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Beyond free riding or free racing: a framework for understanding subnational tax policy interdependence

Allyson L. Benton[1]

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Abstract
Subnational governments operating under the same federal fiscal arrangements often make markedly different tax policy choices. Research explains this variation through vertical relationships between subnational and national governments, horizontal relationships among subnational governments, or both, and along either economic or political logics. This study offers a unifying analytical framework integrating these dimensions and logics to help scholars locate their research within the wider literature, identify adjacent processes that may interact with or confound their focal mechanisms, and specify appropriate empirical strategies. I illustrate the framework's value through analysis of Mexico's state vehicle ownership tax (2008–2024). Situating the analysis within the framework yields three competing arguments about how horizontal economic and political logics interact. Spatio-temporal analysis shows that partisan competition, not geographic proximity, is the primary channel of horizontal tax policy interdependence. This partisan effect is conditional on neighbors' tax activity, but in an unexpected way: it is strongest where neighboring states hold their taxes steady and weakest where they are cutting most heavily. The case demonstrates the framework's usefulness in revealing new substantive findings and prompting new theoretical questions.

Keywords Subnational tax policy · Fiscal federalism · Policy interdependence · Policy competition · Spatial econometrics · Mexico

Mathematics Subject Classification H71 · H77 · C23 · D72 · O54

1 Introduction

Subnational governments operating under the same federal fiscal arrangements often make surprisingly different tax policy choices. What explains these differences? Research in this area offers two main theoretical approaches to answering this question.

✉ Allyson L. Benton
allyson.benton@essex.ac.uk

[1] Department of Government, University of Essex, Colchester, UK

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One approach focuses on the vertical relationship between subnational and national governments. Following an economic logic, research argues that vertical fiscal imbalances lead subnational governments to reduce tax collections, because national transfers reduce their incentive to bear the costs of taxation. Fiscal illusion and soft budget constraints aggravate this, as each state draws on a common pool of shared national resources rather than its own tax base (e.g., Goodspeed 2002b; Grossman 1990; Weingast et al. 1981; Rodden et al. 2003; Rodden 2002; Rodden and Wibbels 2002). Following a political logic, research argues that subnational leaders sharing partisan affiliation with national governments seek to demonstrate fiscal responsibility to copartisan national leaders to ensure career advancement to positions in national government, raising their incentive to tax, while those not aligned have less career incentive to do so (e.g., Benton 2019; Jones et al. 2000; Rodden and Wibbels 2002).

Another approach focuses on the horizontal relationship among subnational governments. Following an economic logic, research argues that when subnational governments compete for mobile factors—households and firms that sort across jurisdictions—they adjust rates downward to retain and attract tax contributors (e.g., Tiebout 1956; Buchanan 1965; Berry and Berry 1992; Besley and Case 1995; Fletcher and Murray 2006; Leiser 2017; Wilson 1999). Following a political logic, research argues that subnational leaders respond to the policies of copartisans to avoid unfavorable comparison with copartisan peers, adopting approaches that have proven electorally successful for their copartisans with similar constituencies (e.g., Salmon 1987; Besley and Case 1995; Butler et al. 2017; Butler and Pereira 2018; Grossback et al. 2004; Gilardi 2010; Mallinson 2021).

While scholars adopting one theoretical approach recognize the influence of the other, they usually set it aside to maintain analytical focus. Yet this entails risks. Theoretically, the causal process underlying the dimension of focus may interact with or be confounded by the causal process underlying the other. Public finance research has thus long recognized that both vertical and horizontal fiscal externalities coexist and can even push subnational tax rates in opposing directions (e.g., Keen and Kotsogiannis 2002; Goodspeed 2000, 2002a). Yet few scholars model both dimensions at once, and even fewer join economic and political logics into a single account (as in Goodspeed 2002b). Methodologically, neglecting the other dimension or logic invites inappropriate research designs, since unmodeled interdependence and omitted logics can bias statistical results.

In this study, I situate subnational tax policy within the broader context in which it is made, bringing its vertical and horizontal dimensions and their economic and political logics into a unifying analytical framework. I show how each dimension and logic can be represented and how they may interact with or confound one another. My goal is threefold: to help scholars locate their tax policy research within the wider theoretical landscape; identify whether their focal causal process may be interconnected with adjacent ones, opening avenues for theoretical innovation; and identify the most appropriate empirical strategies for evaluating their arguments.

I illustrate the value of the unifying analytical framework using Mexico's state vehicle ownership tax. Mexico is a decentralized, federal system where state governments enjoy the autonomy to determine state tax policy. Its vehicle ownership tax is a useful point of empirical focus: its administrative costs and expected earnings were known to state governments, since the national government had originally collected this tax with state help. Variation in state vehicle tax policy is thus expected to reflect the vertical and horizontal dynamics—and

their economic and political logics—identified in the framework, opening the door for similar analysis of subnational fiscal policy more widely.

2 Two dimensions, two logics

Research has taken two approaches to explaining subnational tax policy. One focuses on its *vertical* dimension, where relationships between subnational and national governments drive tax policy decisions. The other focuses on its *horizontal* dimension, where relationships among subnational governments drive tax policy decisions. Crossing these two dimensions with their distinctive economic and political logics yields four causal pathways that shape subnational tax policy decisions.

2.1 The vertical dimension

Following an economic logic, scholars argue that when subnational governments fund policy responsibilities mainly through federal fiscal transfers—rather than own-source revenues—they have little incentive to invest in tax collection. Fiscal transfers reduce the marginal gains from own-source revenues, making the administrative and political costs of tax collection harder to justify (Grossman and West 1994; Grossman 1994, 1989; Rodden et al. 2003; Rodden 2002; Rodden and Wibbels 2002). Consistent with this logic, the withdrawal of such transfers prompts subnational governments to raise own-source revenue (Jaaidane and Larribeau 2026). Fiscal illusion reinforces the disincentive to collect because voters struggle to connect taxation to service provision, reducing the political rewards from additional tax effort (Grossman 1990). When soft budget constraints lead subnational leaders to expect bailouts from national governments to cover revenue shortfalls or subnational debt, the incentive to invest in tax collection declines further (Goodspeed 2002b; Rodden 2002; Rodden and Wibbels 2002; Rodden et al. 2003). Because the cost of any one state's fiscal slack falls on the shared national budget, this dynamic compounds across states, each drawing on the common national pool rather than taxing its own residents (Rodden 2002; Rodden et al. 2003; Weingast et al. 1981).

Following a political logic, scholars argue that subnational leaders sharing vertical partisan affiliation with the national incumbent exercise greater fiscal discipline because their career advancement depends on copartisan national incumbents concerned with ensuring national macroeconomic stability (Benton 2019; Jones et al. 2000; Rodden and Wibbels 2002). Subnational leaders thus maintain tax collections to demonstrate fiscal responsibility to copartisan national incumbents who hold sway over the trajectory of their future political careers. In contrast, subnational leaders whose partisan affiliation differs from national incumbents are more willing to forego tax collections to cultivate voter support, since these subnational leaders answer to their own, national opposition party leaders who prioritize unseating national incumbents and therefore prefer to ensure subnational electoral support.

2.2 The horizontal dimension

Following an economic logic, scholars argue that tax policy converges among subnational governments through competition for mobile factors. Because residents and firms sort

across jurisdictions (Tiebout 1956), their threat of exit disciplines subnational tax rates from below (Buchanan 1965). Subnational governments competing to retain or attract mobile households and firms therefore often engage in race-to-the-bottom tax competition (e.g., Berry and Berry 1992; Besley and Case 1995; Cai et al. 2026; Fletcher and Murray 2006; Leiser 2017; Wilson 1999), with this pressure strongest among neighboring jurisdictions where relocation costs among them are lowest (Brueckner 2003; Wilson 1999). Subnational governments thus have an incentive to undercut the tax rates of neighboring jurisdictions, driving convergence in tax rates among geographic neighbors (Allers and Paul Elhorst 2005; Besley and Case 1995; Schaltegger and Küttel 2002). Competition for foreign direct investment strengthens this downward pressure, as subnational governments competing for highly mobile international investment lower rates further (Baccini et al. 2018; Slaski and Bauerle Danzman 2025). The result is horizontal tax interdependence, with subnational governments adjusting rates downward in response to others' cuts, with this competitive pressure stronger among better-resourced jurisdictions who have more to offer mobile domestic households and firms, and international investors (Cai and Treisman 2005; Goodspeed and Zhang 2024).

Following a political logic, scholars argue that subnational leaders respond to the tax choices of their copartisan peers because voters compare the performance of subnational incumbents to those in comparable jurisdictions. A subnational leader who taxes more heavily than her most similar peers risks appearing less responsive to constituents (Salmon 1987; Besley and Case 1995). Copartisans are the natural benchmark for such comparisons: they share a party label and govern similar constituencies, with an incumbent who fails to match a copartisan's tax relief inviting unfavorable comparison and risking electoral punishment. Subnational incumbents also answer to national party leaders who control resources, such as access to election ballots, appointed posts, and campaign financing (Benton 2019). A governor whose fiscal record diverges from her copartisan peers risks weakening her internal party standing, giving her a further incentive to track copartisan tax policy choices. Subnational policy innovations thus tend to cluster among copartisans (e.g., Butler et al. 2017; Butler and Pereira 2018; Grossback et al. 2004; Gilardi 2010; Mallinson 2021).

While scholars approaching subnational tax policy along one dimension would recognize the importance of the other, they typically set the other aside to maintain analytical focus. For example, scholars examining how vertical partisan alignment affects subnational fiscal policy tend to assume that subnational decisions are independent from one another (e.g., Benton 2019; Jones et al. 2000; Rodden and Wibbels 2002). Scholars examining horizontal tax competition tend to assume that subnational tax policy decisions are made irrespective of any vertical fiscal ties to national governments (e.g., Berry and Berry 1992; Besley and Case 1995; Fletcher and Murray 2006; Leiser 2017). Meanwhile, research integrating vertical and horizontal dimensions typically does so within a single, usually economic, logic (e.g., Keen and Kotsogiannis 2002; Goodspeed 2000, 2002a), while research integrating economic and political logics typically pairs each along a single dimension (such as in Goodspeed (2002b) who examines vertical political interactions amidst horizontal economic interdependence).

Narrowing the analytical focus in these ways can strengthen causal arguments but it carries risks. Theoretically, a causal process operating along one dimension and according to one logic may interact with or be confounded by processes operating along others. Empirically, neglecting adjacent processes invites missed interactions and inappropriate modeling

strategies, and therefore omitted-variable bias. In the next section, I present an analytical framework that maps the two dimensions and two logics shaping subnational tax policy, which paves the way for discussion of the risks of neglecting them below.

3 A unifying analytical framework

The vertical and horizontal dimensions of subnational tax policy can be integrated into a unifying analytical framework. Figure 1 presents a schematic for this framework, depicting a *National Government* ruled by *Party A* and five *State Governments* governed by either ruling *Party A* or opposition *Party B*. Adjacent state governments are economic competitors, which are depicted here as sharing geographic borders, although they might instead share similar resource endowments that place them in competition for the same mobile factors. For example, *State Government 2* competes economically with both *State Government 1* and *State Government 3*, and shares its *Party A* affiliation with *State Government 1* but not with *State Government 3*. The figure depicts how any subnational government's tax policy choice may be linked to the national government via vertical economic drivers (such as vertical fiscal imbalances) or vertical political drivers (such as vertical partisan alignment). Any subnational government's tax policy choice may also be linked to other subnational governments via horizontal economic drivers (such as economic competition for mobile factors) or horizontal political drivers (such as copartisan competition for political support).

To facilitate the translation of the two dimensions and their two logics into empirical model specifications, Fig. 1 also presents statistical notation for each theoretical driver. A vertical economic factor (such as vertical fiscal imbalances) is captured by V_{it}^{E}, *i* representing the state and *t* the year. A vertical political factor (such as vertical partisan alignment with the national government) is captured by V_{it}^{P}. A driver of horizontal economic inter-

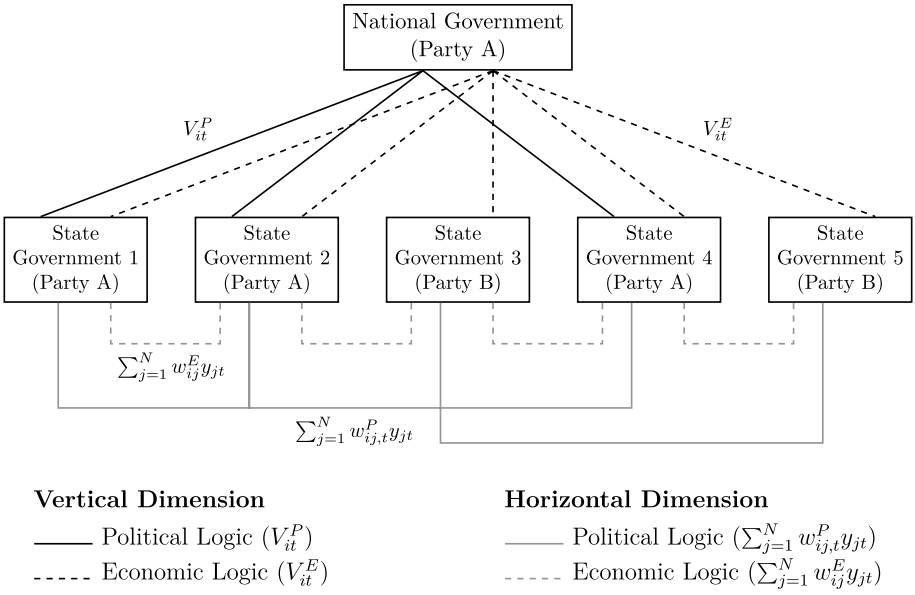

Fig. 1 Vertical and horizontal variables driving subnational tax policy

dependence (such as economic competition for mobile factors) is captured by a spatially lagged dependent variable $\sum_{j=1}^{N} w_{ij}^{E} y_{jt}$, where w_{ij}^{E} is a spatial weights matrix indicating whether states *i* and *j* compete for the same mobile tax base. Geographic proximity is a leading driver of tax competition, since relocation costs among neighboring jurisdictions are lowest, but competition for mobile factors can also occur between states with similar economic resource endowments, making them similarly appealing to domestic households and firms and international investors, in which case the weight matrix takes a time-varying form $w_{ij,t}^{E}$. A driver of horizontal political interdependence (such as copartisan competition for political support) is captured by $\sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}$, where $w_{ij,t}^{P}$ is a time-varying spatial weights matrix indicating whether states *i* and *j* share partisan affiliation in year *t*, with the time subscript reflecting that horizontal copartisan alignment regularly shifts with elections. Mapping each theoretical approach to its empirical specification reveals three issues that scholars studying subnational tax policy should consider.

3.1 Issue 1: Justification

The framework suggests that any focus on a particular causal logic—economic or political—within a single dimension—vertical or horizontal—requires justification, particularly why other causal logics are excluded. For example, a study of how vertical fiscal imbalances V_{it}^{E} affect subnational tax policy should explain why vertical partisan alignment V_{it}^{P} is not expected to shape subnational fiscal policy decisions and can thus be set aside. A study of how horizontal economic competition for mobile factors $\sum_{j=1}^{N} w_{ij}^{E} y_{jt}$ affects subnational tax policy should explain why horizontal political competition among copartisans $\sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}$ is not of concern. Absent such justification, scholars risk theoretical incompleteness, missing causal processes that may confound, condition, or interact with the focal mechanism.

3.2 Issue 2: Confounders

The framework shows that empirical tests of arguments about subnational tax policy must account for the impact of other dimensions and their relevant logics, whether as confounders or as additional or alternative theoretical drivers. Within dimensions, for example, a study highlighting horizontal copartisan competition $\sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}$ must account for horizontal economic competition $\sum_{j=1}^{N} w_{ij}^{E} y_{jt}$, lest its effect be misattributed to horizontal copartisan competition. A study highlighting vertical partisan alignment V_{it}^{P} must account for vertical fiscal imbalances V_{it}^{E}, lest fiscal incentives be misattributed to vertical partisan effects. Confounding can also occur between dimensions. If fiscally dependent states (high V_{it}^{E}) also cluster as economic competitors—geographically or by resource endowment—or share partisan affiliation, estimates of vertical fiscal effects may capture unmodeled horizontal interdependence and be inflated without controls for $\sum_{j=1}^{N} w_{ij}^{E} y_{jt}$ and $\sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}$. The framework helps scholars identify these potential confounders and specify empirical strategies to address them.

3.3 Issue 3: Interactions

The framework reveals opportunities for theoretical innovation by highlighting potential interactions. Within dimensions, for example, the impact of vertical fiscal imbalances on subnational tax policy may be weaker under vertical partisan alignment ($V_{it}^{E} \times V_{it}^{P}$), if aligned governors exercise fiscal discipline to demonstrate competence to copartisan national leaders. The impact of horizontal economic competition may be amplified among horizontal copartisans ($\sum_{j=1}^{N} w_{ij,t}^{EP} y_{jt}$), if copartisan leaders face the strongest comparisons with peers who are both economic competitors and copartisans. Between dimensions, the impact of horizontal economic competition may be stronger in contexts of high vertical fiscal imbalances ($V_{it}^{E} \times \sum_{j=1}^{N} w_{ij}^{E} y_{jt}$), as subnational leaders with limited own-source revenue may more readily engage in race-to-the-bottom competition. Or the impact of horizontal copartisan competition may be stronger among states sharing vertical partisan alignment ($V_{it}^{P} \times \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}$), as aligned governors seek to demonstrate competence to national leaders. The framework thus helps move beyond single-mechanism explanations toward integrated theories of how vertical and horizontal, economic and political processes jointly shape subnational tax policy.

3.4 Implications for empirical strategy

The horizontal dimension carries a further implication for research design. If subnational tax policies are interdependent—through horizontal economic or copartisan competition—then observations are not independent across units, violating the unit-independence assumption of standard time-series cross-sectional (TSCS) methods. When this assumption is violated, both coefficient estimates and standard errors may be biased (Wooldridge 2010). Spatio-temporal methods address this problem by explicitly modeling interdependence through spatially lagged dependent variables (Elhorst 2021; LeSage and Dominguez 2012), something especially important in public choice analysis (Elhorst 2021).[1]

Consider an argument about the impact of vertical fiscal imbalances on subnational tax policy decisions. To account for the dimensions in Fig. 1, we would specify a TSCS model including not only V_{it}^{E} but also V_{it}^{P} (vertical partisan alignment), $\sum_{j=1}^{N} w_{ij}^{E} y_{jt}$ (horizontal economic interdependence), and $\sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}$ (horizontal copartisan interdependence). An appropriate baseline spatio-temporal model specification would be:

$$
\begin{aligned}
y_{it} = {} & \delta_E V_{it}^{E} + \delta_P V_{it}^{P} \\
& + \rho_E \sum_{j=1}^{N} w_{ij}^{E} y_{jt} + \rho_P \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt} \\
& + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}
\end{aligned}
$$

[1] Other approaches are available as well. I focus here on spatio-temporal methods given their established use in subnational fiscal and tax policy research and their capacity to accommodate multiple connectivity structures, including both economic and partisan matrices (LeSage and Pace 2009, pp. 52–53).

where y_{it} is the tax policy outcome for state *i* in year *t*; V_{it}^{E} captures vertical fiscal imbalance; V_{it}^{P} captures vertical partisan alignment; $\sum_{j=1}^{N} w_{ij}^{E} y_{jt}$ is an economic spatial lag identifying the tax policies of economic competitor states (which may be geographic neighbors or states with similar resource endowments); $\sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}$ is the partisan spatial lag with time-varying weights $w_{ij,t}^{P}$ capturing horizontal copartisan interdependence; X_{it} is a vector of control variables (as needed); μ_i represents state fixed effects (as needed); τt may be year fixed effects or a linear time trend (as needed); and ϵ_{it} is the error term.

The baseline model treats vertical economic and political interdependence as distinct channels. However, scholars may theorize that the impact of vertical fiscal imbalances on subnational tax policy is weaker under vertical partisan alignment, given state leaders' efforts to demonstrate competence to national party leaders through fiscally responsible choices. An appropriate baseline spatio-temporal interaction model specification would be:

$$\begin{aligned} y_{it} = {} & \delta_E V_{it}^{E} + \delta_P V_{it}^{P} + \delta_{E\times P}(V_{it}^{E} \times V_{it}^{P}) \\ & + \rho_E \sum_{j=1}^{N} w_{ij}^{E} y_{jt} + \rho_P \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt} \\ & + \beta X_{it} + \mu_i + \tau t + \epsilon_{it} \end{aligned}$$

where the interaction term $V_{it}^{E} \times V_{it}^{P}$ captures the conditioning effect of vertical partisan alignment on the relationship between vertical fiscal imbalances and subnational tax policy. This specification can also be found in Table 1's Model 2.[2]

The baseline model also treats horizontal economic competition and horizontal partisan interdependence as distinct channels. However, scholars may theorize that tax interdependence operates specifically among copartisan economic competitors, that is, among states that are both economic competitors—such as those sharing geographic borders or enjoying similar resource endowments—and copartisans. This would require a composite spatial weights matrix $w_{ij,t}^{EP} = w_{ij}^{E} \times w_{ij,t}^{P}$, yielding a spatial lag $\sum_{j=1}^{N} w_{ij,t}^{EP} y_{jt}$ that captures influence only from copartisans who are also economic competitors. This approach differs from interacting two separate spatial lags ($\sum_{j=1}^{N} w_{ij}^{E} y_{jt} \times \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}$), which would model either whether responsiveness to economic competitors depends on what copartisans are doing or whether responsiveness to copartisans depends on what economic competitors are doing. I return to these differences in the case illustration below. Either way, the composite weights matrix embeds the theoretical interaction within the spatial connectivity structure, while the multiplicative interaction tests whether two distinct channels condition one another. Specifications using the composite weight term and the multiplicative interaction term are found in Table 1's Model 3 and Model 4.[3]

[2] A more general specification is the Spatial Durbin Model (SDM), which adds spatial lags of the covariates (*WX*) and nests the spatial autoregressive (SAR) model specified here as a special case (LeSage and Pace 2009, pp. 29–30, 46; see also LeSage and Dominguez 2012). The choice depends on whether the theory concerns interdependence in policy outcomes (a *Wy* process) or propagation from competitors' covariates (a *WX* process). For simplicity, I omit the *WX* terms. A fully general approach would include them and test whether they can be excluded, retaining them only where the data warrant.

[3] Separate economic and partisan spatial lags can be included in Model 3 to isolate the copartisan-economic competitor effect from general horizontal economic and partisan interdependence.

Table 1 presents the baseline model specification above (Model 1) alongside extensions incorporating interaction terms. Models 2 through 4 present within-dimension specifications: vertical fiscal imbalances conditioned by vertical partisan alignment (Model 2), horizontal copartisan-competitor influence via composite weights (Model 3), and horizontal economic competition conditioned by horizontal copartisan competition (Model 4). Models 5 through 8 present between-dimension baseline interaction models, capturing ways that vertical and horizontal processes may combine. Each specification represents a distinct theoretical claim about how the causal processes identified in Fig. 1 may interact, translating substantive dimensions into theoretical arguments and, in turn, into testable empirical models.

These specifications in Table 1 are not meant to be exhaustive, and will depend on the dimensions and logics at play and the arguments being tested. The models are presented in static form and with variables specified in levels. Where theory predicts persistence or diagnostics indicate residual autocorrelation, scholars should consider dynamic specifications; where data are nonstationary, differenced data or other specifications will be more appropriate. The choice between static and dynamic forms, and between levels and differences, should follow theoretical expectations and the time-series properties of the data (see Elhorst 2021; Enders 2010). In presenting this framework, I do not claim that both dimensions, or their economic and political logics, matter equally across all subnational governments or tax rights. Instead, I argue that scholars should consider their theoretical argument and empirical strategy in light of the dimensions and logics that may shape subnational tax policy decisions.

4 An illustration: Mexico's state vehicle ownership tax

I illustrate the usefulness of the framework using Mexico's state vehicle ownership tax. This is a useful case for analysis. States already possessed the administrative capacity to collect this tax when they were given full legislative authority to collect it in 2012, having done so on behalf of the national government since 1973. Expected revenue generation was therefore known to them, eliminating uncertainty about its fiscal returns. Variation in state vehicle ownership tax policy may thus be shaped by any of the dimensions and logics depicted in the analytical framework above, but not by differences in state capacity, information, or legislative rights.

4.1 Fiscal federalism in Mexico

Mexico's constitutionally federal system comprises 32 states, including Mexico City (which operated as a state but received formal statehood in 2016). National government consists of an elected president and bicameral legislature, with presidential elections every six years and mid-term legislative elections. Each state mirrors this structure, with its own constitution, elected governor (six-year terms), unicameral legislature (three-year terms), with some exceptions.

Three traditional and two newer parties regularly compete in national and state elections. The Institutional Revolutionary Party (PRI) dominated 20th-century politics under an electoral authoritarian regime, losing the national presidency in 2000. Since then the

Table 1 Potential interactions among vertical and horizontal, economic and political dimensions of subnational tax policy choice

Model	Theoretical interaction	Statistical interaction	Relevant model specification
Baseline Model			
Model 1	None	None	$y_{it} = \delta_E V_{it}^E + \delta_P V_{it}^P + \rho_E \sum_{j=1}^N w_{ij}^E y_{jt} + \rho_P \sum_{j=1}^N w_{ij,t}^P y_{jt} + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}$
Within-Dimension Interactions			
Model 2	Vertical Fiscal Imbalances × Vertical Partisan Alignment	$\delta_{E\times P}(V_{it}^E \times V_{it}^P)$	$y_{it} = \delta_E V_{it}^E + \delta_P V_{it}^P + \delta_{E\times P}(V_{it}^E \times V_{it}^P) + \rho_E \sum_{j=1}^N w_{ij}^E y_{jt} + \rho_P \sum_{j=1}^N w_{ij,t}^P y_{jt} + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}$
Model 3	Horizontal Copartisan Economic Competitors (Composite Weight)	$\rho_{EP} \sum_{j=1}^N w_{ij,t}^{EP} y_{jt}$	$y_{it} = \delta_E V_{it}^E + \delta_P V_{it}^P + \rho_{EP} \sum_{j=1}^N w_{ij,t}^{EP} y_{jt} + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}$
Model 4	Horizontal Economic Competition × Horizontal Copartisan Competition	$\rho_{E\times P}(\sum_{j=1}^N w_{ij}^E y_{jt} \times \sum_{j=1}^N w_{ij,t}^P y_{jt})$	$y_{it} = \delta_E V_{it}^E + \delta_P V_{it}^P + \rho_E \sum_{j=1}^N w_{ij}^E y_{jt} + \rho_P \sum_{j=1}^N w_{ij,t}^P y_{jt} + \rho_{E\times P}(\sum_{j=1}^N w_{ij}^E y_{jt} \times \sum_{j=1}^N w_{ij,t}^P y_{jt}) + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}$
Between-Dimension Interactions			
Model 5	Vertical Fiscal Imbalances × Horizontal Economic Competition	$\lambda_{E\times E}(V_{it}^E \times \sum_{j=1}^N w_{ij}^E y_{jt})$	$y_{it} = \delta_E V_{it}^E + \delta_P V_{it}^P + \rho_E \sum_{j=1}^N w_{ij}^E y_{jt} + \rho_P \sum_{j=1}^N w_{ij,t}^P y_{jt} + \lambda_{E\times E}(V_{it}^E \times \sum_{j=1}^N w_{ij}^E y_{jt}) + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}$

Table 1 (continued)

Model	Theoretical interaction	Statistical interaction	Relevant model specification
Model 6	Vertical Fiscal Imbalances × Horizontal Copartisan Competition	$\lambda_{E\times P}(V_{it}^{E} \times \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt})$	$y_{it} = \delta_E V_{it}^{E} + \delta_P V_{it}^{P} + \rho_E \sum_{j=1}^{N} w_{ij}^{E} y_{jt} + \rho_P \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt} + \lambda_{E\times P}(V_{it}^{E} \times \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}) + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}$
Model 7	Vertical Partisan Alignment × Horizontal Economic Competition	$\lambda_{P\times E}(V_{it}^{P} \times \sum_{j=1}^{N} w_{ij}^{E} y_{jt})$	$y_{it} = \delta_E V_{it}^{E} + \delta_P V_{it}^{P} + \rho_E \sum_{j=1}^{N} w_{ij}^{E} y_{jt} + \rho_P \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt} + \lambda_{P\times E}(V_{it}^{P} \times \sum_{j=1}^{N} w_{ij}^{E} y_{jt}) + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}$
Model 8	Vertical Partisan Alignment × Horizontal Copartisan Competition	$\lambda_{P\times P}(V_{it}^{P} \times \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt})$	$y_{it} = \delta_E V_{it}^{E} + \delta_P V_{it}^{P} + \rho_E \sum_{j=1}^{N} w_{ij}^{E} y_{jt} + \rho_P \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt} + \lambda_{P\times P}(V_{it}^{P} \times \sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}) + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}$

y_{it} = state tax policy outcome for state i in year t. E identifies economic logics and P identifies political logics. V_{it}^{E} = vertical fiscal imbalance; V_{it}^{P} = vertical partisan alignment; $\sum_{j=1}^{N} w_{ij}^{E} y_{jt}$ = horizontal economic competition captured by an economic spatial lag with time-invariant weights; $\sum_{j=1}^{N} w_{ij,t}^{P} y_{jt}$ = horizontal copartisan competition captured by a partisan spatial lag with time-varying weights; $\sum_{j=1}^{N} w_{ij,t}^{EP} y_{jt}$ = horizontal competition among copartisan economic competitors captured by a composite spatial lag where $w_{ij,t}^{EP} = w_{ij}^{E} \times w_{ij,t}^{P}$; X_{it} = vector of control variables; μ_i = state fixed effects; τt = linear time trend or time fixed effects; ϵ_{it} = error term. The composite weight coefficient ρ_{EP} (Model 3) is the coefficient on the composite lag $w_{ij,t}^{EP}$, not an interaction term. Interaction terms capture conditioning effects within the vertical dimension ($\delta_{E\times P}$), within the horizontal dimension ($\rho_{E\times P}$), and between dimensions ($\lambda_{E\times E}$, $\lambda_{E\times P}$, $\lambda_{P\times E}$, $\lambda_{P\times P}$)

National Action Party (PAN), the PRI, and the newer Movement for National Regeneration (MORENA) have alternated in national power. At the state level, the PAN, PRI, the Democratic Revolution Party (PRD), the Ecologist Green Party of Mexico (PVEM), and the newer MORENA and Citizen Movement (MC) parties regularly win gubernatorial elections, alone or in coalition with each other or with Mexico's numerous small parties.

Mexican states hold wide policy responsibilities—basic education, primary healthcare for the uninsured, local economic development, infrastructure, and public security—and enjoy considerable budgetary autonomy. Mexico's federal fiscal contract centralizes legislative authority over most taxes in the national government, which states accepted in exchange for a share of revenues in fiscal transfers (Díaz-Cayeros 2006). National transfers, divided into earmarked and unearmarked, constitute the lion's share of state resources but vary by state, with states enjoying considerable discretion over both (Giugale et al. 2000). States retain important tax rights for generating own-source revenues, with state tax effort varying as well. These rights include payroll, lodging, real estate property and transfer, and lottery and entertainment taxes, as well as various fees, alongside the vehicle ownership tax (my point of focus). States retain full discretion over whether to collect state taxes and fees, how to set rates, and how to spend the revenues generated.

4.2 Mexico's state vehicle ownership tax

Mexico's vehicle ownership tax, introduced in the early 1960's and legislated separately as the Vehicle Ownership Tax Law in 1962 (effective 1963), proved remarkably durable (Hernández Cordero and Urzua 2024). Originally levied on private cars and trucks, it was later extended to motorcycles, watercraft, and aircraft. It survived two major reforms to the federal fiscal contract (1974 and 1997), two reforms to the tax law itself (1980 and 1991), and the transition from hegemonic PRI rule to national democracy in 2000.

Although originally a national tax, administrative responsibility for the vehicle ownership tax was gradually transferred to state governments, culminating in the transfer of legislative authority. In 1973, the national government made states responsible for verifying registered vehicle ownership and associated tax payments in exchange for a 30% share of collections in their jurisdictions. By 1991, it had transferred full administrative responsibility for collection, with states enjoying 100% of receipts. In December 2007, the national government transferred full legislative authority over the tax to state governments, effective 1 January 2012 (Hernández Cordero and Urzua 2024).

This history creates ideal conditions for examining the state ownership vehicle tax under the framework in Fig. 1: by the time states gained full authority, they had decades of collection experience and full information about revenue potential, so their decisions to collect, raise/reduce, or discontinue the tax were independent of administrative feasibility or uncertainty about fiscal benefits. Yet states made strikingly different choices: some maintained the tax or raised it, others reduced the tax or made exemptions, and others eliminated it. This variation provides an opportunity to examine which of the vertical and horizontal, economic and political logics identified in the framework shaped these decisions.

5 Dimensions of Mexican state tax policy

Research suggests that any of the vertical or horizontal dimensions, economic or political logics in Fig. 1 could have contributed to state vehicle ownership tax policy in Mexico.

5.1 Framing Mexican state vehicle tax policy in the literature

Along the vertical dimension, vertical fiscal imbalances and vertical partisan alignment may have shaped Mexican state vehicle tax policy. States facing greater dependence on fiscal transfers may have been more likely to reduce or forego vehicle tax collections, especially given well-documented vertical fiscal imbalances and soft budget constraints (Benton 2019; Díaz-Cayeros 2006; Hernández-Trillo et al. 2009). On the political side, research shows that subnational fiscal excess is lower in Mexico when subnational leaders share partisan affiliation with national governments (Benton 2019), suggesting that aligned states may have been more likely to maintain vehicle tax collections to demonstrate fiscal responsibility, while opposition-governed states may have been more willing to forego them.

Along the horizontal dimension, economic competition for mobile factors and copartisan political competition may have shaped Mexican state vehicle tax policy. Research shows that Mexican state governments compete for both domestic and foreign direct investment, reducing tax rates or raising public investment to attract and retain capital (Kahn and Zimbalist 2022; Mendoza-Velázquez et al. 2021). This dynamic may extend to vehicle tax collections, particularly among neighboring states where relocation costs are lowest and economic structures tend to be similar; I therefore treat the economic channel as competition among geographic neighbors throughout the case study. Research on Mexico also documents that policies spread among copartisan state governments through shared network ties (Ingram 2016), a pattern consistent with governors responding to copartisans whose constituencies and party label make them natural benchmarks. Mexican governors may thus track copartisans' vehicle tax decisions, with early reductions or eliminations by one governor pressuring fellow copartisans to follow.

5.2 Theoretical innovations about Mexican state vehicle tax policy

Fig. 1 also suggests avenues for theoretical innovation. Neither economic nor partisan competition alone may be sufficient to generate tax policy responses; the strength of each may depend on the other. This interaction between geographic and partisan competition may unfold across three possible logics.

According to one logic, geographic competition may be the primary driver of state vehicle tax policy interdependence, but its force may be stronger when copartisans are actively changing their tax policies. The baseline pressure is economic: when a neighboring state lowers its vehicle tax, a governor faces competitive pressure to match it or risk losing mobile tax base to the cheaper jurisdiction. This pressure may strengthen when the neighbor is a copartisan. Voters benchmark governor performance against comparable leaders, and shared partisan affiliation makes the comparison more telling, since a copartisan governs a presumptively similar constituency. A governor who holds her vehicle tax steady while a neighboring copartisan cuts faces pressure to explain why she has not offered comparable relief. The same gap with an opposing-party neighbor carries less force, since it may reflect

the parties' distinct constituencies. Geographic competition is thus expected to be present wherever neighbors cut, and strongest where copartisans are actively cutting.

The Geographic Competition Hypothesis predicts that state vehicle tax policy choices will reflect those of geographic neighbors, and that this geographic interdependence will be stronger when copartisans are actively changing their tax policies. Geographic competition is thus expected to be present wherever neighbors cut, and strongest where copartisans are actively cutting.

According to another logic, the primary channel may run through partisan networks. Governors respond to the tax choices of fellow copartisans wherever they are located, because voters judge them against copartisans. However, the strength of this response may depend on geographic neighbor activity. The baseline pressure is partisan: a governor whose vehicle tax diverges from her copartisans' invites unfavorable comparison from voters who treat copartisan leaders as the natural benchmark, regardless of where those copartisans govern. Geographic neighbor activity may strengthen this pressure. When nearby states are actively changing their tax policies, the comparison becomes locally salient: voters, local media, and business groups attend to neighboring states, so copartisan signals that might otherwise stay in the background become electorally urgent. A geographic neighbor faces similar factor markets and electorates, giving voters a direct comparison, whereas a distant copartisan's tax relief may carry little weight at home. Copartisan competition is thus expected to be present wherever copartisans cut, and strongest where neighbors are actively cutting.

The Partisan Competition Hypothesis predicts that state vehicle tax policy choices will reflect those of copartisan governors, and that this copartisan interdependence will be stronger when geographic neighbors are actively changing their tax policies. Copartisan competition is thus expected to be present wherever copartisans cut, and strongest where neighbors are actively cutting.

According to a final logic, tax policy interdependence may run through a single composite channel: governors may respond specifically to copartisan states that are also geographic neighbors. The copartisan neighbor is the most comparable peer a governor has: both nearby (and competing for the same mobile households and firms) and copartisan (and judged together by voters as comparable peers). Voters, along with the mobile factors whose threat of relocation drives competition, most readily judge a governor's tax policy against that of her copartisan neighbors, so the competitive pressure to follow suit is strongest there. Unlike the two preceding logics, this one posits no conditioning relationship between channels; it proposes instead that interdependence runs specifically through the copartisan-neighbor intersection.

The Copartisan-Neighbor Hypothesis predicts that state vehicle tax policy choices will reflect specifically those of states that are both geographic neighbors and copartisans.

6 Data and model specification

To test these arguments, I examine panel data across Mexico's 32 states (including Mexico City) from 2008 to 2024, for a total of 544 state-year observations. I begin in 2008, the first year after publication of the new vehicle tax law in December 2007. Although the national government formally decentralized legislative authority over the vehicle ownership tax to

state governments on 1 January 2012, state governments appear to have begun adjusting their collection strategy after the reform was approved, as suggested in Fig. 2.

The dependent variable is yearly state vehicle tax collections, deflated to 2018 Mexican pesos and transformed into per capita logged values to account for outliers. Unit root tests in the Electronic Supplementary Material's (ESM) Section 1 (ESM.1) show that state vehicle tax (per capita, logged) collections are not stationary in levels, so I first-difference the data, reducing the dataset to 512 observations. Figure 2 depicts level form and first-differenced *State Vehicle Tax (per capita, logged)* collections; the variation across states over time is notable. Pre-analysis diagnostics for *State Vehicle Tax* Δ *(pc, log)* show both cross-sectional dependence and geographic and partisan spatial dependence, suggesting that the theoretical approach and statistical model specification (described below) are appropriate to the data (ESM.1). Data are from the National Institute of Statistics and Geography (INEGI) (https://www.inegi.org.mx).

The main explanatory variables are the horizontal economic and political drivers that affect state vehicle tax policy. To capture *Horizontal Geographic Competition* for mobile factors, I created a time-invariant $NT \times NT$ (512×512) block-diagonal matrix, where w_{ij}^{G} denotes a shared border between states *i* and *j*. I row-normalize the matrix, so state *i*'s geographic neighbors receive equal weight summing to one. Although the framework denotes the horizontal economic channel w^{E}, in the Mexican application I write the geographic contiguity matrix as w^{G}, since competition for mobile factors operates through geographic proximity; the coefficient retains the economic-logic subscript ρ_{E}. Figure 3 maps Mexico's 32 states, showing how the number of neighbors varies. Shape file data are from INEGI (https://www.inegi.org.mx). See ESM.2 for additional details.

To capture *Horizontal Partisan Alignment*, I created a time-varying $NT \times NT$ (512×512) block-diagonal matrix, where $w_{ij,t}^{P}$ denotes the partisan alignment between states *i* and *j* in year *t*. I row-normalize the matrix, so state *i*'s copartisan peers receive equal weight summing to one. Figure 4 shows considerable variation in partisan alignment across states and over time. Data are from Magar (2018) and state electoral institutes. See ESM.2 for details and ESM.3 for coding rules.

To capture *Horizontal Copartisan-Neighbor Influence*, I combined the geographic and partisan matrices into a single $NT \times NT$ (512×512) block-diagonal composite weights matrix identifying only neighboring states that are copartisan. I row-normalize the matrix, so state *i*'s copartisan neighbors receive equal weight summing to one. About 17% of states each year have no copartisan neighbors.

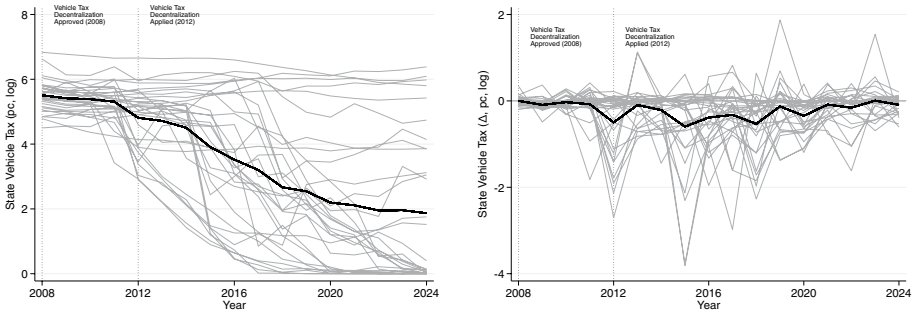

Fig. 2 Mexican state vehicle tax collections (2008–2024)

Fig. 3 Mexico and its 32 States. Note: AGS=Aguascalientes, BC=Baja California, BCS=Baja California Sur, CAMP=Campeche, CDMX=Ciudad de México, CHIS=Chiapas, CHIH=Chihuahua, COAH=Coahuila, COL=Colima, DGO=Durango, GTO=Guanajuato, GRO=Guerrero, HGO=Hidalgo, JAL=Jalisco, MEX=México, MICH=Michoacán, MOR=Morelos, NAY=Nayarit, NL=Nuevo León, OAX=Oaxaca, PUE=Puebla, QRO=Querétaro, QROO=Quintana Roo, SIN=Sinaloa, SLP=San Luis Potosí, SON=Sonora, TAB=Tabasco, TAMPS=Tamaulipas, TLAX=Tlaxcala, VER=Veracruz, YUC=Yucatán, ZAC=Zacatecas. Created in Stata using Shape Files from INEGI (https://www.inegi.org.mx)

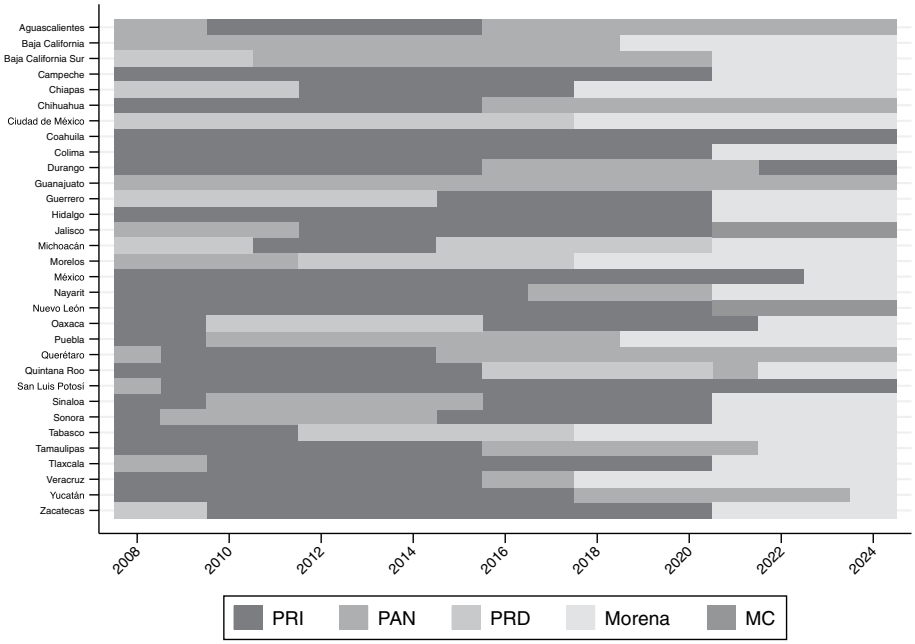

Fig. 4 Horizontal copartisan alignment across Mexico's states (2008–2024)

The framework suggests two potential vertical confounders. *Vertical Fiscal Imbalances* is captured using the ratio of national transfers to total state revenues for each state ($\times 100$); unit root tests show it is stationary in levels. *Vertical Partisan Alignment* captures whether each state governor shares party affiliation with the national president in year t (1 = yes, 0 = no). Additional controls include a *Tax Reform Applied* (2012) dummy for the official transfer of vehicle tax authority; a *State Election* dummy for election-related budget cycles; *PRI*, *PAN*, *PRD*, and *MC* governor dummies (omitting *MORENA* governor) for partisan differences; *Governor Margin* (first differenced due to non-stationarity), since the marginal political value of vote-seeking tax relief is greatest where the governor's margin is narrowest (Goodspeed 2002b); *Total State Revenues (pc, log)* (in levels) and *State GDP (pc, log)* (first differenced), since wealthier states may have alternative own-source tax resources; and a *Covid Pandemic* (2020) dummy for its economic shock. State population was not stationary in levels or differences and was excluded. Unit root tests are in ESM.1.

The first two theoretical arguments can be tested using Model 4 in Table 1:

$$\begin{aligned} y_{it} = {} & \delta_E V_{it}^E + \delta_P V_{it}^P \\ & + \rho_E \sum_{j=1}^{N} w_{ij}^G y_{jt} + \rho_P \sum_{j=1}^{N} w_{ij,t}^P y_{jt} \\ & + \rho_{E\times P} \left(\sum_{j=1}^{N} w_{ij}^G y_{jt} \times \sum_{j=1}^{N} w_{ij,t}^P y_{jt} \right) \\ & + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}. \end{aligned}$$

The third theoretical argument can be tested using Model 3 in Table 1:

$$\begin{aligned} y_{it} = {} & \delta_E V_{it}^E + \delta_P V_{it}^P \\ & + \rho_{EP} \sum_{j=1}^{N} w_{ij,t}^{GP} y_{jt} \\ & + \beta X_{it} + \mu_i + \tau t + \epsilon_{it}. \end{aligned}$$

In these models, y_{it} is the first-differenced state vehicle ownership tax (per capita, logged); $\sum_{j=1}^{N} w_{ij}^G y_{jt}$ is the geographic spatial lag identifying the tax policies of bordering states; $\sum_{j=1}^{N} w_{ij,t}^P y_{jt}$ is the partisan spatial lag capturing horizontal copartisan interdependence; $\sum_{j=1}^{N} w_{ij}^G y_{jt} \times \sum_{j=1}^{N} w_{ij,t}^P y_{jt}$ is the interaction between geographic and partisan spatial lags; $\sum_{j=1}^{N} w_{ij,t}^{GP} y_{jt}$ is the composite copartisan-neighbor spatial lag; μ_i are state fixed effects; τt is a linear time trend; and ϵ_{it} is the error term. V_{it}^E controls for state vertical fiscal imbalances and V_{it}^P for vertical partisan alignment. Additional control variables X_{it} are listed above. The static approach is justified by the first-differenced dependent variable and by post-analysis diagnostics showing the absence of residual serial correlation.

7 Statistical results

Tables 2 and 3 present the results. In Table 2's baseline models, without (Model 1) and with (Model 2) party controls, *Horizontal Partisan Alignment* (ρ_P W(Partisan)) is positive but significant only in Model 1, and *Horizontal Geographic Competition* (ρ_E W(Geographic)) is insignificant in both models. A researcher stopping here—estimating only Table 1 Model 1's additive model—would conclude that partisan networks barely matter, if at all, and geography not at all.

Table 2's Models 3 and 4 show something different. Once the geographic and partisan lags are allowed to interact, the partisan coefficient strengthens and becomes significant, the interaction $\rho_{E\times P}$ W(Geo) $\times$ W(Party) term is positive and significant, while the geographic coefficient remains insignificant. These results are consistent with the *Partisan Competition Hypothesis* that the copartisan channel is the primary driver of state tax policy choice but that it is conditioned on neighboring state tax policy activities. The composite specification in Table 3 confirms this interpretation: the composite term ρ_{EP} W(Copartisan Neighbors) is near zero and insignificant, whether entered alone (Models 1 and 2) or alongside separate partisan and geographic lags (Models 3 and 4), where the partisan lag remains positive and significant. Residual diagnostics show no serial correlation and adequate handling of cross-sectional and geographic dependence, though residual partisan spatial dependence remains detectable (Moran's I $p < 0.05$ in all four models). The copartisan effect thus appears to operate through copartisans generally, not copartisan neighbors specifically, but is conditioned on activities among geographic neighbors.

These results hold, and even strengthen, when restricting the analysis to the 2012–2024 period, addressing the possibility that pre-decentralization shifts (2008–2011) reflect national factors or that status-quo anchoring occurs at the 2012 transition (ESM.4). They also hold when using alternative horizontal partisan alignment codings for years with "orphaned" governors (ESM.5), that is, years where governors enjoy no partisan peers.

The results also hold under alternative temporal specifications. Year fixed effects are the standard temporal control in spatio-temporal models, and I estimate and report them in full (ESM.6). Here, however, they absorb much of the copartisan signal: because the partisan weight matrix is row-normalized and a single party holds most governorships in nearly every year (on average 59%, rising to 72% by 2024), each state's partisan lag closely tracks the yearly national mean, which is precisely the quantity year fixed effects remove by demeaning. This entanglement of time effects and the row-normalized weight matrix, of the kind noted by Lee and Jihai (2010), is why I prefer the year-trend specification. Even so, the central interaction $\rho_{E\times P}$ holds across temporal specifications, including year fixed effects, and throughout the 2012–2024 subsample. See ESM.6 for the full treatment.

8 Conditional spatial multipliers and effects

The results thus far reject the *Copartisan-Neighbor Hypothesis* and favor the *Partisan Competition Hypothesis* over the *Geographic Competition Hypothesis*. However, the regression coefficients alone cannot adjudicate between these two conditional hypotheses. I therefore evaluate the interaction model at low (10th percentile), mean, and high (90th percentile) values of the conditioning lag, yielding an implied conditional dependence parameter for each

Table 2 Mexican State Vehicle Tax Policy Interdependence (2008–2024): Conditional Geographic × Partisan Interaction

	(1)	(2)	(3)	(4)
ρ_E W(Geographic)	−0.061	−0.065	0.103	0.091
	(0.133)	(0.135)	(0.124)	(0.133)
ρ_P W(Partisan)	0.321*	0.302	0.446**	0.424*
	(0.178)	(0.177)	(0.194)	(0.200)
$\rho_{E\times P}$ W(Geo) × W(Party)			0.496**	0.467*
			(0.178)	(0.240)
δ_E Vertical Fiscal Imbalance (%)	−0.006	−0.006	−0.005	−0.005
	(0.006)	(0.006)	(0.006)	(0.006)
δ_P Vertical Partisan Alignment	0.099*	0.050	0.096	0.060
	(0.057)	(0.077)	(0.057)	(0.084)
State Election	−0.103	−0.115	−0.102	−0.113
	(0.094)	(0.093)	(0.093)	(0.092)
Governor Margin (% Δ)	0.004	0.004	0.004	0.004
	(0.004)	(0.004)	(0.004)	(0.004)
State GDP (pc, log, Δ)	0.054	−0.011	−0.007	−0.056
	(0.620)	(0.583)	(0.631)	(0.619)
Total State Revenue (pc, log)	0.201	0.240	0.268	0.307
	(0.358)	(0.324)	(0.357)	(0.324)
PAN Governor		−0.103		−0.074
		(0.092)		(0.104)
PRI Governor		−0.159		−0.135
		(0.099)		(0.109)
PRD Governor		−0.195		−0.159
		(0.172)		(0.181)
MC Governor		−0.078		−0.017
		(0.323)		(0.336)
Tax Reform Applied 2012	−0.357*	−0.304	−0.348*	−0.305
	(0.173)	(0.177)	(0.175)	(0.179)
Covid Pandemic 2020	−0.088	−0.089	−0.073	−0.071
	(0.096)	(0.092)	(0.102)	(0.098)
Year Trend	0.021	0.009	0.020	0.010
	(0.014)	(0.016)	(0.014)	(0.017)
Constant	−1.391	−1.688	−2.095	−2.416
	(3.925)	(3.515)	(3.880)	(3.477)
State Fixed Effects	Yes	Yes	Yes	Yes
Year Trend	Yes	Yes	Yes	Yes
Party Controls	No	Yes	No	Yes
Observations	512	512	512	512
Adjusted R-squared	0.084	0.080	0.087	0.082
AIC	780.2	784.1	777.5	781.8
BIC	822.6	839.2	819.9	836.9
AC *p*-value	0.171	0.189	0.200	0.214
CDw *p*-value	0.517	0.956	0.062	0.668
Moran's I *p*-value (Partisan)	0.030	0.038	0.032	0.038
Moran's I *p*-value (Geographic)	0.387	0.372	0.422	0.399

Dependent variable is first-differenced logged state vehicle tax per capita. Standard errors clustered by state and year (in parentheses). *p <0.10, **p<0.05, ***p<0.01

Table 3 Mexican State Vehicle Tax Policy Interdependence (2008–2024): Composite Copartisan-Neighbor Interdependence

	(1)	(2)	(3)	(4)
ρ_{EP} W(Copartisan Neighbors)	−0.003	−0.015	−0.044	−0.051
	(0.105)	(0.103)	(0.126)	(0.127)
ρ_E W(Geographic)			−0.039	−0.038
			(0.166)	(0.168)
ρ_P W(Partisan)			0.332*	0.315*
			(0.168)	(0.169)
δ_E Vertical Fiscal Imbalance (%)	−0.008	−0.008	−0.006	−0.005
	(0.007)	(0.006)	(0.007)	(0.006)
δ_P Vertical Partisan Alignment	0.135*	0.069	0.097*	0.051
	(0.067)	(0.092)	(0.056)	(0.080)
State Election	−0.105	−0.119	−0.100	−0.112
	(0.088)	(0.087)	(0.092)	(0.091)
Governor Margin (% Δ)	0.005	0.004	0.004	0.004
	(0.004)	(0.004)	(0.004)	(0.004)
State GDP (pc, log, Δ)	0.038	−0.044	0.050	−0.015
	(0.644)	(0.595)	(0.619)	(0.581)
Total State Revenue (pc, log)	0.063	0.125	0.205	0.250
	(0.405)	(0.380)	(0.362)	(0.337)
PAN Governor		−0.134		−0.099
		(0.107)		(0.098)
PRI Governor		−0.207**		−0.163
		(0.096)		(0.095)
PRD Governor		−0.239		−0.191
		(0.220)		(0.176)
MC Governor		−0.153		−0.074
		(0.304)		(0.338)
Tax Reform Applied 2012	−0.460**	−0.386*	−0.361*	−0.309
	(0.175)	(0.182)	(0.176)	(0.181)
Covid Pandemic 2020	−0.121	−0.120	−0.087	−0.086
	(0.089)	(0.082)	(0.095)	(0.088)
Year Trend	0.028*	0.013	0.021	0.010
	(0.014)	(0.018)	(0.014)	(0.017)
Constant	0.163	−0.341	−1.438	−1.801
	(4.402)	(4.079)	(3.968)	(3.637)
State Fixed Effects	Yes	Yes	Yes	Yes
Year Trend	Yes	Yes	Yes	Yes
Party Controls	No	Yes	No	Yes
Geo + Partisan Lags	No	No	Yes	Yes
Observations	512	512	512	512
Adjusted R-squared	0.069	0.067	0.083	0.079
AIC	787.8	790.3	781.9	783.6
BIC	825.9	841.2	828.5	838.7
AC p-value	0.228	0.294	0.194	0.218
CDw p-value	0.251	0.504	0.067	0.453
Moran's I p-value (Partisan)	0.010	0.013	0.030	0.038
Moran's I p-value (Geographic)	0.444	0.432	0.372	0.354

Dependent variable is first-differenced logged state vehicle tax per capita. Standard errors clustered by state and year (in parentheses). *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

channel: $\rho_P^{eff} = \rho_P + \rho_{E\times P}\,\overline{WG\,y}$ for the partisan channel and $\rho_E^{eff} = \rho_E + \rho_{E\times P}\,\overline{WP\,y}$ for the geographic channel. I use these conditional parameters to summarize policy transmission through each network via the corresponding multiplier, and to estimate how a large tax cut in one state—a one-standard-deviation negative shock to its first-differenced collections—propagates to others.[4] See ESM.7.

Tables 4 and 5 report the results. As shown in Table 4's Panel A, the strength of the copartisan effect depends on geographic activity, consistent with the *Partisan Competition Hypothesis*. The implied dependence parameter ρ_P^{eff} summarizes how strongly tax changes propagate across copartisans: the higher it is, the more a change in one state propagates through the partisan network and the larger the cross-state multiplier it generates. The direction of this conditioning, however, runs opposite to what the hypothesis predicted. Rather than strengthening as geographic neighbors become more active in changing their tax collections, the copartisan effect is *weakest* where neighbors are cutting most heavily ($\rho_P^{eff} = 0.1318$, insignificant) and *strongest* where they hold roughly stable ($\rho_P^{eff} = 0.4780,\ p < 0.01$). Because the dependent variable is first-differenced over a period of broad tax decline, the geographic conditioner is almost always negative: its low 10th percentile value (-0.6329) reflects neighbors cutting heavily, its high 90th percentile value (0.0645) neighbors holding roughly stable.

Table 4 Conditional spatial multipliers, by channel and conditioner

Panel A. Partisan Network, by Geographic Conditioner				
Geographic conditioner level	ρ_P^{eff}	Own	Cross-State	Total
Low (10th percentile)	0.1318	1.0026***	0.1491	1.1518***
	(0.1709)	(0.0089)	(0.1872)	(0.1889)
Mean	0.3348**	1.0209***	0.4823**	1.5032***
	(0.1569)	(0.0130)	(0.2384)	(0.2502)
High (90th percentile)	0.4780***	1.0524***	0.8632**	1.9157***
	(0.1629)	(0.0280)	(0.3612)	(0.3885)
Panel B. Geographic Network, by Partisan Conditioner				
Partisan conditioner level	ρ_E^{eff}	Own	Cross-State	Total
Low (10th percentile)	−0.1349	1.0057***	−0.1296	0.8762***
	(0.1039)	(0.0118)	(0.0935)	(0.0843)
Mean	−0.0103	1.0000***	−0.0108	0.9892***
	(0.1095)	(0.0061)	(0.1146)	(0.1129)
High (90th percentile)	0.0960	1.0031***	0.1113	1.1144***
	(0.1247)	(0.0094)	(0.1578)	(0.1642)

Conditional partial multipliers from $S = (I - \rho^{eff} W)^{-1}$, evaluated at the 10th percentile, mean, and 90th percentile of the conditioning lag. Panel A: partisan conduit ($W = W^P$), conditioned on geographic activity $\overline{WG\,y} = -0.6329,\ -0.2240,\ 0.0645$. Panel B: geographic conduit ($W = W^G$), conditioned on partisan activity $\overline{WP\,y} = -0.4785,\ -0.2275,\ -0.0135$. Own, Cross-State, and Total effects are the average direct, indirect, and total effects implied by S. See ESM.7. Block-bootstrap standard errors (1,000 draws, 3-year blocks) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

[4] A model with two endogenous spatial lags is more general than a single-network spatial autoregressive (SAR) model (LeSage and Pace 2009, pp. 52–53); because the specification here adds an interaction between those lags, the reported multipliers should be interpreted as summaries of the interaction model evaluated at representative values of the conditioning lag rather than as the exact multiplier implied by a single-network SAR (LeSage and Pace 2009).

Table 5 Cross-state effects of a one-standard-deviation tax cut in a single state, by channel and conditioner

Panel A. Partisan Network, by Geographic Conditioner				
Geographic conditioner level	ρ_P^{eff}	Direct	Indirect	Total
Low (10th percentile)	0.1318	−0.5565***	−0.0828	−0.6393***
	(0.1709)	(0.0049)	(0.1039)	(0.1049)
Mean	0.3348**	−0.5667***	−0.2677**	−0.8344***
	(0.1569)	(0.0072)	(0.1324)	(0.1389)
High (90th percentile)	0.4780***	−0.5842***	−0.4792**	−1.0633***
	(0.1629)	(0.0156)	(0.2005)	(0.2156)
Panel B. Geographic Network, by Partisan Conditioner				
Partisan conditioner level	ρ_E^{eff}	Direct	Indirect	Total
Low (10th percentile)	−0.1349	−0.5583***	0.0719	−0.4863***
	(0.1039)	(0.0065)	(0.0519)	(0.0468)
Mean	−0.0103	−0.5551***	0.0060	−0.5491***
	(0.1095)	(0.0034)	(0.0636)	(0.0627)
High (90th percentile)	0.0960	−0.5568***	−0.0618	−0.6186***
	(0.1247)	(0.0052)	(0.0876)	(0.0912)

Direct, indirect, and total effects of a one-standard-deviation negative shock (0.5551 log-points) to a single state's first-differenced tax collections, propagated through $S = (I - \rho^{eff} W)^{-1}$ and evaluated at the 10th percentile, mean, and 90th percentile of the conditioning lag. Panel A: partisan conduit ($W = W^P$), conditioned on geographic activity $\overline{W^G y} = -0.6329, -0.2240, 0.0645$. Panel B: geographic conduit ($W = W^G$), conditioned on partisan activity $\overline{W^P y} = -0.4785, -0.2275, -0.0135$. See ESM.7. Block-bootstrap standard errors (1000 draws, 3-year blocks) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

The propagated effects in Table 5's Panel A make this magnitude tangible by feeding a concrete shock through the cross-state multiplier of Table 4's Panel A. Consider a large tax cut in a single state—a one-standard-deviation negative shock (about 0.5551 log-points) to its first-differenced collections—and trace how it spreads to copartisans through the partisan network. In a context where geographic neighbors are generally holding stable—so partisan dependence runs high ($\rho_P^{eff} = 0.4780$)—the cross-state multiplier is large and the cut propagates strongly, generating a significant indirect (cross-state) reduction of about 48% (-0.4792). In a context where geographic neighbors are generally cutting heavily—so partisan dependence runs low ($\rho_P^{eff} = 0.1318$)—the multiplier is small and the same cut propagates weakly, generating only a small and insignificant 8% reduction (-0.0828). In contrast, Panel B across Tables 4 and 5 shows the geographic channel's conditional dependence parameter ρ_E^{eff} and its implied indirect (cross-state) effect are insignificant at every level of copartisan activity.

This reinforces the conclusion that the partisan channel, not the geographic one, drives tax-policy interdependence, and that its strength is conditional on geographic activity. However, it is important to stress that this finding runs in a direction opposite to the one expected in the *Partisan Competition Hypothesis*. The hypothesis specified that copartisan competition would be conditioned by geographic activity, and that copartisan interdependence would be *stronger* when geographic neighbors were actively changing their tax policy. In contrast, I find that copartisan interdependence is *weaker* when geographic neighbors are actively changing their tax policy and *stronger* when geographic neighbors are holding their tax policy stable. One interpretation of the finding, consistent with a public choice account of competing incentives, is that when every neighbor is cutting heavily, the competitive

pull of factor mobility overwhelms partisan considerations, whereas when neighbors hold steady the pull of copartisans looms larger. Because this direction was neither predicted nor hypothesized, this interpretation is exploratory and post-hoc, offered as a conjecture to be tested in future work rather than a claim adjudicated here. Even so, the central result is unchanged: the copartisan channel drives tax-policy choice, with its strength depending on what geographic neighbors are doing. Modeling the interaction between geographic and partisan channels, as the framework directs, revealed a conditionality that an additive specification leaves hidden.

9 Concluding remarks

This study provides a unifying analytical framework for subnational tax policy in decentralized federal systems—one that helps scholars locate their research, identify adjacent causal processes that may interact with or confound their focal mechanisms, and specify more robust empirical strategies for testing them.

I demonstrate the framework's value through analysis of the Mexican state vehicle ownership tax. Situating the tax within the analytical framework facilitated the specification of three distinct arguments about how horizontal economic and political logics may interact: one proposing that partisan alignment conditions economic (geographic) competition; another that economic (geographic) competition conditions copartisan competition; and a third that interdependence runs specifically through copartisan neighbors, the intersection of the economic (geographic) and partisan channels.

The results show that partisan networks, not geographic proximity, are the primary channel of state vehicle tax policy interdependence in Mexico, with the copartisan effect conditional on neighbors' tax activity. This conditionality emerged only once the interaction was modeled: in an additive specification the partisan channel appears weak. It also took an unanticipated form: the copartisan effect is strongest where regional tax activity is muted and weakest where surrounding cuts are deepest. The illustration thus contributes to our understanding of Mexican state tax policy while demonstrating the framework's usefulness: interactions that single-channel approaches miss can help identify new theoretical arguments, reveal unexpected substantive findings, and raise new research questions.

Although the study focuses on tax policy, future research could extend the framework to the expenditure side of subnational fiscal policy—or even subnational borrowing decisions (e.g., Goodspeed and Zhang 2024)—where similar vertical and horizontal, economic and political considerations may shape policy choices in ways that existing research has not yet fully considered. The framework could also be applied to other national contexts—such as those with highly regulated economies, alternative federal fiscal arrangements, greater party system fragmentation, or authoritarian political regimes—where the relative salience and nature of the vertical and horizontal dimensions and their economic and political logics may differ. A natural next step suggested by the Mexican case is to probe the conditionality it uncovered: why, and under what conditions, copartisan competition is dampened by intense regional economic competition.

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Data availability All data used in this study are publicly available. Fiscal data (state vehicle tax collections, fiscal transfers, state revenues, inflation data, and geographic boundary files) were obtained from Mexico's National Institute of Statistics and Geography (INEGI) at https://www.inegi.org.mx. Electoral data were obtained from Magar (2018), available at https://github.com/emagar/elecRetrns, and at Mexican state electo ral institutes. Replication materials (code and processed data) can be found on the author's webpage https://www.allysonbenton.com.

Declarations

Ethical approval This study does not involve human participants or animals; ethics approval was not required.

Conflict of interest The authors declare no conflict of interest.

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