . a [net] 2.1% increase [in the number of star scientists locating in New York].”⁸⁶ This could perhaps suggest that the semi-elasticity for horizontal distortions might be somewhere near the neighborhood of 3.2.⁸⁷ However, another paper reports that horizontal distortions with respect to millionaire migration may be considerably lower, with the implied semi-elasticity perhaps being close to 0.15.⁸⁸ Overall, it is hard to know what to make of these divergent and only tenuously relevant estimates, but we think a plausible range for horizontal distortions might perhaps be somewhere between 0 and 4.

Regardless, as in the previous Section, our purpose here is only to explain what the range of estimates reported in the existing empirical literature implies about the possible magnitude of tax cannibalization. In Table 2 below, we show our model’s outputs with respect to vertical distortion measurements of 3 and 3.5, while also showing 1 as a low-end outlier measurement. We then show how the model’s outputs vary with respect to a (wider) range of measurements for horizontal distortions, focusing on the range of between 0 and 4, but also showing 7 as a high-end outlier measurement.

Turning to our model’s other empirical input parameters, we use 23.8% as our input for the federal tax rate (TR_F),⁸⁹ which is the sum of the 20% top statutory federal capital gains tax rate and the 3.8% federal Net

⁸⁵ Jon Bakija & Joel Slemrod, *Do the Rich Flee from High State Taxes? Evidence from Federal Estate Tax Returns* 5 (Nat’l Bureau of Econ. Research, Working Paper No. 10645, 2004).

⁸⁶ Enrico Moretti & Daniel Wilson, *The Effect of State Taxes on the Geographical Location of Top Earners: Evidence from Star Scientists* 4 (Nat’l Bureau of Econ. Research, Working Paper No. 21120, 2015).

⁸⁷ Because 2.1% divided by the difference of 7.5% and 6.85% yields 3.23.

⁸⁸ See Cristobal Young et al., *Millionaire Migration and Taxation of the Elite: Evidence from Administrative Data*, 81 AM. SOC. REV. 421, 434 (2016). This study reports a “millionaire population elasticity” of 0.1. *Id.* (emphasis omitted). It is unclear what tax rate(s) this elasticity corresponds with, making it difficult to translate this into a semi-elasticity estimate. At the “optimal tax rate on top incomes of 68 percent” implied by their analysis, *id.*, this might suggest a semi-elasticity of 0.15 (from 100 divided by 68, then multiplied by 0.1).

⁸⁹ This should be a reasonable proxy for the top effective marginal tax rate. See *supra* note 69 and accompanying text. In any case, adjusting this value within the range of plausibility does not dramatically alter the results. But remember that we are only showing approximations with respect to taxpayers who are subject to the top federal rate bracket. See *supra* note 78.

Investment Income Tax rate that went into effect in 2013.⁹⁰ We then use as our input for other states' tax rate (TR_O) an estimate of 3.4%,⁹¹ equal to two-thirds of the approximate median top state-level capital gains tax rate of 5.1%.⁹² Finally, (for TR_A), top state-level statutory capital gains tax rates range from California's 13.3% to 0% in the nine states that do not levy capital gains taxes. Table 2 shows outputs for California's top tax rate of 13.3% (the highest) and for New Jersey's top tax rate of 8.97% (the fourth highest).⁹³

Based on all of these inputs, Table 2 shows our model's outputs across a range of measurements for vertical and horizontal distortions:

TABLE 2: APPROXIMATING TAX CANNIBALIZATION FOR CAPITAL GAINS TAX RATES⁹⁴

		Horizontal Distortions (HD)						
		0	1	2	3	4	7	
Vertical Distortions (VD)	1.0	100.0	50.0	33.3	25.0	20.0	12.5	ActStRevMaxTR (%)
		76.2	39.8	27.7	21.6	18.0	12.5	NatRevMaxTR (%)
		\$0.27	\$0.28	\$0.28	\$0.29	\$0.30	N/A	MargTaxCann (\$) at CA tax rate of 13.3%
		\$0.26	\$0.25	\$0.23	\$0.21	\$0.18	\$0.00	MargTaxCann (\$) at NJ tax rate of 8.97%
		33.3	25.0	20.0	16.7	14.3	10.0	ActStRevMaxTR (%)
		9.5	8.0	7.1	6.5	6.0	5.2	NatRevMaxTR (%)
	3.0	\$1.19	\$1.45	\$1.93	\$3.03	\$8.38	N/A	MargTaxCann (\$) at CA tax rate of 13.3%
		\$0.98	\$1.06	\$1.17	\$1.33	\$1.55	\$4.62	MargTaxCann (\$) at NJ tax rate of 8.97%
		28.6	22.2	18.2	15.4	13.3	9.5	ActStRevMaxTR (%)
		4.8	4.5	4.3	4.1	4.0	3.9	NatRevMaxTR (%)
		\$1.56	\$1.99	\$2.85	\$5.39	\$278.80	N/A	MargTaxCann (\$) at CA tax rate of 13.3%
		\$1.21	\$1.34	\$1.51	\$1.75	\$2.13	\$10.23	MargTaxCann (\$) at NJ tax rate of 8.97%

For the first takeaway from Table 2, we can again see that marginal tax cannibalization (MTC) is positive for every cell except for the outliers, where vertical distortions are 1 and horizontal distortions are 7. Thus, for

⁹⁰ *Questions and Answers on the Net Investment Income Tax*, IRS (Oct. 13, 2015), <https://www.irs.gov/uac/Newsroom/Net-Investment-Income-Tax-FAQs> [<https://perma.cc/TYN3-BES9>].

⁹¹ This is somewhat arbitrary, but (again) adjusting this value within the range of plausibility does not dramatically alter the results.

⁹² Both our median estimate and the figures we use for all top state-level capital gains tax rates are from KEATING, *supra* note 71, at 6.

⁹³ California's 13.3% top rate on both capital gains and ordinary income was enacted through Proposition 30 as a temporary measure taking effect in 2012 and is currently scheduled to expire in 2019, at which point the top tax rate on both capital gains and ordinary income would revert to the prior 10.3%. However, there are numerous proposals currently being circulated to make the Proposition 30 tax hikes permanent. Whether these tax hikes will be allowed to expire is perhaps the central question in current tax reform debates in California. See CAL. ATTORNEY GEN., PROPOSITION 30: OFFICIAL TITLE AND SUMMARY (2012), <http://vig.cdn.sos.ca.gov/2012/general/pdf/30-title-sum-analysis.pdf> [<https://perma.cc/L5VA-5R6Q>]; Wayne Winegarden, *Regain Golden State's Luster by Eliminating Prop. 30*, SAN DIEGO UNION-TRIB. (Apr. 2, 2015), <http://www.sandiegouniontribune.com/news/2015/apr/02/prop-30-end/> [<https://perma.cc/UUE2-CQ75>] ("The tax increases were supposed to be temporary But proponents of Prop. 30 . . . now want to renege on that promise and extend the tax hike.").

⁹⁴ As in Table 1, we put "N/A" (for "Not Applicable") in boxes where MTC is infinite.

equivalent reasons as in our earlier discussion of corporate income tax rates,⁹⁵ we infer that vertical externalities almost certainly exceed horizontal externalities for top state-level capital gains tax rates. Also, and as with corporate income taxes, even a very low-end assumption for vertical distortions (i.e., 1) still results in considerable tax cannibalization, unless horizontal distortions are implausibly large.

So, is this positive tax cannibalization sufficiently large for any state-level capital gains tax rates to exceed their national revenue-maximizing levels? We said earlier that we consider 2.99 to be a reasonable midpoint estimate for the vertical distortions associated with persistent selective realization responses. Rounding to an overall vertical distortions measurement of 3, our model implies that the national revenue-maximizing state-level capital gains tax rate is probably between 9.5% and 6% (corresponding with a range of horizontal distortions estimates of between 0 and 4). Even at the 9.5% approximation, the current top capital gains tax rates levied by California (13.3%), Oregon (9.9%), and Minnesota (9.85%) would all probably exceed their national revenue-maximizing levels. If New York City's capital gains tax rate of 3.88% is added to New York State's rate of 8.82%, the combined rate there of 12.7% would also probably exceed its national revenue-maximizing level.⁹⁶

At California's current top tax rate, an overall vertical distortions estimate of 3 implies that other governments lose somewhere between \$1.19 and \$8.38 of revenue through tax cannibalization for every marginal \$1.00 raised by California (again corresponding with a range of horizontal distortions estimates of between 0 and 4). More generally, if vertical distortions are at least 3, and if horizontal distortions are at least moderate, the implied marginal tax cannibalization generated by California's current top capital gains tax rate is enormous.

Consequently, based on mid-range estimates from the empirical literature, our model implies that the current top capital gains tax rates in at least some states probably exceed their national revenue-maximizing levels. Moreover, remember that the empirical estimates for vertical distortions that we discussed earlier were based only on persistent selective realization responses. If taxpayers also respond to capital gains tax rates in other ways beyond just through the responses of selective realization (the basis of our estimates for vertical distortions) and of relocating taxable

⁹⁵ See *supra* notes 73–74 and accompanying text.

⁹⁶ AM. COUNCIL FOR CAPITAL FORMATION, STATE AND FEDERAL INDIVIDUAL CAPITAL GAINS TAX RATES: HOW HIGH COULD THEY GO? 5 (2012), http://accf.org/wp-content/uploads/2012/04/1204-15-ACCF-Special-Report-on-Capital-Gains_FINAL.pdf [https://perma.cc/2YVU-SNYT] (reporting “12.7%” as the “[t]op effective long-term state & local tax rate” for New York City).

activity across state lines (horizontal distortions), then the tax cannibalization problem resulting from current top state-level capital gains tax rates would be even larger.

For instance, consider if vertical distortions are 3.5 (only somewhat above the mid-range estimate for persistent selective realization responses of 2.99). Then, our model would imply that the top capital gains tax rates in the majority of the states might well currently exceed their national revenue-maximizing levels.⁹⁷ Further, our model would then imply that the marginal tax cannibalization in relatively high-tax areas like California and New York City would be even more enormous.

E. Approximating Tax Cannibalization for State Ordinary Income Tax Rates

We now assess tax cannibalization for the top state-level ordinary income tax rates. Again, to keep the exposition manageable, we will only show our model's approximations with respect to taxpayers in the highest federal rate bracket.⁹⁸

However, because the ordinary income rate structure of the federal income tax is quite progressive, whereas states vary widely in the progressivity of their income tax rate structures, the top ordinary income tax rates in some states apply to taxpayers even in the lower federal ordinary income tax brackets. We thus stress that our approximations for ordinary income tax rates only necessarily apply with respect to taxpayers in the top federal rate bracket.⁹⁹ For this reason, our approximations are only fully applicable to the current top ordinary income tax rates in states with relatively progressive rate structures—such as California, New York, and New Jersey.¹⁰⁰ With those caveats, we can proceed to assessing our model's inputs.

⁹⁷ For any plausible horizontal distortions measurement, the implied national revenue-maximizing tax rate level would then come in below the median top state-level capital gains tax rate of 5.1%, at least with respect to taxpayers in the top federal rate bracket. Whether this also holds with respect to taxpayers in the 15% federal capital gains brackets is less clear. See *supra* note 78.

⁹⁸ See *supra* note 78.

⁹⁹ The approximations reported here would not be all that different from those for taxpayers in the 35% or 33% federal ordinary income tax brackets. However, for lower income taxpayers, especially those in the 25% and lower federal brackets, the approximations may be considerably different, in part because the vertical distortions measurement is likely to be lower also.

¹⁰⁰ For a compilation of the states' income tax rate bracket structures, see *Income Tax Rates & Brackets by State*, TAX-BRACKETS.ORG, <http://www.tax-brackets.org/> [<https://perma.cc/LN7H-QS2J>]. In addition to California, New York, and New Jersey, the following states also use bracket structures whereby the top state ordinary income tax rate brackets correspond (closely enough for our purposes) with the top federal ordinary income tax rate bracket: Connecticut, Hawaii, Maryland, North Dakota, Oregon, Vermont, and Wisconsin.

For the vertical distortions measurement, we take our midpoint estimate from the economists Jon Gruber and Emmanuel Saez.¹⁰¹ They report an elasticity measurement of 0.57 for taxpayers with incomes above \$100,000 per year,¹⁰² which implies that the semi-elasticity for these taxpayers is around 1.27¹⁰³—which we then round down to 1.25. Because there is some uncertainty in this estimate,¹⁰⁴ we show (in Table 3) our model's outputs for the range of vertical distortion measurements of 0.75, 1.25, and 1.75.

As with our analysis of capital gains tax rates, the best (suggestive) estimates we have for horizontal distortions come from the same handful of studies examining the interstate mobility responses of high-income taxpayers to state tax rates more generally.¹⁰⁵ We thus use the same range for horizontal distortion measurements (in Table 3) as we previously used when assessing capital gains tax rates.

For our model's other empirical input parameters, we use 39.6% as our input for the federal tax rate (TR_F), and 3.6% as our input for the other states' tax rate (TR_O).¹⁰⁶ Then, (for TR_A), we show outputs for California's top ordinary income tax rate of 13.3% (the highest)¹⁰⁷ and for New Jersey's of 8.97% (the fourth highest).

Based on all of these inputs, Table 3 shows our model's outputs across a range of measurements for vertical and horizontal distortions:

¹⁰¹ Jon Gruber & Emmanuel Saez, *The Elasticity of Taxable Income: Evidence and Implications*, 84 J. PUB. ECON. 1 (2002).

¹⁰² *Id.* at 1.

¹⁰³ This is based on a reference tax rate of 45%—the aggregate of the top federal tax rate of 39.6% and the median top state-level tax rate of 5.4%. Then, 100 divided by 45, multiplied by 0.57, yields ~1.27. We take all top state-level ordinary income tax rates from KEATING, *supra* note 71, at 5.

¹⁰⁴ The economist Raj Chetty cites to the Gruber and Saez estimate, as well as others, to conclude that “[t]he empirical literature on the taxable income elasticity has generally found that elasticities are large (0.5 to 1.5) for individuals in the top percentile of the income distribution.” Raj Chetty, *Is the Taxable Income Elasticity Sufficient to Calculate Deadweight Loss? The Implications of Evasion and Avoidance*, 1 AM. ECON. J.: ECON. POL’Y 31, 31 (2009). The Gruber and Saez estimate that we use is thus toward the lower part of the range cited by Chetty. However, the higher points in Chetty’s range come from older papers based on somewhat outdated data and methodologies, and so we think the Gruber and Saez estimate is the most reliable currently available. But note that these estimates are only for high-income taxpayers. Measured elasticity estimates for low- and middle-income taxpayers are much smaller. *Id.*; Gruber & Saez, *supra* note 101, at 1.

¹⁰⁵ See *supra* notes 85–88 and accompanying text.

¹⁰⁶ The logic behind these numbers is equivalent to that in our discussions of these inputs for assessing corporate income and capital gains tax rates. See *supra* notes 70–72, 91–93 and accompanying text. Accordingly, the 3.6% other states’ tax rate estimate comes from two-thirds of the median top state-level ordinary income tax rate of 5.4%. See KEATING, *supra* note 71, at 5.

¹⁰⁷ But see *supra* note 93.

TABLE 3: APPROXIMATING TAX CANNIBALIZATION FOR ORDINARY INCOME TAX RATES¹⁰⁸

		Horizontal Distortions (HD)						
		0	1	2	3	4	7	
Vertical Distortions (VD)	0.75	133.3	57.1	36.4	26.7	21.1	12.9	ActStRevMaxTR (%)
		93.7	42.2	28.2	21.6	17.8	12.3	NatRevMaxTR (%)
		\$0.33	\$0.34	\$0.35	\$0.38	\$0.42	N/A	MargTaxCann (\$) at CA tax rate of 13.3%
	\$0.32	\$0.31	\$0.30	\$0.28	\$0.27	\$0.15	MargTaxCann (\$) at NJ tax rate of 8.97%	
	1.25	80.0	44.4	30.8	23.5	19.0	12.1	ActStRevMaxTR (%)
		40.4	24.0	17.8	14.4	12.4	9.2	NatRevMaxTR (%)
\$0.59		\$0.66	\$0.75	\$0.89	\$1.16	N/A	MargTaxCann (\$) at CA tax rate of 13.3%	
\$0.56	\$0.58	\$0.60	\$0.63	\$0.66	\$0.93	MargTaxCann (\$) at NJ tax rate of 8.97%		
1.75	57.1	36.4	26.7	21.1	17.4	11.4	ActStRevMaxTR (%)	
	17.5	12.5	10.1	8.7	7.8	6.4	NatRevMaxTR (%)	
	\$0.90	\$1.04	\$1.24	\$1.59	\$2.33	N/A	MargTaxCann (\$) at CA tax rate of 13.3%	
\$0.82	\$0.87	\$0.94	\$1.02	\$1.13	\$2.05	MargTaxCann (\$) at NJ tax rate of 8.97%		

Once again, for our first takeaway, we can see that marginal tax cannibalization (*MTC*) is positive for every cell—this time including when the vertical distortions measurement is below 1 and when the horizontal distortions measurement is 7. Thus, for equivalent reasons to those in our earlier analyses of corporate income and capital gains tax rates,¹⁰⁹ we again infer that vertical externalities almost certainly exceed horizontal externalities for the top state-level ordinary income tax rates. However, we reemphasize here the caveat that this is only necessarily so with respect to taxpayers in the top federal rate bracket. Our model does not allow us to assess with any confidence whether or not vertical externalities also exceed horizontal externalities with respect to taxpayers in the lower federal rate brackets. Our conclusion here may thus only apply to states with relatively progressive rate structures.¹¹⁰

We next ask: is this positive tax cannibalization sufficiently large for any state-level ordinary income tax rates to exceed their national revenue-maximizing levels? In contrast to the prior two Sections, the answer here is: probably not. Based on our midpoint estimate for vertical distortions of 1.25, horizontal distortions would need to be close to 4 for even California's top ordinary income tax rate (the highest) to exceed its national revenue-maximizing level. Although a horizontal distortions measurement of 4 might arguably be plausible, we view that as a high-point estimate based on the (limited and only suggestively relevant) existing empirical literature.¹¹¹

Accordingly, we infer that tax cannibalization is almost certainly positive for the top state-level ordinary income tax rates, at least with respect to taxpayers in the top federal rate brackets. Yet we also—but more tentatively—infer that this positive tax cannibalization is probably not so

¹⁰⁸ As in Table 1, we put "N/A" (for "Not Applicable") in boxes where *MTC* is infinite.

¹⁰⁹ See *supra* notes 73–74, 95 and accompanying text.

¹¹⁰ See *supra* notes 99–101 and accompanying text.

¹¹¹ See *supra* notes 85–88 and accompanying text.

large that any state's current ordinary income tax rates exceed their national revenue-maximizing levels.

Nevertheless, the tax cannibalization that results from the top state-level ordinary income tax rates is most likely rather significant, at least in those states with relatively progressive rate structures. For instance, based on a vertical distortions measurement of 1.25, and on a horizontal distortions measurement of somewhere between 0 and 3, New Jersey's top ordinary income tax rate would, on net, cannibalize between \$0.56 and \$0.63 of revenue from other governments per marginal \$1.00 of revenue raised by New Jersey. Although this is not quite as blatant a result as what we found from our analyses of corporate income and capital gains tax rates, this still implies that New Jersey lawmakers likely perceive the state-level welfare costs of raising revenue through New Jersey's top ordinary income tax rate as being less than half of the full national welfare costs.

F. *Summary and Synthesis*

The primary message of this Part is that tax cannibalization is currently very large.¹¹² This is especially, flagrantly so for the top state-level tax rates on corporate income and capital gains. But this is also so for the top state-level ordinary income tax rates, in at least some states, albeit to a much lesser extent. Before proceeding, it is worth saying a bit more— at a more conceptual level—about why the costs from tax cannibalization are so enormous within the context of contemporary federal tax law.

One reason is that the federal government currently levies relatively high tax rates on somewhat narrow bases. Indeed, the United States stands alone among major developed countries in not raising a large portion of its revenues through a value-added tax (VAT), and then compensates for this by levying some of the world's highest tax rates on corporate income, capital gains, and ordinary income.¹¹³ The federal government then defines

¹¹² Of course, this conclusion is based on extrapolations from the existing empirical literature. Yet, so as to not continually repeat this caveat, throughout the rest of this Article we will treat these extrapolations as roughly accurate—and indeed we believe that they probably are roughly accurate.

¹¹³ See William G. Gale & Benjamin H. Harris, *A VAT for the United States: Part of the Solution*, in *THE VAT READER: WHAT A FEDERAL CONSUMPTION TAX WOULD MEAN FOR AMERICA* 64, 65 (2011), [http://www.taxanalysts.com/www/freefiles.nsf/Files/VATReader.pdf/\\$file/VATReader.pdf](http://www.taxanalysts.com/www/freefiles.nsf/Files/VATReader.pdf/$file/VATReader.pdf) [<https://perma.cc/52DV-ZHFB>] (“[T]he VAT is in place in about 150 countries worldwide and in every OECD country other than the United States.”); Kyle Pomerleau, *2015 International Tax Competitiveness Index*, TAX FOUND. (Sept. 28, 2015), <http://taxfoundation.org/article/2015-international-tax-competitiveness-index> [<https://perma.cc/W7BE-C6W2>] (explaining that the United States has “the highest corporate income tax rate in the OECD” and “a relatively high, progressive individual income tax”); Kyle Pomerleau, *U.S. Taxpayers Face the 6th Highest Top Marginal Capital Gains Tax Rate in the OECD*, TAX FOUND. (Mar. 24, 2015), <http://taxfoundation.org/blog/us-taxpayers-face-6th-highest-top-marginal-capital-gains-tax-rate-oecd> [<https://perma.cc/Q3NE-ZHAL>].

these tax bases in ways that permit large-scale tax avoidance and tax gaming, especially for the corporate income and capital gains tax bases.¹¹⁴ There is controversy as to how successful the federal government might be in fixing these loopholes and structural flaws if greater effort were applied toward tax reform. Regardless, as things stand, the empirical literature implies that there is only limited space between the federal government's top tax rates on corporate income and capital gains, and the overall revenue-maximizing levels for these tax rates. There is thus only constricted room for state-level tax rates on these bases without unduly harming national welfare. To a lesser degree, this is also so for the top tax rates on ordinary income.

But this is only part of the story. The other part harks back to the classical theoretical result of the fiscal federalism literature.¹¹⁵ So long as horizontal distortions are positive, state-level tax rates on corporate income, capital gains, and ordinary income are simply less efficient than are their federal analogs.¹¹⁶ This potentially makes tax cannibalization a much worse problem.

As we have shown, despite the relative inefficiency of state-level tax rates on corporate income, capital gains, and ordinary income, state governments face incentives to tax these bases at what may be excessively high top rates. Because of tax cannibalization, the costs from states doing so are largely borne by the federal government.¹¹⁷ This Article's principal argument is that policymakers should understand and take account of these (potentially huge) costs.

¹¹⁴ See *supra* notes 59–64, 81–84, 101–04 and accompanying text; see also Gamage, *supra* note 29, at 365–68, 404–10 (discussing the prevalence of tax gaming).

¹¹⁵ See *supra* note 20 and accompanying text.

¹¹⁶ If horizontal distortions are substantially positive, the top state-level tax rates on ordinary income are far less efficient than the top federal-level tax rates. For example, consider that (in Table 3), for our midpoint vertical distortions measurement of 1.25, the values for the acting state's revenue-maximizing tax rates start at 80% when horizontal distortions are 0, then drop to 44.4% when horizontal distortions are 1, and to 23.5% when horizontal distortions are 3. The values for the national revenue-maximizing tax rates similarly drop from 40.4%, to 24%, to 14.4%. Accordingly, if horizontal distortions are substantially positive, the top state-level tax rates on ordinary income are far less efficient than the top federal-level tax rates.

¹¹⁷ Of course, tax cannibalization can also work in a downward direction, such that some of the costs from the federal government's relatively high tax rates are borne by state governments. But because the federal government's tax rates are currently much higher than are state-level tax rates, and because only state-level tax rates induce horizontal distortions, the costs from upward tax cannibalization (that we focus on) are currently dramatically larger than the costs from downward tax cannibalization (which we do not focus on).

III. HOW TAX CANNIBALIZATION BIASES STATE GOVERNMENTS' TAX BASE CHOICES

We have now explained that the vertical externalities currently induced by the top state-level corporate income and capital gains tax rates almost certainly overpower the horizontal externalities. In other words, tax cannibalization for these tax rates is almost certainly positive—and strongly so.

Even on its own, this suggests that state governments might be biased toward relying too much on these forms of taxation. Yet fully demonstrating this bias requires further analysis when tax cannibalization is positive but when state tax rates are set below their national revenue-maximizing levels.

State governments must raise revenue somehow. Under our working assumption of strict budget and distribution constraints, if a state government gives up revenue (or distribution) by reducing its reliance on certain tax rates, the state government must then make up for the lost revenue (or distribution) by increasing the use of some other forms of taxation.¹¹⁸ Therefore, to fully assess whether tax cannibalization biases state governments to overtax the corporate income, capital gains, or ordinary income tax bases, we must evaluate the relative tax cannibalization for these forms of taxation as compared to alternatives.

Accordingly, we demonstrate in this Part that contemporary federal tax law biases state governments to overtax the corporate income and capital gains tax bases, and more tentatively also the ordinary income tax base, at least with respect to the versions of these tax bases that are defined by the federal government's tax-base-definition rules. We make these demonstrations primarily by comparison to the alternative of state sales taxes.

There are two steps to our argument in this Part. The key elements of the first step are already well established in the existing tax legal literature. Prior scholarship has clarified how contemporary federal tax law pushes state governments toward greater use of corporate and personal income taxes and toward lesser use of sales and other indirect taxes.¹¹⁹ Prior scholarship has also clarified how contemporary federal tax law pushes state governments toward mostly piggybacking on the federal government's tax-base-definition rules when implementing state-level

¹¹⁸ See *infra* Section IV.F.

¹¹⁹ Following common practice in the economics literature, we refer to taxes like retail sales taxes and gross receipts taxes as "indirect taxes," based on the notions that (in contrast to corporate income taxes) the burden of these taxes is intended to fall largely on individual consumption purchases and (in contrast to personal income taxes) the nominal taxpayers for these taxes are businesses.

corporate and personal income taxes. However, prior scholarship has not convincingly demonstrated why this is a problem that the federal government should be concerned with.

The second step of our argument, which presents our unique contribution to the literature on state tax base choices, demonstrates why the federal government should be concerned. Because of tax cannibalization, the federal government loses out whenever state governments overtax the federally defined corporate or personal income tax bases. To elaborate on this, we explain how certain aspects of contemporary federal tax law bias state governments to overtax the federally defined corporate income and capital gains tax bases and more tentatively also the ordinary income tax base (all as a result of tax cannibalization). These biases are then exacerbated by the ways in which other aspects of contemporary federal tax law push state governments to further overtax these same bases (as shown by prior tax legal scholarship). Put together, the united force of these two steps warps state governments' tax base choices in directions that are harmful to national welfare.

A. *How Federal Tax Law Pushes State Governments*

Because prior tax legal scholarship has already clarified the key elements of the first step of our argument, in this Part we limit ourselves to briefly highlighting this prior scholarship and its implications. We begin with how contemporary federal tax law pushes state governments toward greater use of corporate and personal income taxes and toward lesser use of sales and other indirect taxes.

Professor Kirk Stark has provided the most comprehensive account of this federal–state relationship:

[T]he basic picture is that under current law, the federal government generally favors the adoption of state *individual and corporate income taxes* (by virtue of both the administrative benefits associated with base conformity and the price effects associated with federal income tax deductibility) Additionally, federal law currently *disfavors* the adoption of *general sales taxes* (by virtue of the lack of any base conformity benefits and the usual lack of any price effects from deductibility).¹²⁰

One way in which contemporary federal tax law pushes state governments' tax base choices is by offering states the opportunity to piggyback on the administrative and enforcement infrastructure for the

¹²⁰ Stark, *supra* note 8, at 431. Note that Congress in 2015 made the deduction for state sales taxes permanent. Protecting Americans from Tax Hikes Act of 2015, Pub. L. No. 114-113, § 106, 129 Stat. 3040, 3046. Nevertheless, for the reasons Stark explains, the structure of the deduction still disfavors sales taxes.

federal-level corporate and personal income taxes. As Stark elaborates, “[t]he very existence of the Code, Treasury Regulations, IRS administrative guidance, and federal judicial case law creates an almost irresistible incentive for the states to adopt individual and corporate income taxes.”¹²¹ The federal government does not currently offer any equivalent support for state-level sales or other broad-based indirect taxes.

Indeed, the federal government currently places a number of impediments in the way of states effectively administering their own sales and other indirect taxes.¹²² Among the most important of these impediments is the Supreme Court’s decision in *Quill Corp. v. North Dakota*,¹²³ followed by Congress’s failure to pass the subsequent legislation invited by that decision.¹²⁴ Until Congress passes such authorizing legislation, the *Quill* decision seriously limits the reach of state sales and use taxes.¹²⁵ Notably, state corporate income taxes are not similarly limited,¹²⁶ and this is so even for state corporate income taxes that use single-sales-factor apportionment, which makes these taxes otherwise effectively similar to sales and other indirect taxes from state governments’ perspectives (but not from the federal government’s perspective).¹²⁷ Accordingly, as Stark concludes, “as long as the *Quill* rule stands, state retail sales taxes will remain nothing more than a weak imitation of a consumption tax.”¹²⁸ This inevitably pushes state governments toward lesser use of sales taxes and toward greater use of corporate and personal income taxes.

¹²¹ Stark, *supra* note 8, at 423.

¹²² *Id.* at 427–32.

¹²³ 504 U.S. 298 (1992).

¹²⁴ For further discussion of the sort of legislation Congress might pass, see Andrew J. Haile, David Gamage & Darien Shanske, *A Potential Game Changer in E-Commerce Taxation*, 67 ST. TAX NOTES 747 (2013); David Gamage & Devin J. Heckman, *A Better Way Forward for State Taxation of E-Commerce*, 92 B.U.L. REV. 483, 531–32 (2012).

¹²⁵ Specifically, the *Quill* decision largely shields e-commerce transactions from sales taxation. See *Quill*, 504 U.S. at 317–18; Gamage & Heckman, *supra* note 124, at 484. This limitation has seriously hindered states from levying effective sales taxes, both by directly restricting the reach of these taxes and because higher sales tax rates result in greater leakage through state taxpayers shifting purchases to exempt e-commerce retailers.

¹²⁶ Stark, *supra* note 8, at 428–29.

¹²⁷ The income earned by a multistate corporation is apportioned by formula across the various states in which the corporation has a nexus. States use different apportionment formulas, with the current trend being to use formulas based on the number of sales a corporation has in a state (i.e., the “sales factor”). For further discussion of these issues, see Charles E. McLure, Jr., *The State Corporate Income Tax: Lambs in Wolves’ Clothing*, in THE ECONOMICS OF TAXATION 327, 341–42 (Henry J. Aaron & Michael J. Boskin eds., 1980); Darien Shanske, *A New Theory of the State Corporate Income Tax: The State Corporate Income Tax as Retail Sales Tax Complement*, 66 TAX L. REV. 305, 311–317 (2013).

¹²⁸ Stark, *supra* note 8, at 430.

Another way in which contemporary federal tax law pushes state governments' tax base choices is through the state and local tax (SALT) deduction. The mechanics of this deduction are somewhat complicated under current law, especially as it interacts with the alternative minimum tax.¹²⁹ Nevertheless, as Stark concludes, "the SALT deduction establishes clear price effects favoring the adoption of . . . income taxes over sales taxes."¹³⁰ He continues, "[o]n balance, therefore, the federal subsidy disfavors greater state reliance on sales taxes"¹³¹

Stark argues against the aforementioned ways contemporary federal tax law pushes state governments' tax base choices, on account of how this worsens state-level fiscal volatility and resulting state budget crises.¹³² We agree.¹³³ State-level taxes on corporate income and on capital gains are the primary sources of the fiscal-volatility-induced boom-and-bust cycle that has caused damaging state budget crises.¹³⁴ Nevertheless, we doubt that the federal government has enough of a direct stake in these problems for this to be sufficient motivation on its own to reform how it pushes state governments toward greater use of corporate and personal income taxes.¹³⁵

Certainly, the fiscal volatility problem is one factor deterring state governments from even greater reliance on corporate and personal income taxes.¹³⁶ But state-level fiscal volatility and the resulting state budget crises affect the federal government only indirectly and to a much lesser extent

¹²⁹ See *id.* at 425–27.

¹³⁰ *Id.* at 425–26.

¹³¹ *Id.* at 427.

¹³² *Id.* at 431–32.

¹³³ For some of our writings on the fiscal volatility problem, see, for example, David Gamage, *Preventing State Budget Crises: Managing the Fiscal Volatility Problem*, 98 CALIF. L. REV. 749 (2010); Darien Shanske, *How Less Can Be More: Using the Federal Income Tax to Stabilize State and Local Finance*, 31 VA. TAX REV. 413 (2012).

¹³⁴ See Stark, *supra* note 8, at 422–23.

¹³⁵ An article by Brian Galle and Kirk Stark, and another by John Brooks, argue for other reforms that the federal government might implement to address state-level fiscal volatility. Brooks, *supra* note 7, at 94 (“[I]ncorporation of the insurance function of taxation illuminates the degree to which risks can and should be shared and spread throughout a federal system. . . . [T]his Article . . . views the combined federal/state tax-and-transfer system as a coherent whole, and asks how such a system can operate more effectively.”); Brian Galle and Kirk J. Stark, *Beyond Bailouts: Federal Tools for Preventing State Budget Crises*, 87 IND. L.J. 599, 602 (2012) (“We propose . . . a set of federal policies to encourage states to establish robust rainy day funds (RDFs) subject to restrictions on withdrawal except in the case of genuine fiscal emergency.”). We worry that the federal government lacks enough of a direct stake in the fiscal volatility problem to motivate even these reforms. But for the purposes of this Article, the key point is that even if federal tax lawmakers decide to act to address the state fiscal volatility problem, there are more promising approaches for this than reforming how federal tax law pushes state governments' tax base choices.

¹³⁶ For instance, see Stark's discussion of how the fiscal volatility problem has played a central role in California's recent tax reform debates. Stark, *supra* note 8, at 432–36.

than these problems affect state governments. Consequently, by demonstrating that tax cannibalization causes the federal government to lose revenue by pushing state governments toward greater use of corporate and personal income taxes, we offer a more persuasive argument for motivating the federal government to reform these aspects of contemporary federal tax law.

Proceeding to how contemporary federal tax law pushes state governments to mostly piggyback on the federal government's tax-base-definition rules when implementing state-level corporate and personal income taxes, the most comprehensive account of this is by Professor Ruth Mason. Mason concludes that although states have the formal option to deviate from the federal government's tax-base-definition rules, and states do in fact deviate from these rules in certain ways, there are "political, procedural, and administrative obstacles" that result in the states mostly piggybacking on the federal government's tax-base-definition rules when implementing corporate and personal income taxes.¹³⁷

Mason argues that there are both costs and benefits to this practice of piggybacking. She stresses the costs of this piggybacking to "federalism values," such as an inability to tailor state tax policy to local voters' distinct preferences and to differing local conditions, diminishing political accountability, and reducing policy experimentation.¹³⁸ She further explains that some federal tax-base-definition rules are easier for states to opt out from than others, and that there is no necessary connection between the ease of states opting out and the balance of costs versus benefits from states doing so.¹³⁹

In particular, states can (and regularly do) deviate from federal tax-base-definition rules in order to compete with other states by offering special tax benefits to lure mobile business activities.¹⁴⁰ In a separate article, we argue that tax cannibalization currently biases state governments toward greater use of these sorts of deviations at the expense of national welfare.¹⁴¹ However, in this Article, we focus instead on how tax

¹³⁷ Mason, *supra* note 1, at 1272.

¹³⁸ *Id.* at 1295–305.

¹³⁹ *See id.* at 1272.

¹⁴⁰ *Id.* at 1310–12.

¹⁴¹ David Gamage & Darien Shanske, *Tax Cannibalization and State Government Tax Incentive Programs*, 82 ST. TAX NOTES 197 (2016), https://papers.ssrn.com/sol3/papers2.cfm?abstract_id=2869605 [<https://perma.cc/S4N4-FQTT>]. The essence of our argument in this piece starts by explaining that state governments regularly decide between either offering special tax preferences to lure mobile economic activity or levying taxes with broader bases and lower rates. State governments frequently choose the former strategy and so give away massive dollar amounts of special tax preferences. What has not previously been understood is that—because of tax cannibalization—the

cannibalization biases state governments against opting out in certain ways that might otherwise enhance national welfare.¹⁴²

B. How Federal Tax Law Biases State Governments

The second step of our argument in this Part is based on tax cannibalization. More specifically, we explain that tax cannibalization is relatively much greater for the top state-level tax rates on corporate income and on capital gains, as compared to state sales tax rates and also as compared to certain other potential alternatives. We similarly explain that this is also probably so for top state-level ordinary income tax rates, although we conclude this more tentatively.

Yet some further clarification is needed before we begin this analysis. The states' top tax rates on capital gains and on ordinary income are generally more progressive than are the states' sales tax rates. We think the same is probably true for the states' corporate income tax rates, although there is some dispute about this in the literature.¹⁴³ Nevertheless, we rely on the working assumption of strict revenue and distribution constraints.

But what does it mean to compare raising revenue from more progressive forms of taxation (e.g., personal income tax rates) to raising revenue from more regressive forms of taxation (e.g., sales tax rates) under strict revenue and distribution constraints? The answer is relatively easy to explain for revenue neutrality. All this requires is for the state to adjust its tax rates so as to ensure that the states' revenue loss from reducing certain tax rates is recouped by raising other tax rates.

Similarly, ensuring distributional neutrality potentially requires the state to make adjustments to recoup lost distribution. For example, California State Senator Bob Hertzberg has proposed a reduction to California's personal income tax rates, accompanied both by revenue-raising reforms to California's sales tax and by offering tax credits to low- and middle-income taxpayers.¹⁴⁴ Notably, although Senator Hertzberg's

federal government bears much of the cost when states enact special tax preferences rather than levying taxes with broader bases and lower rates. In this way, contemporary federal tax law biases state governments toward enacting special tax preferences even when doing so is strongly against national welfare. We then explain how federal-level reforms could alleviate this aspect of the tax cannibalization problem.

¹⁴² See *infra* Section III.B.6.

¹⁴³ See Suárez Serrato & Zidar, *supra* note 68, at 1 (discussing corporate tax incidence and the disagreements about what this means for the progressivity of corporate tax rates).

¹⁴⁴ See S.B. 8, 2015–16 Leg., Reg. Sess. (Cal. 2015); see also John Diaz, *State Sen. Bob Hertzberg Takes on Toughest Issue: Tax Reform*, SFGATE (Jan. 16, 2015, 3:48 PM), <http://www.sfgate.com/opinion/diaz/article/State-Sen-Bob-Hertzberg-takes-on-toughest-issue-6021174.php> [<https://perma.cc/RMF3-QHT5>] (“The last thing Hertzberg would want to do . . . would be to make the tax structure more regressive. So his [proposals include] . . . providing tax credits for the poor . . .”).

proposals would reduce California's (more progressive) personal income tax rates while increasing California's (more regressive) taxation of its sales tax base,¹⁴⁵ the overall effect of the proposed reform package would be to *increase* both California's revenues and distribution. This is because the lost distribution from swapping to a more regressive form of taxation would be more than recouped by the new tax credits.

Our purpose in this discussion is not to advocate for any specific approach for recouping lost distribution. Our goal is only to explain that opting for a more regressive form of taxation can be done in a distributionally neutral fashion by accompanying that switch with new tax credits—or, alternatively, with adjustments to other tax rates, or with other approaches for recouping the lost distribution.

We thus evaluate the national welfare implications of the states' tax base choices by abstracting from (controversial) questions about the proper size of governments with respect to either revenue or distribution.¹⁴⁶ We later explain how the federal government can reform how it influences state-level tax base choices while maintaining the same incentives in regard to overall revenue and distribution. For now, though, we just assume strict revenue and distribution constraints to facilitate our analysis. Accordingly, we compare state-level corporate income, capital gains, and ordinary income tax rates to hypothetical alternatives that have been modified to be equally as progressive (such as by accompanying state sales tax rate hikes with expanded tax credits for low- and middle-income taxpayers).

1. *At First Glance: The Tax Cannibalization Problem Is Mostly About the Federal Government's Tax Rates.*—We begin our analysis by assessing the relative vertical externalities generated by different forms of state-level taxation. Vertical externalities come from a state government and the federal government taxing overlapping bases. For every dollar by which vertical distortions shrink these overlapping tax bases, the federal government loses revenue equal to the effective marginal tax rates that the federal government assesses on these tax bases. Consequently, the federal government's tax rates determine what portions of vertical distortions constitute vertical externalities.

¹⁴⁵ See Cal. S.B. 8.

¹⁴⁶ Our analytic approach in this Part of controlling for revenue and distribution follows common practice among tax policy experts when evaluating bipartisan proposals for tax reform. See David Gamage, Assistant Professor of Law, Univ. of Cal., Berkeley, Testimony Before the California State Assembly, Committee on Revenue and Taxation, Informational Hearing on Academic Perspectives on the Tax Recommendations of the Commission on the 21st Century Economy (Oct. 2009), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1608504 [<https://perma.cc/6JBX-STMP>].

The federal government currently levies much higher tax rates on corporate income, ordinary income, and capital gains, when compared to the federal government's minimal use of indirect taxes. Specifically, the federal government currently levies a corporate income tax that assesses a 35% statutory tax rate on most taxable corporate income.¹⁴⁷ The federal government also currently levies a personal income tax that assesses a progressive schedule of tax rates, with a maximum statutory rate of 39.6% on ordinary income and of 20% on capital gains (or of 23.8%, when combined with the 3.8% Net Investment Income Tax).¹⁴⁸ In contrast, the federal government currently levies only minimal excise taxes and does not currently levy a national sales tax or any other similar broad-based indirect tax.¹⁴⁹

At first glance, it is thus readily apparent how the federal government's current tax rates result in much larger vertical externalities for state-level corporate income tax rates, capital gains tax rates, and ordinary income tax rates, as opposed to the rates of state-level sales taxes. For instance, if vertical distortions shrink the federally defined corporate income tax base by \$1.00, this might cost the federal government something like \$0.35 in revenue (the federal statutory corporate income tax rate). In contrast, if vertical distortions shrink sales and indirect tax bases by \$1.00, this might cost the federal government close to zero revenue (because the federal government levies only minimal indirect taxes).

Moreover, this conclusion does not meaningfully change even after adjusting the states' sales tax rates to ensure distributional neutrality. For instance, making a sales tax rate marginally as progressive as a personal income tax rate probably requires hiking the sales tax rate somewhat to fund, for example, expanded tax credits for low- and middle-income taxpayers. Nevertheless, because the federal government currently levies only minimal indirect taxes, any additional shrinkage to the sales tax base induced by raising sales tax rates to fund these tax credits will produce only minimal incremental vertical externalities.

At first glance, this may all seem rather straightforward. That the federal government levies dramatically higher tax rates on corporate income, capital gains, and ordinary income, would seem to support a prima

¹⁴⁷ See *supra* note 69.

¹⁴⁸ See *supra* notes 73, 98.

¹⁴⁹ James R. Hines Jr., *Taxing Consumption and Other Sins*, 21 J. ECON. PERSP. 49, 51 (2007) ("There is . . . no federal sales tax, and only a rather modest assortment of federal excise taxes. . . . The federal tax on gasoline and related products accounts for . . . 45 percent of total excise tax collections, with the remainder consisting principally of federal taxes on tobacco (11 percent of total excise taxes), air travel (8 percent), telephone service (8 percent), and various forms of alcohol (12 percent).")

facie case that vertical externalities are much higher for these tax bases, at least as compared to sales tax rates. Yet a second glance reveals a more complicated story.

Nevertheless, a third glance then clarifies that the straightforward takeaways from the first glance are mostly correct, at least for state-level taxes on corporate income and capital gains. In other words, despite the complications that we will now proceed to discuss, it ultimately remains the case that the federal government's relatively high tax rates on corporate income and on capital gains result in differentially much larger vertical externalities for these tax bases. This is also probably so for state-level taxes on ordinary income, but with greater uncertainty.

2. *At a Second and Third Glance: It Is (Somewhat) More Complicated.*—To understand why a second glance reveals a more complicated story, consider the following hypothetical. Imagine if the only way in which taxpayers could respond to any form of taxation was by reducing their work effort. Further imagine that all forms of state-level taxation similarly induce taxpayers to reduce their work effort—because, for example, hiking the rate of a sales tax would reduce taxpayers' incentives to work for the purpose of funding purchases that would be subject to that sales tax. Under these assumptions, all forms of state-level taxation might similarly affect all federal tax bases (at least after controlling for revenue and distribution). Vertical externalities would then potentially be similar for all forms of state-level taxation, and there might thus be no biases to state-level tax base choices, even despite the dramatic differences in federal tax rates.

Much of the prior theoretical literature analyzing tax base choices relies on (extreme) assumptions similar to those in the above hypothetical.¹⁵⁰ However, in recent scholarship, one of us critiqued that prior theoretical literature's reliance on these sorts of assumptions.¹⁵¹ The essence of this critique is that many important distortionary responses are unique to only certain forms of taxation (defined as "single-instrument" distortions).¹⁵² Accordingly, to appreciate how a third glance resolves much of the complication that arose from the second glance, we need only understand that the majority of the measured vertical distortionary responsiveness for corporate income and capital gains tax rates consists of single instrument distortions for these forms of taxation, at least relative to sales taxes.

¹⁵⁰ See Gamage, *supra* note 29, at 403–04; *supra* note 39.

¹⁵¹ Gamage, *supra* note 29, at 403–04.

¹⁵² *Id.* at 382–83.

3. *Comparing the States' Corporate Income Tax Rates to Sales Tax Rates.*—Consider first the measured distortionary responsiveness to corporate income tax rates, as compared to sales tax rates. Certainly, not all of this measured distortionary responsiveness is single-instrument. Correspondingly, perhaps about a third of the measured responsiveness to corporate income tax rates comes from taxpayers shifting real investment activities abroad.¹⁵³ This form of responsiveness might well be induced by the overall tax burden on business investments—potentially including both the burden of corporate income tax rates and the burden of sales tax rates. A state government swapping from the use of corporate income tax rates to the (distributional and revenue-neutral) use of sales tax rates might thus not substantially reduce this form of distortionary responsiveness.

By contrast, the remaining two-thirds or so of the measured distortionary responsiveness to corporate income tax rates comes from: (a) profit shifting, (b) shifting from the use of corporate organizational forms to partnership organizational forms, and (c) shifting from equity financing to debt financing.¹⁵⁴ These forms of responsiveness are directly induced only by corporate income tax rates, not by sales tax rates (at least not to any substantial degree).

For instance, perhaps the most prevalent form of profit shifting involves a foreign subsidiary corporation charging its U.S.-based parent corporation inflated prices for the use of intellectual property controlled by the foreign subsidiary.¹⁵⁵ By doing so, the corporate group reduces the profits reported to the domestic federal and state governments for the purpose of assessing corporate income tax liabilities, by instead reporting these profits to the foreign (lower tax) jurisdiction of the subsidiary. This form of distortionary responsiveness is thus only directly induced by corporate income tax rates, not by sales tax rates, because only reported profits need be shifted to the foreign jurisdiction. More generally, shifting reported profits to subsidiaries in foreign jurisdictions—as opposed to shifting real investment activities—does not directly affect sales tax liabilities, as sales tax liabilities do not depend on profitability.

¹⁵³ See de Mooij & Ederveen, *supra* note 12, at 695 (reporting a combined semi-elasticity for shifting real investment abroad of 1.05, as compared to a combined semi-elasticity for profit shifting, substituting debt for equity, and shifting organizational form of 2.05).

¹⁵⁴ *Id.*

¹⁵⁵ See Andrew Blair-Stanek, *Intellectual Property Law Solutions to Tax Avoidance*, 62 UCLA L. REV. 2, 2 (2015) (“Multinational corporations use intellectual property . . . to avoid taxes on a massive scale . . .”). Blair-Stanek illustrates this point with an example regarding an Irish subsidiary of Google, which holds technology patents and sells devices to Google distributors: “[a]s consequence, the substantial profits from the IP remain in Ireland, typically not subject to Irish tax, and also not subject to U.S. tax so long as the cash is not returned to the U.S.” *Id.* at 11.

Similar logic holds when taxpayers shift to the use of partnership forms or to the use of debt financing to reduce their domestic federal- and state-level corporate income tax liabilities. These distortionary responses again directly reduce the taxpayers' corporate income tax liabilities, but do not directly affect the taxpayers' sales tax liabilities. After all, conducting business in a partnership form looks the same from the perspective of a sales tax as does conducting business in a corporate form. Likewise, the sales and purchasing activities of a corporation appear the same from the perspective of a sales tax regardless of the extent to which the corporation is financed with debt or with equity.

Therefore, we might estimate that a state government swapping from the use of a corporate income tax to the use of a sales tax might thereby reduce the overall vertical distortions previously induced by the corporate income tax rate by perhaps about two-thirds as much as would instead lowering the corporate income tax rate without replacing the lost revenue and distribution. We earlier said that 2.5 is a plausible midpoint estimate for the semi-elasticity of the vertical distortions induced by corporate income tax rates. We might thus take 1.67 (two-thirds of 2.5) as a plausible estimate for the semi-elasticity of the differentially greater extent to which corporate income tax rates shrink the corporate income tax base through vertical distortions, as compared to sales tax rates.

Because we have already discussed the federal government's tax rates on corporate income (35%) and on sales (close to 0%), and also the relevant state-level tax rates, we now have almost all of the inputs we need to apply our model. All we are missing is a measurement for horizontal distortions. We thus next assess whether state-level corporate income tax rates might induce differentially greater or smaller horizontal distortions, as compared to state-level sales tax rates, and what the semi-elasticity of this difference might be.

Unfortunately, the existing empirical literature offers little help in answering this question. As we discussed previously, there is suggestive evidence that state-level corporate income tax rates induce substantial horizontal distortions.¹⁵⁶ But there is also suggestive evidence that state-level sales tax rates induce substantial horizontal distortions.¹⁵⁷ We do not know of any straightforward way to calculate the differential horizontal distortions induced by these two forms of taxation based on the existing empirical literature.

¹⁵⁶ See *supra* Section II.C.

¹⁵⁷ See, e.g., Eric T. Anderson et al., *How Sales Taxes Affect Customer and Firm Behavior: The Role of Search on the Internet*, 47 J. MARKETING RES. 229 (2010); Liran Einav et al., *Sales Taxes and Internet Commerce*, 104 AM. ECON. REV. 1 (2014).

Fortunately, this does not matter all that much for our purposes. We earlier explained why it is improbable that the horizontal externalities induced by state corporate income tax rates could be so large as to overpower the vertical externalities (and that the same logic holds for the top state-level capital gains and ordinary income tax rates).¹⁵⁸ Analogously, because the difference between the federal government's corporate income tax rate and its indirect tax rates (35% v. close to 0%) is so large by comparison to either state-level corporate income tax rates or state-level sales tax rates, it is improbable that differential horizontal externalities could exceed differential vertical externalities.

Consistent with this, based on the differential vertical distortions estimate of 1.67, and any plausible differential horizontal distortions estimate (say, between -4 and 4), our model approximates that—for most states¹⁵⁹—swapping from raising a marginal \$1.00 from the state's sales tax rate to raising that marginal \$1.00 instead from the state's corporate income tax rate would cannibalize somewhere between \$0.50 and \$0.95 of net revenue from other governments.¹⁶⁰

Put more simply, horizontal distortions do somewhat matter. But they do not matter so much within the probable range for the relevant empirical parameters to alter the key takeaway. That key takeaway is that tax cannibalization biases state governments to overtax the federally defined corporate income tax base relative to the sales tax base. More specifically, for every marginal \$1.00 a typical state raises from its top corporate income tax rate rather than from its sales tax rate, our model approximates that other governments might lose perhaps somewhere between \$0.50 and \$0.95 of net revenue from tax cannibalization.

4. *Comparing the States' Capital Gains Tax Rates to Sales Tax Rates.*—The analysis is similar for comparing capital gains tax rates to sales tax rates. As we discussed earlier, the convincing evidence of measured vertical distortionary responsiveness to capital gains tax rates comes from selective realization responses.¹⁶¹

¹⁵⁸ See *supra* Part II.

¹⁵⁹ The primary exceptions are the six states that do not currently levy corporate income taxes. The other exception is Iowa, which currently levies the highest state corporate income tax rate at 12%. If differential vertical distortions are 3 (or 4), then Iowa's opting to raise a marginal \$1.00 of revenue from its corporate income tax rate rather than from its sales tax rate would cannibalize \$1.03 (or \$1.28) of revenue from other governments.

¹⁶⁰ The assumptions behind these approximations are the same as in Section II.B. The approximations are derived from Expression (C) in the Technical Appendix.

¹⁶¹ See *supra* Section II.D.

Selective realization responses are primarily single-instrument distortions¹⁶² for capital gains tax rates, at least as compared to sales tax rates. For instance, the higher the capital gains tax rate, the more incentive taxpayers have to forgo shifting their appreciated investments to alternative investments (such as by selling stock to purchase different stock), as shifting appreciated investments triggers the capital gains tax.¹⁶³ By contrast, shifting appreciated investments does not trigger sales tax, as sales tax bases generally do not include financial assets. Similarly, the higher the capital gains tax rate, the more incentive taxpayers have to forgo selling their appreciated investments and to instead borrow against those investments to fund consumption, so as to avoid triggering the capital gains tax.¹⁶⁴ By contrast, funding consumption through borrowing triggers sales tax, the same as does funding consumption by selling appreciated investments, because consumption purchases are included in sales tax bases regardless of whether they are financed with borrowing or cash. More generally, so long as future consumption is taxed at the same sales tax rates as is present consumption, sales tax rates are neutral as to the timing of when capital gains are realized.¹⁶⁵

We thus take our prior midpoint estimate for the vertical distortions associated with persistent selective realization responses (of 3.15) as also being a plausible estimate for the semi-elasticity of the differentially greater extent to which capital gains tax rates shrink the capital gains tax base through vertical distortions, as compared to sales tax rates. With that, we have all of the inputs that we need to apply our model, again using a wide range of measurements for differential horizontal distortions.

Consider our model's approximation for the tax cannibalization created by New Jersey's raising a marginal \$1.00 of revenue from its top capital gains tax rate (8.97%) rather than from its sales tax rate. Inputting a range for differential horizontal distortion measurements of between -4 and 4, and our midpoint vertical distortions measurement of 3.15, our model approximates that New Jersey is cannibalizing somewhere between \$0.82 and \$1.71 of revenue from other governments.¹⁶⁶

These approximations would be larger in California and in other states with higher top capital gains tax rates. At California's top rate (13.3%),

¹⁶² See *supra* note 152 and accompanying text.

¹⁶³ Richard L. Schmalbeck, *The Uneasy Case for a Lower Capital Gains Tax: Why Not the Second Best?*, 48 TAX NOTES 195, 200-01 (1990).

¹⁶⁴ Gamage, *supra* note 29, at 435.

¹⁶⁵ See David A. Weisbach, *The Case for a Consumption Tax*, 110 TAX NOTES 1357, 1357 (2006) (explaining that consumption taxes do not distort "savings decisions").

¹⁶⁶ The assumptions behind these approximations are the same as in Section II.D. The approximations are derived from Expression (C) in the Technical Appendix.

these approximations would range from \$0.80 to \$12.51. Conversely, these approximations would be smaller in North Dakota and in other states with lower top capital gains tax rates. At North Dakota's top rate (1.932%), these approximations would range from \$0.71 to \$0.87.

The key takeaway is that tax cannibalization biases state governments to overtax the federally defined capital gains tax base relative to the sales tax base. More specifically, for every marginal \$1.00 a typical state raises from its top capital gains tax rate rather than from its sales tax rate, our model approximates that other governments might lose perhaps somewhere between \$0.71 and well over \$1.00 of net revenue from tax cannibalization.¹⁶⁷

5. *Comparing the States' Ordinary Income Tax Rates to Sales Tax*

Rates.—The analysis is more uncertain for state ordinary income tax rates, in part because we lack any reliable indications for how much of the measured responsiveness to ordinary income tax rates consists of single-instrument distortions rather than distortions that are also induced by sales tax rates. When considering an analogous question in prior scholarship, one of us concluded “as a very rough best-guess estimate” that “perhaps 50%” of the measured responsiveness to income tax rates might constitute single-instrument distortions as compared to sales tax rates.¹⁶⁸ This guess was based primarily on anecdotal evidence and is far from reliable, but we do continue to think that at least a good portion of the responsiveness to income tax rates probably constitutes single-instrument distortions relative to sales taxes. Indeed, we lack any reason to think that below 50% would be a better guess than above 50%.

We earlier took 1.25 as our midpoint estimate for the vertical distortions induced by the top state ordinary income tax rates with respect to taxpayers in the top federal rate bracket.¹⁶⁹ Taking half of this gives us a possible estimate of 0.625 for the differentially greater vertical distortions to the ordinary income tax base induced by raising marginal revenue from a state's top ordinary income tax rate rather than from the state's sales tax rate. Based on this estimate, and again taking a range for differential horizontal distortion measurements of between -4 and 4, our model

¹⁶⁷ However, note that we purposefully picked three states (New Jersey, California, and North Dakota) wherein the top capital gains rate brackets are similar to the federal government's (but with different rates), as doing so sidesteps the complication of a state's top rate applying to taxpayers who fall into the lower federal-level rate brackets. With respect to other states, we repeat our earlier caveat that our approximations only necessarily apply with respect to taxpayers in the top federal rate bracket. See *supra* notes 73, 98 and accompanying text.

¹⁶⁸ Gamage, *supra* note 29, at 410.

¹⁶⁹ See *supra* Section II.E.

approximates that New Jersey's raising a marginal \$1.00 of revenue from its ordinary income tax rate (8.97%), rather than from its sales tax rate, cannibalizes somewhere between \$0.18 and \$0.30 of revenue from other governments.¹⁷⁰

These approximations are somewhat more tentative than our prior approximations. For instance, if only 20% or less of the distortionary responsiveness to income tax rates are single instrument, and if differential horizontal distortions are on the high side, then this positive tax cannibalization might disappear or even become negative (implying that differential horizontal externalities might potentially slightly overpower differential vertical externalities). Nevertheless, for most of the probable range for the empirical input parameters, our model approximates significantly positive marginal tax cannibalization from a state raising revenue from its top ordinary income tax rate rather than from its sales tax rate, at least with respect to taxpayers in the highest federal rate bracket. Overall, then, we tentatively infer that tax cannibalization most likely biases state governments to overuse their top ordinary income tax rates relative to their sales tax rates, at least to some extent.

6. *What About Other Potential Alternative Tax Bases?*—So far we have only discussed the possibility of states switching from the use of corporate or personal income tax rates to the use of sales tax rates. Limiting the scope of our discussion is necessary, in part because determining how much of the vertical distortionary responsiveness to a tax rate constitutes single-instrument distortions depends on what we are comparing that tax rate to.¹⁷¹

Nevertheless, there are numerous potential alternative ways in which state governments might implement what could be thought of as variations or hybrids on corporate or personal income taxes or on indirect taxes. To consider one example: in addition to its more traditional corporate income tax that mostly piggybacks on the federal government's tax-base-definition rules (called the "Business Profits Tax"), New Hampshire also levies another business-entity-level tax (called the "Business Enterprise Tax").¹⁷² This Business Enterprise Tax is levied on all business entities conducting substantial activity in New Hampshire—including both corporations and partnerships—on a base consisting of "the total amount of interest paid,

¹⁷⁰ The assumptions behind these approximations are the same as in Section II.E. The approximations are derived from Expression (C) in the Technical Appendix.

¹⁷¹ See Gamage, *supra* note 29, at 396.

¹⁷² JON B. SPARKMAN ET AL., DEVINE, MILLIMET & BRANCH, SUMMARY OF NEW HAMPSHIRE TAXATION OF BUSINESS 1–2, https://www.devinemillimet.com/uploads/docs/summary_of_nh_taxation__m1608974_.pdf [https://perma.cc/2BYA-QUQK].

dividends paid or accrued, and wages paid or accrued” within New Hampshire.¹⁷³

For the purposes of assessing tax cannibalization, the key question in considering alternative forms of taxation is the extent to which these alternatives do or do not replicate the flaws in the federally defined corporate and personal income tax bases that result in vertical distortions. New Hampshire’s Business Enterprise Tax bears some resemblance to both more traditional corporate¹⁷⁴ and personal¹⁷⁵ income taxes. But New Hampshire’s Business Enterprise Tax most likely does not replicate at least some of the flaws in the federally defined corporate and personal income tax bases that result in vertical distortions.

For a relatively simple example as to why, consider that the Business Enterprise Tax applies to partnerships as well as to corporations, and so—in contrast to state corporate income taxes that piggyback on the federal government’s base-definition rules¹⁷⁶—the Business Enterprise Tax presumably does not induce the distortionary response of taxpayers shifting from corporate to partnership organizational forms. Similarly, because the Business Enterprise Tax is not based on measuring either business profits or corporate income, it presumably does not induce the sort of profit shifting responses that shrink the federally defined corporate income tax base.¹⁷⁷

Aside from our prior discussions of sales tax rates, it is beyond the scope of this Article to evaluate more fully whether national welfare would be enhanced were states to move more toward levying other specific alternative tax bases (such as New Hampshire’s Business Enterprise Tax).¹⁷⁸ For now, we seek only to make the following, relatively simple point in regard to this question.

Because of tax cannibalization, many of the potential welfare benefits from a state government switching from taxing the federally defined corporate or personal income tax bases to more creative alternatives would advantage the federal government rather than the state government

¹⁷³ *Id.* at 2–3.

¹⁷⁴ For instance, the tax is imposed on business entities based on proxies for their economic activity within the state.

¹⁷⁵ For instance, the tax base consists in part of interest, dividends, and wages paid by businesses.

¹⁷⁶ See *supra* note 137 and accompanying text.

¹⁷⁷ See *supra* Section III.B.3.

¹⁷⁸ For discussion of the merits of the Business Enterprise Tax, see JENNIFER WEINER, NEW ENGLAND PUB. POLICY CTR., RESEARCH REPORT 11-1, HOW DOES NEW HAMPSHIRE DO IT? AN ANALYSIS OF SPENDING AND REVENUES IN THE ABSENCE OF A BROAD-BASED INCOME OR SALES TAX 32 (2011). The report explains that the Business Enterprise Tax has “been lauded for its simplicity, economic neutrality, and political stability.” *Id.*

implementing the reform. By contrast, the costs of designing and implementing the alternative tax base would be borne by the state government. In this sense, contemporary federal tax law biases state governments against experimenting with alternative forms of taxation that might otherwise have the potential to enhance national welfare.

C. *Summary and Synthesis*

The federal government currently levies relatively high tax rates on corporate income, capital gains, and ordinary income. In contrast, the federal government does not currently levy a sales tax or other broad-based indirect tax. As a result, top state-level corporate and personal income tax rates currently generate large marginal tax cannibalization relative to state sales tax rates.

The biases associated with this differentially larger tax cannibalization are strongest and most certain with respect to the top state-level corporate income and capital gains tax rates. We approximated that for every marginal \$1.00 a typical state raises from its top corporate income tax rate, rather from its sales tax rate, other governments might lose perhaps somewhere between \$0.50 and \$0.95 of net revenue from tax cannibalization. We similarly approximated that for every marginal \$1.00 a typical state raises from its top capital gains tax rate, rather than from its sales tax rate, other governments might lose perhaps somewhere between \$0.71 and well over \$1.00 of net revenue from tax cannibalization.

There is thus strong reason to infer that other governments currently suffer large net revenue costs when a typical state government opts to raise marginal revenues from its top tax rates on the federally defined corporate and personal income tax bases, relative to alternatives. We further emphasize that these revenue costs represent pure economic waste (deadweight loss).

To see why, consider that a state government should be indifferent as to whether it raises a marginal \$1.00 of revenue from, say, its corporate income tax rate or from its sales tax rate.¹⁷⁹ Yet the federal government should be far from indifferent. Our approximations suggest that the state government cannibalizes somewhere between \$0.50 and \$0.95 of revenue from opting to raise a marginal \$1.00 from its corporate income tax rate

¹⁷⁹ If the state government were not indifferent, then the state government should presumably have already swapped to greater revenue generation from its preferred tax instrument, until the state government then became indifferent. We are assuming here that the state government acts to further state-level revenues and welfare and does not otherwise seek to promote national revenues or welfare. This assumption corresponds both with theory, *see supra* Section I.B; Stark, *supra* note 20, at 1392–93, and with our experience observing and advising on state-level tax reform debates.

rather than from its sales tax rate. Therefore, because the acting state government should be indifferent between these choices, whereas other governments should care to the extent of somewhere between 50% and 95% of the marginal revenue raised, that 50% to 95% tax cannibalization represents pure economic waste.

All of that was the second step of our argument in this Part. Then, in addition, other aspects of contemporary federal tax law push state governments toward even greater use of the federally defined corporate and personal income tax bases, relative to alternatives, thereby exacerbating the magnitude of this tax cannibalization problem. This was the first step of our argument in this Part.

Putting these two steps together thus reveals that contemporary federal tax law pushes state governments' tax decisionmaking in directions that are harmful to national welfare. Or, in other words, tax cannibalization currently imposes large and wasteful costs on the federal government, and this outcome is at least partially the federal government's fault.

IV. HOW THE FEDERAL GOVERNMENT COULD ALLEVIATE THE TAX CANNIBALIZATION PROBLEM

We have shown that the federal government is partially to blame for the current severity of the tax cannibalization problem. This is primarily because the federal government assesses relatively high tax rates on somewhat narrowly defined and porous bases. Thus, when state governments levy taxes on these same bases, the result is massive tax cannibalization.

The federal government could therefore alleviate the tax cannibalization problem by reforming its tax rates, its tax-base-definition rules, or both. For instance, were the federal government to follow other developed nations by levying a VAT, along with then using the newly generated revenues to fund reducing the rates of the federal corporate and personal income taxes, this would go a long way toward alleviating the tax cannibalization problem.¹⁸⁰

There are also numerous proposals for how the federal government might reform the tax-base-definition rules for its corporate or personal income taxes. To the extent that these reforms could successfully address the flaws and loopholes that currently invite large vertical distortions for

¹⁸⁰ Implementing this sort of reform in a distributionally neutral fashion might entail making the remaining federal personal income tax rates more progressive. Even so, the top federal personal income tax rates needed to achieve the current level of overall tax distribution would be far lower if those rates were supplementing a substantial VAT. For further discussion, see Reuven S. Avi-Yonah, *The Three Goals of Taxation*, 60 TAX L. REV. 1, 5–10 (2006); Gamage, *supra* note 29, at 402–13.

these tax bases, the reforms would thereby also serve to alleviate the tax cannibalization problem.¹⁸¹ By demonstrating the large costs that the federal government currently suffers from tax cannibalization, this Article thus adds a further argument in favor of these sorts of reforms. Indeed, we hope that accounting for the costs of tax cannibalization might tip the balance enough to convince federal policymakers to adopt some reforms to federal tax rates or tax-base-definition rules.

Yet the opponents of these reforms might object that implementing these sorts of reforms as a response to tax cannibalization would be like the tail wagging the dog. There is already a vast literature weighing the merits of various approaches for federal tax reform. This Article certainly contributes to that literature by introducing tax cannibalization as an additional factor that should be considered. Nevertheless, we think that our efforts in this Part are probably best oriented toward explaining how the federal government might alleviate the tax cannibalization problem under the assumption that federal policymakers will *not* be willing to reform the federal government's current tax rates or tax-base-definition rules.

So, if federal policymakers are unwilling to reform the federal government's tax rates or tax-base-definition rules, how might the federal government then alleviate the tax cannibalization problem? The basic goal of any solution should be to reduce the states' top tax rates on the federally defined corporate and personal income tax bases. The states could then be compensated for the lost revenue through some combination of direct subsidies and incentives for the states to recoup that revenue themselves by taxing bases that overlap less with the federal government's.

The remainder of this Part first briefly sketches a map of possible approaches for reform, and then proceeds to evaluate more specific reform possibilities. Throughout, we discuss how the federal government might reduce the states' top tax rates on both the corporate and personal income tax bases. The reform possibilities we discuss could be tailored to reduce only certain of these tax rates. For instance, it might well make sense for the federal government to target only state capital gains tax rates and not also ordinary income tax rates. However, for expositional reasons, we

¹⁸¹ For example, we think that ending the preference for stepped-up basis upon death might substantially reduce the selective realization responses to the capital gains tax rates, as might reforming the rules for how the income tax treats borrowing. For discussion of these ideas, see Lawrence Zelenak, *Debt-Financed Consumption and a Hybrid Income-Consumption Tax*, 64 TAX L. REV. 1 (2010); Lawrence Zelenak, *Taxing Gains at Death*, 46 VAND. L. REV. 361 (1993). For discussion of other possible reforms that might go even further toward combatting selective realization responses, see Alan J. Auerbach, *Retrospective Capital Gains Taxation*, 81 AM. ECON. REV. 167 (1991); Gamage, *supra* note 29, at 431–37; Mark P. Gergen, *The Effects of Price Volatility and Strategic Trading Under Realization, Expected Return and Retrospective Taxation*, 49 TAX L. REV. 209 (1994).

mostly discuss reform possibilities by reference to both the corporate and personal income tax bases.

A. Mapping Four Categories of Reform Options

Tax cannibalization is at essence a problem of a net negative externality—that is, a third party (the federal government) is harmed by decisions that state governments make for their own benefit. As such, the tax cannibalization problem can be addressed through one (or more) of four broad categories of policy instruments of the sort that are generally available to mitigate negative externalities. To begin with, the federal government can use either sticks or carrots (or a mixture of both sticks and carrots). Then, both sticks and carrots can be implemented either through a regulatory command-and-control approach or through an incentive-based price approach (or through some combination of these two approaches).

An example of a *regulatory stick* would be for the federal government to ban state governments from using tax bases that overlap with the federal government's—for instance, banning state governments from taxing corporate income. An example of a *price-based stick* would be for the federal government to penalize state governments that make use of overlapping tax bases like the corporate income tax.

An example of a *regulatory carrot* would be for the federal government to design and implement a less-overlapping tax base that would then be made available for use by state governments—for instance, the federal government could design and implement a national sales tax infrastructure while leaving that tax base for the exclusive use by the states. An example of a *price-based carrot* would be for the federal government to subsidize state governments' use of less-overlapping tax bases like sales taxes.

TABLE 4: MAPPING THE FOUR CATEGORIES OF REFORM OPTIONS

	Regulatory Command-and-Control	Price-Based Incentives
Sticks	Ban of limit use of overlapping bases	Penalize use of overlapping bases
Carrots	Support use of less-overlapping bases	Subsidize use of less-overlapping bases

To foreshadow our conclusions, we propose that the federal government use some mixture of both sticks and carrots. To the extent that state governments are viewed even partially as a source of the tax cannibalization problem, sticks are more directly effective at controlling

the problem.¹⁸² Ultimately, because the goal is to *reduce* the state's top tax rates on the federally defined corporate and personal income tax bases, some use of sticks is probably necessary to achieve this goal. Relying only on carrots could result in the states just increasing their use of the less-overlapping tax bases promoted by the carrots while still continuing their same use of the overlapping tax bases that currently results in tax cannibalization.

Yet relying solely on sticks would also be problematic, especially to the extent that the federal government is viewed as partially to blame for the tax cannibalization problem. Even as a matter of constitutional doctrine, the Supreme Court has repeatedly, and reasonably, insisted that there is something special about the state revenue function that deserves protection.¹⁸³ A sticks-only approach to combatting tax cannibalization would thus likely run afoul of constitutional doctrines, particularly the anti-commandeering doctrine, designed to prevent the federal government from coercing state governments.¹⁸⁴ More generally, fiscal federalism in the United States is built on a foundation of preserving a substantial role for state fiscal autonomy. As one eminent scholar of state tax policy explains, “[t]he case for state autonomy over tax rates is taken as axiomatic. Leaving aside the compelling conceptual arguments for state autonomy over rates, it seems that any system that compromised such autonomy would be politically unacceptable.”¹⁸⁵

Overall, then, we argue that some use of sticks is necessary to induce state governments to reduce their tax rates on overlapping bases. But this use of sticks should be tied in with a reform package consisting of substantial carrots for the sticks to be viable in light of the concerns about preserving state governments' fiscal autonomy.

B. *Regulatory Sticks*

In the absence of any concerns about interfering with state governments' fiscal autonomy, perhaps the most obvious solution to the tax cannibalization problem would be for the federal government to just ban

¹⁸² For explanation of the general superiority of sticks for controlling negative externalities, see Brian Galle, *The Tragedy of the Carrots: Economics and Politics in the Choice of Price Instruments*, 64 STAN. L. REV. 797, 813–31 (2012).

¹⁸³ In a separate essay, we discuss the constitutional limits on the federal government's power to coerce or influence state governments' tax base choices. See David Gamage & Darien Shanske, *The Federal Government's Power to Restrict State Taxation*, 81 ST. TAX NOTES 547 (2016), https://papers.ssrn.com/sol3/papers2.cfm?abstract_id=2836649 [<https://perma.cc/PM9D-8CSN>].

¹⁸⁴ See *id.* at 550.

¹⁸⁵ Charles E. McLure, Jr., *How to Coordinate State and Local Sales Taxes with a Federal Value Added Tax*, 63 TAX L. REV. 639, 645 (2010).

state governments from taxing the corporate and personal income tax bases. If state governments could be banned both from directly taxing these bases and also from levying alternative forms of taxation that overlap too much with these bases, then this would effectively solve the tax cannibalization problem.

Yet we are skeptical that an extreme solution of this sort would be constitutionally permissible.¹⁸⁶ The federal government clearly has the power to ban state governments from taxing certain activities, especially activities that are highly related to interstate commerce.¹⁸⁷ But we doubt that the Supreme Court would extend this power so far as to allow the federal government to ban the states from using major tax bases that have historically been important tools of state policy. Moreover, we think this is probably for good reason. We ultimately agree that there are merits to preserving fiscal autonomy for state governments, so that (for instance) California's voters can have the flexibility to opt for greater distribution than what is chosen by voters in Texas.¹⁸⁸

Of course, state governments could still promote distribution and other state-level tax policy goals without the use of a corporate or personal income tax. However, income taxes on both corporations and persons have traditionally been the primary policy tools used for promoting distribution and also for achieving certain regulatory goals.¹⁸⁹ We thus do not believe that state governments should be completely deprived of these tools, unless perhaps the federal government were to create an adequate substitute and provide that substitute to state governments for use as a replacement.¹⁹⁰

Moreover, these concerns about interfering with state governments' fiscal autonomy are especially troubling to the extent that we view the federal government as being partially to blame for the tax cannibalization problem. Put another way: why should state governments be forced to retreat from using overlapping tax bases rather than having the federal government retreat? Overall, we are thus skeptical that banning overlapping tax bases would be either constitutionally permissible or desirable.

Rather than outright prohibiting state governments from levying corporate or personal income taxes, it might be less constitutionally

¹⁸⁶ See Gamage & Shanske, *supra* note 183, at 551.

¹⁸⁷ *Id.* at 551–52.

¹⁸⁸ For further discussion, see Brooks, *supra* note 7, at 114–16; Stark, *supra* note 20, at 1408–10.

¹⁸⁹ See Avi-Yonah, *supra* note 180, at 4 (arguing in favor of income taxation as a tool for distribution and regulation).

¹⁹⁰ See *id.* at 26–28 (discussing whether a cash flow consumption tax could be an adequate substitute for the income tax as a tool for distribution and regulation); *infra* Section IV.D.1.

problematic for the federal government to instead just ban the states from piggybacking on the federal government's tax-base-definition rules and associated administrative and enforcement infrastructure. Yet we fear that this might result in state governments just designing their own corporate and personal income taxes in ways that would still overlap substantially with the federal government's, such that tax cannibalization might then be only minimally alleviated, and that at the expense of increased administrative and compliance costs. We thus do not view this as an especially promising reform option and so will not discuss it further.

As a less extreme form of a regulatory stick, the federal government could perhaps cap the maximum rates at which states would be permitted to tax corporate or personal income. On its own, this might still be too draconian an interference with state governments' fiscal autonomy. But this approach has greater merit if considered as part of a reform package whereby the federal government would also offer substantial carrots.

For example, the federal government could require state governments to cap the maximum rates of their corporate and personal income taxes as a condition for the states to receive some new carrots. Done right, with genuinely new carrots, this should mitigate both concerns about constitutional permissibility and more general worries about interfering with state governments' fiscal autonomy.¹⁹¹ Indeed, it might even be both constitutionally permissible and more generally desirable for the federal government to go so far as to require states to completely forgo taxing the corporate income tax base as a conditional requirement for receiving substantial new carrots.¹⁹²

Considered on its own, the regulatory sticks category is the least promising of the four categories of reform options. Yet we do think that there could be a role for regulatory sticks as part of an overall reform package that also includes carrots. In particular, caps on states' corporate and personal income tax rates could be implemented as conditional requirements that state governments would need to agree to in exchange for being offered new carrots.

C. *Price-Based Sticks*

Rather than ban the use of overlapping tax bases or cap the maximum rates allowed on these bases, the federal government could instead attempt to price in the net negative externalities resulting from state governments'

¹⁹¹ See Gamage & Shanske, *supra* note 183, at 552–53.

¹⁹² See *id.* (explaining how it might be constitutionally permissible for Congress to use its tax and spending powers to limit the state's use of the corporate income tax).

tax base decisions.¹⁹³ This approach is theoretically appealing because it would allow state governments to use whatever tax bases they might desire, so long as they internalized the national revenue costs of their decisions.¹⁹⁴ For instance, if hiking a state-level corporate income tax rate would cannibalize a net \$100 million dollars from other governments, then the acting state government should theoretically be charged \$100 million dollars upon enacting that tax hike. It would then be up to that state's government to decide whether the benefits from going forward with the tax hike would suffice to justify the \$100 million dollar payment required to compensate other governments for the costs imposed by tax cannibalization.

Of course, if the acting state's tax rate surpassed its national revenue-maximizing level, then the theoretically correct tax rate would exceed 100%. This would effectively amount to capping the state's tax rates. Yet this outcome is consistent with the philosophy behind price-based sticks. The goal of pricing in the net negative externality implies that state governments *should* be deterred from setting their tax rates in excess of their national revenue-maximizing levels.

One difficulty in implementing this approach would arise from determining how to calculate the amount of the penalties to be charged in light of the considerable uncertainty about many of the key empirical parameters. However, calibrating policy in the face of uncertainty is a challenge for most any approach to regulation.¹⁹⁵ For instance, determining the appropriate settings for caps on the states' maximum tax rates would be similarly difficult in the light of empirical uncertainty. Moreover, even if the price charges were set on the low side of the plausible estimates, this could go a long way toward internalizing the net externalities and thereby alleviating the tax cannibalization problem.

The more fundamental problem with this approach relates to the same constitutional and federalism objections we raised to the use of regulatory sticks. Would charging state governments for the externality costs of tax

¹⁹³ For an analogous proposal with respect to business taxes in Canada, see Dahlby, Mintz & Wilson, *supra* note 40, at 678–79.

¹⁹⁴ For general discussions of the relative merits of regulatory command-and-control versus price-based incentive approaches, see, for example, Cameron Hepburn, *Regulation by Prices, Quantities, or Both: A Review of Instrument Choice*, 22 OXFORD REV. ECON. POL'Y 226 (2006); Louis Kaplow & Steven Shavell, *On the Superiority of Corrective Taxes to Quantity Regulation*, 4 AM. L. & ECON. REV. 1 (2002).

¹⁹⁵ See David S. Gamage, Note, *Taxing Political Donations: The Case for Corrective Taxes in Campaign Finance*, 113 YALE L.J. 1283, 1326–28 (2004) (explaining that uncertainty is a problem both when setting corrective tax rates and when setting the levels of caps in command-and-control regulation).

cannibalization unduly coerce the states or limit the states' fiscal autonomy, either as a matter of constitutional permissibility or of more general desirability? Again, these concerns are especially troubling to the extent that we view the federal government as being partially to blame for the tax cannibalization problem. After all, why should the federal government be permitted to charge state governments for a problem that is partly of the federal government's making?

As before, we consider these objections to be quite serious with respect to a pure policy of the federal government directly charging state governments for the costs of tax cannibalization.¹⁹⁶ Yet these objections could be greatly mitigated by instead implementing price-based sticks as a component of a reform package that would also include substantial carrots. For instance, if the federal government were to provide substantial new subsidies to state governments to support the state governments swapping to greater use of sales taxes, these subsidies could be designed so as to phase out based on the setting of the state government's corporate and personal income tax rates. The amount of this phase-out could then be tied to estimates of marginal tax cannibalization. In effect, the phase-out of the subsidies would then become a form of price-based stick.

We thus reach overall similar conclusions for both regulatory sticks and price-based sticks. Concerns about state fiscal autonomy probably make a pure sticks-based policy of either sort infeasible. But some use of sticks is probably needed, and this use can be justified if the sticks are implemented as a component of a reform package also containing substantial carrots.

Before proceeding to discuss the sorts of carrots that the federal government might offer, we note that there is some potential for implementing what might be considered more limited forms of price-based sticks without unduly interfering with state governments' fiscal autonomy. In particular, the federal government could reform the SALT deduction.

As we previously explained, the SALT deduction currently favors state-level income taxes over state-level sales taxes.¹⁹⁷ Furthermore, the SALT deduction has always been understood as an optional benefit that the federal government provides to state governments and to taxpayers.¹⁹⁸

¹⁹⁶ On the constitutional permissibility question, see *supra* notes 191–93 and accompanying text. Even apart from the constitutionality, it is at least somewhat questionable as a matter of political economy whether the federal government could, say, charge state governments for setting their tax rates too high.

¹⁹⁷ See *supra* notes 130–32 and accompanying text.

¹⁹⁸ There have been numerous proposals to end or limit the SALT deduction, some successfully enacted. These proposals have not been viewed as constitutionally problematic. See CONG. BUDGET OFFICE, THE DEDUCTIBILITY OF STATE AND LOCAL TAXES 1–2 (2008),

Thus, amending or even terminating this benefit should not be especially troubling with respect to concerns about state governments' fiscal autonomy.

Accordingly, the goal of alleviating tax cannibalization suggests that the SALT deduction should probably be reformed so as to at least be neutral with respect to the choice between state-level income and sales taxes.¹⁹⁹ Going further, the SALT deduction ought to perhaps be reformed so as to actually favor state-level sales taxes. Since 2004, the SALT deduction has been structured to allow taxpayers a choice of deducting either their state income tax payments or their state sales tax payments.²⁰⁰ All that would be needed to make the SALT deduction favor sales taxes, then, would be to end the option to deduct state income tax payments, while maintaining the deduction for state sales tax payments.

As a supplement to reforming the SALT deduction, the federal government might also end the deductibility of state corporate income tax payments against the federal corporate income tax base. State-level corporate income tax payments are currently deductible as general business expense deductions. Yet the courts have long held that even business expense deductions are "allowed as a matter of legislative grace."²⁰¹ The federal government should thus be able to end the deductibility of state corporate income tax payments, so that these payments would then be treated like (non-deductible) fines²⁰² rather than like other (deductible) tax payments. Doing this would effectively be similar to levying a 35% penalty on state corporate income tax collections.

These approaches of reforming the SALT deduction and ending the deductibility of state corporate income tax payments show promise as possible elements for inclusion in a reform package. But we doubt that these measures could suffice to fully counteract the tax cannibalization problem on their own. Consequently, more comprehensively addressing the tax cannibalization problem requires a reform package consisting of both sticks and carrots.

https://www.cbo.gov/sites/default/files/110th-congress-2007-2008/reports/02-20-state_local_tax.pdf [<https://perma.cc/BHZ8-7JYD>].

¹⁹⁹ This has previously been suggested by Kirk Stark. See Stark, *supra* note 8, at 437.

²⁰⁰ *Id.* at 425.

²⁰¹ *White v. United States*, 305 U.S. 281, 292 (1938); *accord* *New Colonial Ice Co. v. Helvering*, 292 U.S. 435, 440 (1934).

²⁰² See I.R.C. § 162(f) (2012) (explaining that fines or penalties paid to a government are not deductible).

D. *Regulatory Carrots*

So, if carrots are needed, what form should these carrots take? We previously explained how contemporary federal tax law pushes state governments toward greater use of the corporate and personal income tax bases, in part because of the administrative, compliance, and implementation benefits that states receive from piggybacking on the federal government's tax bases.²⁰³ Accordingly, providing similar support for an alternative tax base could assist in incentivizing state governments to swap toward use of that alternative.

Yet this raises the question of what tax bases would be preferable for state governments to tax. Earlier we discussed how state-level tax rates on corporate income, capital gains, and ordinary income are less efficient than their federal analogs to the extent of horizontal distortions. Through process of elimination, this potentially suggests that state-level consumption taxes might be superior in this regard. However, existing state-level retail sales taxes are deeply flawed, and so do “not in fact share the many advantages of consumption taxation.”²⁰⁴ Indeed, according to Stark, these flaws are so severe that the states' sales taxes are currently “dying on the vine.”²⁰⁵

Moving state governments toward greater reliance on consumption taxation is a promising route for fiscal federalism reform. In theory, the states could rely more heavily on consumption taxes for revenue raising, combining this with more modest use of the income tax bases to promote distribution and regulatory goals. However, existing state-level sales taxes may be too deeply flawed to play such a central role in state-level taxation.

A more fundamental approach for how the federal government might offer regulatory carrots would thus be to design and implement a new and improved form of consumption tax base and to then make this new tax base available for use by the states. A more incremental—and likely more pragmatic—variation on this approach would be for the federal government to assist in fixing the flaws that currently plague the states' retail sales taxes.

²⁰³ See *supra* Section III.A.

²⁰⁴ John L. Mikesell, *Misconceptions About Value-Added and Retail Sales Taxes: Are They Barriers to Sensible Policy?*, PUB. BUDGETING & FIN., Summer 2014, at 1, 4–6 (quoting GEORGE R. ZODROW, STATE SALES AND INCOME TAXES 102 (1999)).

²⁰⁵ Kirk J. Stark, *The Uneasy Case for Extending the Sales Tax to Services*, 30 FLA. ST. U. L. REV. 435, 435 (2003).

1. *More Fundamental Reforms: Designing and Implementing a New Tax Base.*—Let us begin by briefly suggesting some more ambitious and fundamental options for reform. One option would be for the federal government to levy a national VAT and to then dedicate that VAT to funding state governments.²⁰⁶ Or, as a variation on this option, the federal government could just implement and administer a VAT infrastructure for the states to piggyback on with their own state-level tax rates.²⁰⁷ Perhaps even more promising would be to combine these two options. For instance, the federal government could levy a national VAT with a low federal tax rate, the revenues from which would be allocated amongst the states, with state governments then encouraged to also piggyback on this new VAT tax base with their own additional state-level tax rates.

As an alternative to a VAT, there are a number of proposals in the literature for how the federal government might implement some form of progressive consumption tax.²⁰⁸ Stark has argued that state governments should consider adopting one of these proposals as a state-level progressive consumption tax.²⁰⁹ Partly because of tax cannibalization, we doubt that a state government would be motivated to design and implement a new tax of this sort on its own initiative. But state governments might well agree to switch to using this sort of tax base if the federal government did the hard work of implementation and administration, or even if the federal government just sufficiently subsidized that hard work.

Ultimately, however, we describe these sorts of proposals as “ambitious” for good reason. The devil would be in the details for evaluating such extensive approaches for reform. Among other concerns, we worry about the administrative and compliance costs associated with these proposals. There is also a question about whether the federal government would do an adequate job in designing and administering a tax base that the federal government would not then use for raising its own revenues. Nevertheless, we think there is considerable promise in these sorts of reform proposals. At the very least, we think proposals of this sort merit further deliberation and consideration as a potential route for improving fiscal federalism in the United States.

²⁰⁶ Australia does a variation of this. See McLure, *supra* note 185, at 645 (explaining that Australia has a federally administered VAT where revenue “is distributed among the states according to a formula”).

²⁰⁷ The Canadian experience offers lessons in how both state-level VATs and state-level retail sales taxes can be dramatically improved through cooperation and piggybacking on a federally created VAT infrastructure. For discussion of this, see Richard M. Bird & Pierre-Pascal Gendron, *Sales Taxes in Canada: The GST-HST-QST-RST “System,”* 63 TAX L. REV. 517 (2010).

²⁰⁸ E.g., Gamage, *supra* note 29, at 421–23.

²⁰⁹ Stark, *supra* note 205, at 458–64.

2. *More Incremental Reforms: Supporting the States' Existing Sales Tax Bases.*—If the more fundamental reform options prove infeasible, the federal government could instead offer regulatory carrots in the form of increased support for the states' existing sales taxes. Because forty-five states already levy retail sales taxes,²¹⁰ promoting further and more effective use of these tax bases is less likely to raise concerns in terms of potentially increased administrative or compliance costs.

There are currently two central flaws with the states' sales tax bases. The federal government could act to address both of these flaws. As we discussed previously, the first central flaw is the result of the *Quill* decision and of Congress's failure to pass the legislation invited by that decision.²¹¹ The federal government could easily act to resolve this flaw.²¹² At a minimum, then, this Article's demonstration of the costs that the federal government currently suffers from tax cannibalization provides a powerful new argument for why Congress should quickly legislate a solution to the *Quill* problem.²¹³ In the extensive prior literature on the *Quill* decision, we know of no one who has previously explained how enabling more effective state-level sales taxes could serve the *federal* government's revenue interests.²¹⁴ This further illustrates how instructing policymakers about tax cannibalization should prod federal level reforms.

The second central flaw in the states' sales tax bases relates to pyramiding (sometimes called "cascading"). The federal government could act to address this flaw also, although doing so would require greater effort. Pyramiding occurs when a sales tax is applied to business inputs; the more inputs a business happens to use that it must purchase from other businesses, the more tax is then built into the first business's prices. Pyramiding is both unfair and inefficient. To see why, consider an example of a small boutique selling clothes. Suppose that the sales tax is applied to all goods and services, as an ideal consumption tax would be. This means that the small boutique would need to pay sales tax on its purchase of all business inputs, from inventory, to printer paper, to its lawyer and plumber. By comparison, a competing large retail chain, say Gap or J.Crew, would pay sales tax on fewer of these goods and services, because some would be produced in-house by employees.

²¹⁰ Scott Drenkard & Jared Walczak, *State and Local Sales Tax Rates in 2015*, TAX FOUND. (Apr. 8, 2015), <http://taxfoundation.org/article/state-and-local-sales-tax-rates-2015> [<https://perma.cc/AMQ9-A77C>].

²¹¹ See *supra* notes 122–29 and accompanying text.

²¹² See *supra* note 124.

²¹³ See *supra* Section III.A.

²¹⁴ See sources cited *supra* note 124 for some of our prior writings on the *Quill* decision.

The tax is unfair because it advantages large, vertically integrated businesses over smaller competitors. The inefficiency is related to the unfairness: pursuit of this advantage incentivizes vertical integration so that more inputs are produced in-house and thereby exempt from sales tax.

Pyramiding is pervasive—the most commonly cited estimate is that about 40% of sales tax revenue is collected on business inputs.²¹⁵ Moreover, pyramiding would be even more ubiquitous, except that the states have warped the design of their sales tax bases so as to limit the damage from pyramiding. In particular, state governments currently exempt most services from their sales tax bases, because pyramiding is an especially large problem with respect to taxing services.²¹⁶ But exempting services then causes further problems by narrowing sales tax bases and distorting choices between purchases of (taxed) goods and (untaxed) services.

On the international stage, VATs were developed largely as a way to resolve the pyramiding problem.²¹⁷ But full VAT-style solutions to the pyramiding problem are exceedingly difficult for state governments to implement without a federal-level VAT infrastructure to piggyback on, because these solutions require some form of border tax adjustments.²¹⁸ Because goods and services flow relatively freely across state borders, state governments cannot readily implement the most common approaches for border tax adjustments used internationally. Indeed, even if feasible, some commentators have concluded that it might not be constitutionally permissible for state governments to implement border tax adjustments.²¹⁹

Yet there is another option for addressing the pyramiding problem. In theory, all business-to-business purchases could simply be made exempt from the sales tax base. Alas, a simple rule to this effect would put enormous pressure on tax authorities to prevent abuse. The primary issue is that there are numerous dual-use goods—e.g., computers and vehicles—that consumers could try to purchase free of sales tax by representing themselves as businesses.²²⁰

²¹⁵ Raymond J. Ring, Jr., *Consumers' Share and Producers' Share of the General Sales Tax*, 52 NAT'L TAX J. 79, 87 (1999).

²¹⁶ Stark, *supra* note 205, at 456–58.

²¹⁷ See Sijbren Cnossen, *A VAT Primer for Lawyers, Economists, and Accountants*, 124 TAX NOTES 687, 692 (2009).

²¹⁸ See Stark, *supra* note 16, at 441–42.

²¹⁹ A border tax adjustment would facially impose a surcharge on goods and services coming from out of state and so would seem to be an example of per se interstate discrimination, and therefore unconstitutional. *But see* Darien Shanske, *State-Level Carbon Taxes and the Dormant Commerce Clause: Can Formulary Apportionment Save the World?*, 18 CHAP. L. REV. 191 (2014) (summarizing and questioning the consensus view that border taxes violate the dormant Commerce Clause).

²²⁰ McLure, *supra* note 185, at 650.

This is where the federal government could helpfully step in. Effectively administering a sales tax exemption for business-to-business purchases requires a system for registering businesses and for auditing transactions that taxpayers claim to be business purchases.²²¹ The federal government could thus implement and administer a national registration system for identifying businesses and for auditing business-to-business purchases. Indeed, the federal government could do this far more effectively than could state governments, because so many business purchase transactions cross state borders.²²²

There are potentially also other ways in which the federal government might offer regulatory carrots to support state sales tax bases or to facilitate the states in swapping to alternative forms of taxation. Yet, as our discussion here suggests, appreciating the most impactful ways in which the federal government could support state tax bases requires analyzing the structure of state tax bases at a rather detailed level.

Nevertheless, even if the federal government did nothing more than legislate a solution to the *Quill* problem and enact a national registration system for identifying and auditing business-to-business purchases, these measures could greatly strengthen the states' sales tax bases. Through doing so, these measures could then facilitate state governments transition toward greater reliance on sales taxation.

More generally, nothing prevents the federal government from acting to help strengthen the state's sales tax bases or assisting with other alternative state-level tax bases. What has heretofore been lacking was motivation for the federal government to do so. Understanding the costs that tax cannibalization currently imposes on the federal government should thus provide that motivation.

E. Price-Based Carrots

Regulatory carrots work well when the federal government has specific plans for which alternative tax bases to support and how to support those alternative tax bases through cost-effective interventions. Otherwise, price-based carrots may be the better approach.

²²¹ See *id.* at 673.

²²² A new federal system for registering businesses and auditing business-to-business transactions could be created either as a new bureaucracy or enforced by the IRS. Under current law, the IRS can share information upon a written request from a state, I.R.C. § 6103(d)(1), and there is a great deal of federal-state sharing. One additional specific expedient could be for the states to assign a transactional code to exempt business purchases and for the federal government to require that that code be entered on a registered business's federal income tax return in connection with claiming business expense deductions. This would thus help with the creation of an auditable paper trail. See McLure, *supra* note 185, at 699-700.

The most straightforward forms of price-based carrots are monetary subsidies provided either to state governments directly or to taxpayers within the state. These subsidies could be offered to support the use of specific alternative tax bases, such as sales taxes. Or, these subsidies could be offered in a less targeted fashion, but with the subsidies then designed to phase out to the extent that the state government taxes the corporate or personal income tax bases—such that the phase-outs would become a form of price-based stick. Alternatively, the subsidies could be offered conditional on state governments agreeing to cap their top corporate and personal income tax rates—such that this condition would become a form of regulatory stick. Price-based carrots can thus be flexible tools, especially when combined with the other approaches.

Price-based carrots can be self-financing. This is easiest to see when state governments' tax rates exceed their national revenue-maximizing levels. The federal government should then be able to induce state governments to reduce these tax rates by offering price-based carrots that are smaller than the federal government's expected revenue gain.²²³

Similarly, consider price-based carrots offered to induce state governments to swap from marginal use of, say, corporate income tax rates to sales tax rates. As we explained earlier, state governments should be indifferent at the margin between raising a dollar from either of these tax rates.²²⁴ Relatively small price-based carrots should thus suffice to induce state governments to swap to greater use of sales tax rates. Consequently, the federal government's revenue gain from offering these carrots may be many times larger than the cost of the carrots.

F. Summary, Synthesis, and Addressing Size-of-Government Concerns

Even if the federal government needed to spend a dollar to cancel out each dollar of tax cannibalization, this could still significantly enhance national welfare. The reason is that the biases associated with tax cannibalization that we focus on in Parts II and III represent pure economic waste. For instance, imagine if the federal government were to pay state governments a dollar to induce the state governments to reduce tax cannibalization by a dollar by swapping to greater reliance on sales taxes. The federal government would effectively break even from this transaction. But the state governments would be a dollar richer. Thus, in effect, the federal government would have funded that dollar payment by eradicating a dollar of economic waste.

²²³ See *supra* Part II.

²²⁴ See *supra* Section III.C.

By designing a mixed package of both sticks and carrots, the federal government should be able to alleviate tax cannibalization while spending much less than a dollar for each dollar of tax cannibalization eliminated. The federal government could thereby engineer a “win, win, win”—for the federal government, for state governments, and for taxpayers.

We can now relax our working assumption that state governments operate subject to strict revenue and distribution constraints. In place of that assumption, we can instead see how the federal government could control for state government revenues and distribution when implementing reforms to alleviate tax cannibalization.

To control for revenues, all the federal government should need to do is to adjust the relative mix of carrots and sticks. Offering larger carrots could increase state governments’ revenues; using larger sticks could decrease state governments’ revenues.

The federal government could similarly adjust the overall package of reforms to control for distribution. For example, if federal policymakers worry that reforms would lower the progressivity of state taxes, the federal government could compensate by providing some amount of subsidies directly to low- and middle-income taxpayers in the form of tax credits. Alternatively, the federal government could incentivize state governments to provide these sorts of subsidies.²²⁵

Whether and to what extent the federal government *should* aim to influence state governments’ decisions about revenues or distribution is a different question, and a question that we are agnostic on for the purposes of this Article.²²⁶ Our goal with this discussion is only to explain how the federal government *could* control for state government revenues and distribution when enacting reforms to combat tax cannibalization. Our point is that concerns about the potential implications for state governments’ revenues or for distribution should not stand in the way of otherwise desirable reforms for alleviating tax cannibalization.

The source of the current tax cannibalization problem is ultimately a coordination failure between the federal and state governments. We focus on national welfare and evaluate this coordination failure from the federal government’s perspective, primarily because the federal government is in a much better position to alleviate the tax cannibalization problem. But this

²²⁵ This could be done through carrots (or sticks) directed toward state governments. This could also be done by adjusting the mechanics of the SALT deduction, as Stark has previously discussed. *See* Stark, *supra* note 20, at 1424–32.

²²⁶ Stark has argued that the federal government should be neutral as to state governments’ distribution policies. He thus criticizes the current structure of the SALT deduction for how it departs from this principle of being neutral as to distribution. *Id.* at 1425–32.

does not mean that we view state governments as the culpable party. Quite the contrary, we have emphasized how the federal government is in a sense to blame. Indeed, it is partly for this reason that the federal government is better positioned to alleviate the problem.

CONCLUSION

Tax cannibalization is a black hole in the galaxy of fiscal federalism in the United States. Despite its immense and destructive gravitational force, neither state nor federal policymakers directly perceive its existence. Nor, until now, have legal scholars.

We suspect that a major reason for the invisibility of the tax cannibalization problem is because state-level policymakers only generally request revenue estimates for how state governments' tax policy choices affect *state* revenues. Then, likewise, federal-level policymakers only generally request revenue estimates for how federal government tax policy choices affect *federal* revenues. As a consequence, the effects of *state* governments' tax policy choices on *federal* revenues are not apparent in these revenue estimates.²²⁷

Indeed, we first discovered the tax cannibalization problem in part through observing its (unhelpful) gravitational force from afar. Both of us regularly advise state-level lawmakers and their staff on tax policy issues, especially in California, but also sometimes in other states. Through the course of this policy advisory work, we evaluated some proposals for state-level tax reform that we thought would enhance national welfare, and yet we found that these reform proposals would generate surprisingly little revenue for the state considering the reforms. After some reflection, we realized that the reason for this was that the missing revenue would end up with the federal government.

Although we cannot further elaborate the specifics here, imagine (hypothetically) a proposal for a state to reduce its corporate income tax rate and to then make up for the lost revenue by levying something similar to New Hampshire's Business Enterprise Tax. As we discussed previously,²²⁸ a proposal of this sort could lessen tax cannibalization to the extent that the proposal would successfully reduce the ways in which the state's taxes previously piled on to the flaws in the federally defined corporate income tax base that invite vertical distortions. But, again, the

²²⁷ For discussion of the critical role that revenue and distribution estimates play in influencing tax policy, see, for example, Boris I. Bittker, *The Erwin N. Griswold Lecture*, 11 AM. J. TAX POL'Y 213 (1994); Michael J. Graetz, *Paint-By-Numbers Tax Lawmaking*, 95 COLUM. L. REV. 609 (1995).

²²⁸ See *supra* Section III.B.6.

revenue benefits from this would largely end up with the federal government rather than with the acting state.

It should thus come as no surprise that the state-level policymakers we were advising lost interest in these proposed reforms upon realizing that the reforms would generate little in the way of benefit for the *state* government. Why after all should a state government incur the costs of implementing and administering tax reforms without receiving most of the benefit?

In addition to the question of revenue estimates, the invisibility of tax cannibalization also contributes to the apathy that federal lawmakers have shown toward fiscal federalism issues for at least the past couple decades. For instance, there is currently little in the way of resources dedicated to analyzing the fiscal issues that arise in the American federation. For a short time in the 1960s, Congress itself convened a subcommittee to study state and local tax issues. The result of this, the report of the Willis Subcommittee,²²⁹ is an enduring classic in the field, in part because it prepared data never collected before²³⁰ or since.

Then, besides the Willis Subcommittee, there used to be an organization dedicated to studying the operation of our federal system, including its underlying fiscal dynamics: the American Council on Intergovernmental Relations (ACIR). Formed in 1959, the ACIR issued dozens of important reports and policy proposals, many of which substantially influenced law reform. Yet the ACIR was dissolved in 1996. Nevertheless, the ACIR's reports on features of American federalism are still cited as invaluable resources—resources that have not been updated for twenty years.²³¹

Beyond any specific substantive reforms, we thus think it imperative that more attention be paid to fiscal federalism issues. If we have accomplished nothing else with this Article, we hope to at least have

²²⁹ SPECIAL SUBCOMM. ON STATE TAXATION OF INTERSTATE COMM., STATE TAXATION OF INTERSTATE COMMERCE, H. R. REP. NO. 88-1480 (1964).

²³⁰ See Jerome R. Hellerstein, *Federal Legislation on State Taxation of Interstate Commerce: Key Areas of Controversy*, WM. & MARY ANN. TAX CONF., 1966, at 21, 22–23 (explaining that the Willis Report was “the most extensive study of state taxation of interstate commerce in our history”).

²³¹ See Bruce D. McDowell, *Advisory Commission on Intergovernmental Relations in 1996: The End of an Era*, 27 PUBLIUS: J. FEDERALISM 111, 113–14 (1997). As for the continued relevance of the ACIR's work, see, for example, Abraham Bell & Gideon Parchomovsky, *Governing Communities by Auction*, 81 U. CHI. L. REV. 1, 4 n.16, 8 n.52 (2014) (citing ACIR reports for characteristics of residential associations); Elliott Dubin, *Changes in State Corporate Tax Apportionment Formulas and Tax Bases*, 55 ST. TAX NOTES 563, 563 & n.3 (2010) (updating analysis pioneered by ACIR); Daniel L. Smith & Yilin Hou, *Balanced Budget Requirements and State Spending: A Long-Panel Study*, PUB. BUDGETING & FIN., Summer 2013, at 1, 2 (citing ACIR study as part of literature review on balanced budgets).

established that the federal government has a large and direct stake in state-level tax policy decisions. Neither national welfare nor federal policymakers' more parochial interests are thus likely to be served through continued neglect. There is much that we do not know about the fiscal functioning of our federal system, but much that we do not know is potentially knowable.

Our primary goal with this Article was to bring the heretofore-invisible phenomenon of tax cannibalization into revealing light. We have no doubt that future scholarship will uncover additional dimensions to the tax cannibalization problem and thereby bring the phenomenon into even greater light. Through such scholarship, we can help policymakers to understand and take account of the large costs that the federal government currently suffers from tax cannibalization. Then, having seen that there are high stakes involved for all parties, we can collectively work toward a new era of more productive state and federal government fiscal relations.

TECHNICAL APPENDIX

Our Basic Model for Approximating Tax Cannibalization

As we explained in Section II.B, our model uses five empirical parameters as inputs: (1) the effective marginal federal tax rate (TR_F), (2) the effective marginal tax rate of the other states to which taxable activity relocates through horizontal distortions (TR_O), (3) the effective marginal tax rate of the acting state (TR_A), (4) the semi-elasticity of the vertical distortions induced by adjusting the acting state's tax rate (VD), and (5) the semi-elasticity of the horizontal distortions induced by adjusting the acting state's tax rate (HD).

Our model then produces as outputs: (A) the acting state's revenue-maximizing level for its tax rate (TR_{ARM}), (B) the national revenue-maximizing level for the acting state's tax rate (TR_{NRM}), and (C) the marginal tax cannibalization at any specified level for the acting state's tax rate (MTC).

Thus, in this technical appendix, we explain how we derive the following three expressions (which are the source for all of the approximations in the article):

$$(A) TR_{ARM} = \frac{100}{(VD+HD)}$$

$$(B) TR_{NRM} = \frac{100+(HD \times TR_O)-(VD \times TR_F)}{(VD+HD)}$$

$$(C) MTC = \frac{(VD \times TR_F)-(HD \times TR_O)}{(100-TR_A \times (VD+HD))}$$

A. Deriving the Expression for the Acting State's Revenue-Maximizing Level for Its Tax Rate (TR_{ARM})

To begin with, we define TB_A as the acting state's tax base in dollars, and ASR as the Acting State's Revenue—that is, the revenue the acting state generates by applying its tax rate (TR_A) to that tax base (TB_A). We list our tax rate inputs as percentages (out of 100) instead of as decimals, and so must divide them by one hundred to yield decimals.

Thus:

$$\text{Acting State's Revenue (ASR)} = \frac{TR_A}{100} \times TB_A$$

And so:

$$\frac{dASR}{dTR_A} = \frac{TB_A}{100} + \frac{TR_A}{100} \times \frac{dTB_A}{dTR_A}$$

Then, because the shrinkage to TB_A in dollars that is induced by increasing TR_A is given by multiplying $(VD + HD)/100$ by TB_A , we have:

$$\frac{dASR}{dTR_A} = \frac{TB_A}{100} + \frac{TR_A}{100} \times TB_A \times \frac{-(VD + HD)}{100}$$

Then, setting to zero and simplifying:

$$0 = \frac{TB_A}{100} \times \left(1 - \frac{TR_A \times (VD + HD)}{100} \right)$$

Finally, solving for the value of TR_A gives us the value that maximizes the acting state's revenue, or:

$$(A) TR_A = \frac{100}{(VD+HD)}$$

B. Deriving the Expression for the National Revenue-Maximizing Level for the Acting State's Tax Rate (TR_{NRM})

To begin with, we define FR as the Federal Government's Revenue in dollars—that is, the revenue the federal government generates by applying its tax rate (TR_F) to the national tax base. We similarly define OSR as the Other States' Revenue in dollars—that is, the revenue the other states collectively generate from applying their effective tax rate (TR_O) to the portion of the national tax base that locates within the other states (as opposed to within the acting state). We then define NR as the National Revenue in dollars, which is the sum of ASR , OSR , and FR . In other words: $NR = ASR + OSR + FR$. For simplicity, we assume that there are no interactions between vertical and horizontal distortions, such that the Federal Government's Revenue is only affected by vertical distortions and Other States' Revenue is only affected by horizontal distortions.

Thus:

$$\frac{dASR}{dTR_A} = \frac{TB_A}{100} \times \left(1 - \frac{TR_A \times (VD + HD)}{100} \right)$$

$$\frac{dOSR}{dTR_A} = \frac{TB_A}{100} \times \left(HD \times \frac{TR_O}{100} \right)$$

$$\frac{dFR}{dTR_A} = \frac{TB_A}{100} \times \left(-VD \times \frac{TR_F}{100} \right)$$

Summing these three derivatives gives us:

$$\frac{dNR}{dTR_A} = \frac{dASR}{dTR_A} + \frac{dOSR}{dTR_A} + \frac{dFR}{dTR_A}$$

Then inputting from above and setting to zero and then simplifying:

$$0 = \frac{TB_A}{100} \times \left(\left(1 - \frac{TR_A \times (VD + HD)}{100} \right) + \left(HD \times \frac{TR_O}{100} \right) - \left(VD \times \frac{TR_F}{100} \right) \right)$$

$$0 = (100 - TR_A \times (VD + HD)) + (HD \times TR_O) - (VD \times TR_F)$$

Finally, solving for the value of TR_A gives us the value that maximizes national revenue, or:

$$(B) TR_{NRM} = \frac{100 + (HD \times TR_O) - (VD \times TR_F)}{(VD + HD)}$$

C. Deriving the Expression for Marginal Tax Cannibalization (MTC)

To begin with, by definition:

$$MTC = \frac{-\left(\frac{dOSR}{dTR_A} + \frac{dFR}{dTR_A}\right)}{\frac{dASR}{dTR_A}}$$

Then, inputting from earlier:

$$MTC = \frac{-\frac{TB_A}{100} \times \left(HD \times \frac{TR_O}{100}\right) + \frac{TB_A}{100} \times \left(-VD \times \frac{TR_F}{100}\right)}{\frac{TB_A}{100} \times \left(1 - \frac{TR_A \times (VD + HD)}{100}\right)}$$

Finally, simplifying gives us:

$$(C) \ MTC = \frac{(VD \times TR_F) - (HD \times TR_O)}{(100 - TR_A \times (VD + HD))}$$

