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The Spatial Dimensions of State Fiscal Capacity The Mechanisms of International Influence on Domestic Extractive Efforts*

CAMERON G. THIES, OLGA CHYZH AND MARK DAVID NIEMAN

This paper expands traditional predatory theory approaches to state fiscal capacity by adopting spatial analytical reasoning and methods. Although previous work in the predatory theory tradition has often incorporated interdependent external influences, such as war and trade, it has often done so in a way that maintains a theoretical and empirical autonomy of the state. Theoretically, we suggest four mechanisms (coercion, competition, learning, and emulation) that operate to channel information through interstate rivalry and territorial contiguity, trade networks, and the political space associated with regime type and intergovernmental organization membership. We test our predictions using a multi-parametric spatio-temporal autoregressive model with four spatial lags capturing the four mechanisms. Our empirical results provide support for the coercion and learning mechanisms.

In his description of the development of the English state in the 17th century, John Brewer (1989) refers to revenues as the "sinews of power." This corporeal metaphor reinforces our traditional conception of the state as an organism/organization that is self-contained, autonomous, and sovereign. Much of the literature on state development has developed in a similar way, though often incorporating external influences such as war and trade. Yet, while our theories of state building expect external influences on state capacity, our modeling of such factors has not caught up. Theoretical models treat war and trade as traits of the individual state under observation, and empirical models follow suit. What if the sinews of power are conceived of as part of larger webs of connections emanating from within and without of the state? In this paper, we attempt to theoretically and empirically refine the dominant approach to state capacity; namely, predatory theory through an application of spatial analytical reasoning and empirical testing.

We argue that while state fiscal capacity may be in large measure shaped by domestic processes, we can also theorize and more accurately observe international influences as well. Theoretically, we argue that four main mechanisms affect state fiscal capacity, including coercion, competition, learning, and emulation. These mechanisms, already highlighted in the diffusion literature, provide channels through which state and non-state actors such as multinational corporations (MNCs) and intergovernmental organizations (IGOs) affect revenue-extraction policies and outcomes throughout the world. In particular, we believe that coercion works primarily through interstate rivalry and territorial contiguity—already a mainstay of the literature, but tested in a novel way in this paper. Competition occurs through trade networks, as governments must compete through tax policy adjustments to secure flows of production and export market share. Learning is thought to occur through membership in IGOs. IGOs provide policy models for their members based on evidence, shared beliefs and norms that changes

* Cameron G. Thies, School of Politics and Global Studies, Arizona State University, Arizona (cameron.thies@asu.edu). Olga Chyzh, Assistant Professor of Political Science and Statistics, 555 Ross Hall, Iowa State University, Ames, IA 50011-1204. Mark David Nieman, Assistant Professor of Political Science, 537 Ross Hall, Iowa State University, Ames, IA 50011-1204.

beliefs and gives greater confidence in a policy in the adopting state. Finally, emulation occurs through regime type, particularly as democracies turn to each other for lessons learned on the legitimacy of bargains struck between the government and the people over taxation and service delivery. These four mechanisms, and their observable channels, are one way to move forward the predatory theory of the state and associated quantitative tests.

We evaluate the four competing causal mechanisms using a multi-parametric spatio-temporal autoregressive model (m-STAR) that captures the spatial effects of interstate rivalry and geographic contiguity, trade, membership in economic IGOs, and regime similarity using spatial lags. In contrast to more traditional modeling approaches, the spatial lags approach allows for a simultaneous modeling of both domestic-level effects, such as GDP per capita or the level of agricultural development, as well as spatial effects, such as the spillover effects from geographical neighbors or trade partners. The spatial effects act as feedback loops through which the dependent variable—state i's fiscal capacity at time t—is affected by its own fiscal capacity in the previous period $t-1$, as well as the fiscal capacity in neighboring units at time t. This means that a change in state i's level of tax extraction does not only affect state i's own level of tax extraction in the next time period, but also has potential implications for the level of tax extraction of i's geographical neighbors, interstate rivals, trade partners, IGO partners, and states with similar regimes. Our empirical results provide support for the coercion and learning mechanisms. Namely, we find evidence of a positive relationship between state's extractive capacity and the average extractive capacity of its geographical neighbors. We also find that a state's fiscal capacity is positively affected by that of others with whom it shares memberships in economic IGOs. The results show no support for the remaining two mechanisms of competition and emulation.

THE SOURCES OF STATE FISCAL CAPACITY

States are a product of their revenue-generating abilities, thus a long line of scholarship has devoted attention to the internal and external sources of variation in fiscal capacity. As Levi notes, "the history of state revenue production is the history of the evolution of the state" (1988, 1). Levi, and others, such as North (1981), Tilly (1975), Tilly (1985), and Olson (1993) are variously described as developing predatory theory, fiscal contract theory, or even bellicist theory. The particular label attached to this work usually highlights one aspect of the process of revenue extraction, such as the implied exchange relationship between rulers and the rules in fiscal contract theory, or the central importance of war in stimulating extraction in bellicist theory. In general, all of these approaches share a similar view of rulers as predators attempting to maximize their revenue extraction from a subject population subject to a variety of constraints, such as the ruler's relative bargaining power, transaction costs, and discount rate. Although much of this predatory literature was developed to explain early modern European states, a number of scholars have attempted to explore the usefulness of its insights in the contemporary world (e.g., Herbst 2000; Centeno 2002; Thies 2004).

Drawing upon Levi (1988), Thies (2010) describes the relationship between rulers and the ruled in predatory terms for contemporary states. First, he notes that rulers will have increased bargaining power relative to the subject population the greater their monopolization of coercive, economic, and political resources. Rulers therefore attempt to monopolize the means of violence in the territorial areas under their jurisdiction. Of course, this is one of the issues that many post-colonial states now deal with on a regular basis—how to contain a variety of internal rivals to the government, and often how to prevail in full-fledged civil wars through a monopolization of coercive power. The empirical evidence thus far suggests that civil wars and most types of

internal rivalries lead to a reduction in revenue extraction. There has been little systematic evidence gathered on the effect of efforts to monopolize economic resources on extraction. Thies (2010) demonstrated that contrary to the prevailing view in the literature on civil war onset, the state is the main beneficiary of rents and tax revenue from natural resources. Only oil, depending on how it was measured, increased the likelihood of civil war onset (see also Smith 2004; Morrison 2009). No one in the predatory literature has focused on restrictions on the economy related to extraction *per se*, or trade for that matter. Cheibub's (1998) empirical evidence suggests that as levels of trade increase, so do taxation, in part owing to reliance on trade taxes in many developing countries and as a result of a need to develop social protection measures in developed countries. This result is also found in subsequent studies (e.g., Thies 2010).

Although the theoretical story is consistent, the empirical findings regarding the monopolization of political resources are mixed. Olson (1993) suggests that autocrats should extract more than their democratic counterparts, given his view that democratic transitions occur when autocratic succession goes awry owing to changes in the balance of power within society. Democracies by nature represent a balancing of political resources, rather than a monopolization of such resources in the ruler. Empirically, some analyses have found the expected negative relationship between democracy and extraction (e.g., Thies 2006), whereas others have found a positive relationship (e.g., Cheibub 1998; Thies 2004; Thies 2010), others insignificance (Thies 2005; Thies 2007), and others find an effect contingent on other aspects of state development (Thies 2009), though some of this variation is also clearly driven by the sample of states under consideration.

Second, according to Levi, rulers attempt to lower their transaction costs in enforcing compliance with their revenue-extraction policies. There are some standard indicators related to transaction costs found in most empirical studies, such as per capita income, trade openness, inflation, and agriculture as a percentage of GDP. The former two measures are thought to increase state revenues as they reduce transaction costs, whereas the latter two measures should reduce revenues as they increase transaction costs (Cheibub 1998). However, other factors such as religious and ethnic fractionalization also implicate transaction costs, as extraction from homogeneous societies is presumed to be simpler than heterogeneous ones (Thies 2010). In fact, many of the factors discussed as relating to bargaining power (above) and discount rates (see below) also implicate transaction costs. One of the fundamental factors underlying transaction costs is the legitimacy of the ruler, which should generally be higher in democracies than autocracies.

Finally, the discount rates of rulers vary according to the strength of their internal and external rivals. External conflict in the form of war, territorial threat, or interstate rivalry is often argued to loosen the constraints rulers face in raising revenue (e.g., Cohen, Brown and Organski 1981; North 1981; Rasler and Thompson 1985; Tilly 1985; Campbell 1993; Thies 2004; Thies and Sobek 2010). Empirically, however, most studies find a negative relationship between interstate war and fiscal capacity (Thies 2005; Thies 2006; Thies 2007; Thies and Sobek 2010). On the other hand, Thies's modified approach to predatory theory argues that rivalry and ongoing territorial threats should provide the state with the ability to run a version of Tilly's (1975) "protection racket," thus increasing extraction moderately. The evidence from the contemporary developing world seems to confirm this expectation. Internal conflict in the form of civil war or other types of internal rivalry may or may not increase the ruler's discount rate depending on the strength of the challenge (North 1981, 27; Levi 1988, 33), and as previously discussed most of the evidence finds a negative relationship between internal rivalry/civil war and extraction (e.g., Thies 2010), though Thies (2004) found that internal rivalries characterized by ethnic challenges were responsible for increased extraction.

There are several avenues to pursue to improve the existing literature. First, it is focused primarily on bargaining pressures within the state, notwithstanding the important role that external conflict plays in some of the more bellicist versions of the theory. We would like to push the literature forward to consider some of the mechanisms of diffusion that operate across boundaries. It is quite likely that state fiscal capacity, while largely a function of internal processes, is also dependent on international context and events in other states. Although some of these factors are often included in statistical models, such as regime type, trade, external threats; others are not, such as involvement in IGOs, and none are probably modeled in a way that demonstrates their full importance to extraction. Second, as Beck, Gleditsch and Beardsley (2006, 27–8) and Hoff and Ward (2004, 161) note more generally about political science research, most statistical analyses assume the independence of individual observations even if our theories are implicitly based on interdependence. As Franzese and Hays put it, "in international relations … the interdependence of states' actions essentially defines the subject" (2010, 571). However, even work in the bellicist tradition of predatory that focuses on war or interstate rivalry using statistical analyses still holds on to the individual state as the unit of analysis and does not account for potential spatial dependencies in the data.

We already know that within states, subnational units engage in strategic behavior about taxation, as well as welfare provision and imposition of environmental standards (e.g., Case and Rosen 1993; Brueckner 2003). Geys (2006) is practically a subnational version of predatory theory in that he considers tax competition in the context of the public goods that citizens demand, given the taxation/public goods provision in neighboring locales.

The rather large literature on interstate tax competition has investigated whether competition for mobile factors of production has led to a "race-to-the-bottom." The argument is that as governments have reduced the restriction on capital mobility, they may be drawn into a Prisoner's Dilemma in which the dominant strategy of each state is to make its market more profitable than its neighbors. This competition could logically lead to the reduction of taxes on capital. It could also lead to reductions in environmental standards, labor market regulations, and the like, in the pursuit of truly globalized capital. It is often assumed that reductions in marginal tax rates as a result of a race-to-the-bottom dynamic will translate into lower overall government revenues. However, modeling states as if they were predatory rulers—meaning that states prefer higher levels of revenue subject to a variety of constraints—does not rule out the possibility that they may see reducing marginal tax rates as a means to *increase* overall revenue. Indeed, this is a staple of neoliberal thinking about the relationship between tax rates, economic growth, and revenue generation for the state. What is most important for our purposes is the notion that states will look to see what other states are doing on tax rates when considering decisions about their own in order to prevent businesses or individuals from relocating. Despite the inconsistent evidence on tax competition, it is clear that governments' choices about tax policy and extraction, more broadly, are interdependent (e.g., Basinger and Hallerberg 2004; Swank 2006; Franzese and Hays 2007a; Franzese and Hays 2008).

We also know that a number of "internal" policy decisions affecting revenues and expenditures are influenced by diffusion. The literature on the international diffusion of liberalism is replete with examples (Simmons, Dobbin and Garrett 2006). Brooks (2005) has shown that the privatization of pensions is influenced by decisions made by relevant peer groups. Privatization schemes are adopted by states that are concerned with the balance of revenue generation and future expenditures linked to pension liabilities. Meseguer (2004) also shows evidence of rational learning and emulation in privatization more generally in both the OECD and Latin America. Jahn (2006) analyzed the social expenditures of states as a result of diffusion processes associated with globalization. Lee and Strang (2006) demonstrate downsizing in

public sector employment in the OECD is a production of both learning and emulation. Elkins, Guzman and Simmons (2006) have tested a variety of diffusion mechanisms related to the signing of bilateral investment treaties (BITs) designed to increase foreign direct investment. Economic competition seems to have the most significant effect on increasing the likelihood of BITs. Further, Simmons and Elkins (2004) demonstrate diffusion via learning for capital account, current account, and exchange rate policies.

Once again, we suggest that neither the tax competition, nor the diffusion of liberalism literature necessarily implies only a diminution of state fiscal capacity. In fact, liberalism supplies the logic for why reduced tax rates may still produce comparable or even increased revenue for the state. If reduced tax rates (tax competition literature) or reduced regulation/government interference in the economy (diffusion of liberalism literature) free individuals and business to divert their energies to productive uses, then the economy should grow, providing a larger tax base. Even at lower rates, the amount of government revenue may stay the same or even increase. As we know, neoliberal policies were pushed around the world by the International Monetary Fund and World Bank to get governments out of the economy, which they argued would ultimately improve governments' revenue positions.

We could situate all of this work within Lazer's (2005) approach to regulatory capitalism as a kind of informational network. States in such a network are either policy choosers or information producers. The informational spillovers created by some states leads to the kind of diffusion we see in areas like pension privatization, welfare policy, taxation, and the like. Epistemic communities, international organizations, cross-national corporate entities, institutionally mediated networks, and interpersonal networks, all become mechanisms for the transmission of information. This reorientation of what has previously been thought of as separate national decisions into a larger framework of diffusion is a useful wake-up call to the predatory literature, which is still beholden to outdated concepts of immutable state sovereignty. We attempt to draw upon these insights to push the literature forward on state fiscal capacity by considering the mechanisms whereby diffusion of information affects ruler extractive choices and abilities.

MECHANISMS OF INTERNATIONAL INFLUENCE

Like many previous studies, we seek to incorporate, but also move beyond the traditional geographic realm of space to consider other types of space (Anselin 2003). As Beck, Gleditsch and Beardsley suggest, "… although 'nearby' is usually taken to mean geographical closeness, there is no reason why we cannot use any notion of nearness that makes theoretical sense" (2006). These authors include two measures of connectivity in their attempt to model democracy: geographic distance and trade volumes. We include these measures of connectivity that are already common to the predatory literature, and expand to more carefully consider the contested role of regime type and membership in common international organizations. We suggested that each of these types of space represent an opportunity for diffusion of information via a number of mechanisms.

Like Brinks and Coppedge (2006, 468), we follow Rogers who defines diffusion as "the process by which [1] an innovation is [2] communicated through certain channels [3] over time among the members of [4] a social system" (1995). First, the innovation that concerns us is information, models, and practices related to more efficient revenue extraction. Second, the channel of communication will come through a variety of state and non-state (corporations, IGOs) actors as described in more detail below. Although we do not observe this communication directly, we will identify specific mechanisms that serve to channel communication

from one state to another. Third, while some innovations will move quickly via the following mechanisms, others may move more slowly. We examine the timing of these changes closely in the empirical analysis. Fourth, the social system in this context is a network of countries. Some of these networks are based on physical proximity, but others related to cultural, economic, and political ties.

The literature on diffusion has already identified a number of mechanisms operating in the international social system of states. For example, Elkins and Simmons (2005, 35) classify diffusion mechanisms "as one of two kinds: those for which another's adoption alters the value of the practice and those for which another's adoption imparts information. Each of these two broad classes, *adaptation to altered conditions* and *learning*, comprises a set of varied mechanisms (38-39)." The former includes mechanisms like cultural norms, support groups, and competition, whereas the latter involves three methods of learning, namely information cascades, availability, and reference groups. Simmons, Dobbin and Garrett (2006) identify four mechanisms responsible for diffusion of economic and political liberalism: coercion, competition, learning, and emulation. Franzese and Hays (2008, 745) reiterate Simmons, Dobbin and Garrett's four mechanisms and add a fifth mechanism migration.

In our reconceptualization of the external dimension of predatory theory, we focus on these mechanisms that may affect state fiscal capacity: coercion, competition, learning, and emulation.[1] The primary mechanism that we might identify from bellicist strands of predatory theory is coercion. Rulers compete with other rulers for subject populations and territorially based resources. Whether we view this through the lens of North's (1981) property rights framework or through Tilly's (1985) war-centered account of the development of the state, it is clear that coercion, and even the possibility of coercion, with neighboring states has been paramount to the revenue-generating abilities and possibilities for states. Thies's work on interstate rivalry (most of which are territorial in nature and occur between neighbors) has previously demonstrated that it forms a kind of coercive threat that allows for states to increase their tax revenues. We therefore consider interstate rivalry as a form of "direct" coercion that should allow states to increase their revenues. Simmons, Dobbin and Garrett (2006, 790) refer to this type of intentional interaction among states as "direct" coercion because it is active and intentional. We also consider territorial contiguity as a more passive conduit for coercion, or what Simmons, Dobbin and Garrett (2006, 791) refer to as "soft" coercion. Geographic space, a mainstay in the spatial literature, should also have strong positive effects on revenue extraction within states. Gibler's (2012) work on territory and state development, and even Shin and Ward's (1999) work on the spatial clustering of defense spending point to strong geographic spatial effects for state fiscal capacity. Innovations in revenue generation in neighboring states should diffuse quickly, especially in regions with histories of conflict, as the "policies of powerful governments often constitute focal points" for interdependent domestic policy choices (Simmons, Dobbin and Garrett 2006, 791). Thus, the more direct form of coercion is represented by interstate rivalry, whereas the more soft form of coercion is represented by territorial contiguity.

The next mechanism we suggest is important in diffusing information about appropriate extraction is competition, which we believe will be channeled primarily through trade networks. As Simmons, Dobbin and Garrett (2006, 792) note, competition between governments over export market shares, including arguments about diffusion of regulatory environments, and tax

[1] Maggetti and Gilardi (forthcoming) note that the operational indicators used to represent conceptual mechanisms vary across studies with no single measurement approach dominating across any of the mechanisms we examine. We follow their advice and try to match our operational indicators as closely as possible to the way we believe the mechanism operates in the diffusion of state fiscal capacity.

competition as described above are mainstays of the literature. Trade taxation meets Simmons, Dobbin and Garrett (2006, 792–3) standards to make an argument about competition, as tax policy affects the "flow of international production and … the attractiveness of a nation's exports," changes in taxation will have "consequential effects in the short- to medium-term," and occur in an "information-rich (in fact, close to perfect) environment." MNCs engaged in trade assist with the information-rich environment. As Lazer notes, "corporate entities have interests that enter the political calculus in the countries that they exist in (very often pushing for compatible cross-national standards) but, furthermore, also serve as (nonneutral) vessels for policy information" (2005, 56). MNCs will push for harmonious regulations, including tax policy. Consultants like Accenture, as well as law firms operating international also serve as conduits of information about "lessons from one jurisdiction" at the same time that they are trying to "capture some of the potential gains in other jurisdictions as rents" (Lazer 2005, 56). State officials will be subjected to lobbying activities by MNCs, law firms, consultants, as well as non-governmental organizations who may oppose their rent-seeking, as to what are competitive and appropriate levels of taxation as well as agreements on rents derived from jointly owned or managed natural resources. Further, Simmons, Dobbin and Garrett (2006, 794) argue that diffusion via competition will be much more pronounced among countries located in the same trade network. We therefore operationalize the mechanism of competition with a measure of a state's bilateral trade to account for the relative importance of trade to each state.[2]

Next, we look at the mechanism of learning that operates through IGOs. According to Simmons, Dobbin and Garrett, learning "refers to a change in beliefs or a change in one's confidence in existing beliefs, which can result from exposure to new evidence, theories, or behavioral repertoires" (2006, 795). Innovation in tax revenue generation should result from the diffusion of "a shared fund of (often technical) knowledge among elites about what is effective … fostered by … shared norms, beliefs, and notions of evidentiary validity" (Simmons, Dobbin and Garrett 2006, 795). Simmons, Dobbin and Garrett specifically suggest that international institutions are a "natural conduit for learning and, especially, for organized pedagogy" (2006, 798). Lazer (2005, 57) highlights the role that IGOs often play with respect to the dissemination of information about regulatory policy. He used the OECD series of studies about regulatory reform in the 1990s to illustrate how this IGO developed a series of regulatory reform regulations that came to be widely agreed to as being appropriate (see also Breul 1996). The OECD played a critical role in the diffusion process by defining the menu of policy options, providing evaluation of those options by aggregating the experiences of multiple states, and providing exemplars to model appropriate behavior. According to Lazer, the OECD also increased confidence in these beliefs by providing "a cover of legitimacy (normative isomorphism—see DiMaggio and Powell 1983) to policy

[2] Trade relationships may stimulate diffusion in several ways. In this paper, we theorize that economic and political elites mimic the practices of their most important trade partners, and hence, measure trade connectivity as total bilateral trade volumes. From a tax extraction perspective, states care where and whether international trading firms are paying appropriate dues. The best way to ensure compliance with domestic tax law and prevent tax evasion is to close loopholes, or compare notes, with its largest trade partners. An alternative way to think of diffusion through trade, not explored here, is that states mimic the policies of those states that are most similar to them in terms of the portfolio of the trading goods: that is, states that sell the same goods to the same buyers are in direct competition, which leads to policy convergence. Some scholars have attempted to capture such competition by calculating network similarity measures (e.g., structural equivalence scores) on bilateral trade flows (Cao and Prakash 2010). Trade structural equivalence measure, however, may conflate states that compete for the same markets with states that are part of the same supply chain (i.e., two states sell complementary goods to the same buyers). Chatagnier and Kavakli (2014) propose a more nuanced measure of trade portfolio similarity by calculating states' similarity in terms of the types of goods being sold rather than mere volumes. We argue that, while valid, this causal mechanism is less applicable to the subject of tax extraction.

makers seeking policy options and reduced uncertainty regarding the consequences from any particular option" (2005). IGOs can thus provide specific policies that ought to be implemented, in part, because membership in their organization ensures that others are also acting similarly based on shared beliefs about which policies produce the best outcomes. A number of IGOs work on issues specifically related to capacity building. For example, the World Bank's project on Governance and Public Sector Management includes specific policy advice on tax policy and revenue administration. We operationalize the learning mechanism through membership in economic IGOs, as they are the most likely to disseminate information that states may learn from about appropriate tax revenue-generating policies.

Finally, emulation is the last mechanism we examine as a function of political space and more specifically, regime type. Emulation, according to Simmons, Dobbin and Garrett (2006, 799) involves the adoption of a "best practice" in an area of policy based not on evidence nor shared beliefs, but on *who* had previously adopted a policy. The reference group is key for emulation, as this is what distinguishes it from learning. In the learning mechanism, states change their beliefs or increase confidence in their beliefs based on their participation with each other in an international organization that coordinates the dissemination of information about policy. The emulation mechanism involves a self-comparison to a reference group based on a shared social type, which for the case of tax revenue generation, we suggest is regime type. As the default regime type for states since their earliest formation has been autocracy, it stands to reason that once a transition occurs and a democracy is established that its rulers would look to other democracies as models for their policies. As the legitimacy of the bargain over taxation between rulers and ruled in a democracy is critical for the survival of elected leaders in office as well as the maintenance of democracy itself, rather than simply rely on untested notions of what constitutes a legitimate fiscal contract, it makes sense that other models used by democracies would be adapted (Timmons 2005). Campbell's (Campbell 1992; Campbell 1993; Campbell 1994) work on taxation policy in the newly democratized Central and Eastern European states showed a great deal of isomorphism as states emulated Western European democracies after the transition. We would expect such emulation to continue as the taxation policies of successful democracies are emulated by followers. We would similarly expect that successful autocracies would emulate each other's revenue-generating policies. For example, the need for revenue has led many autocrats to cut deals with MNCs to search for natural resource wealth as a way to reduce their need to extract from societal actors and reward those in their selectorate (Bueno de Mesquita et al. 2005). Other autocrats have emulated a relaxed attitude toward remittances, as they are a source of foreign currency and revenues.

We therefore expect that interstate rivalry and territorial contiguity operating through the mechanism of coercion, trade operating through the mechanism of competition, IGO membership operating through the mechanism of learning, and regime type operating through the mechanism of emulation will all have significant, positive effects on state fiscal capacity. Although previous research into revenue extraction may have considered some of these factors, it has primarily done so without truly modeling the interconnectedness of each state in the international system. We believe there are strong reasons to suspect that considering geographic, trade, and several forms of political space (regime type and IGO membership) will allow us to uncover the true nature of international effects on domestic revenue extraction.

We assume, consistent with predatory theory, that states prefer to maximize their revenues subject to constraints. Thus the effects on revenue from these various diffusion mechanisms are all presumed to be positive. Predatory theory expects that once increases in revenue generation occur, they tend to be sticky—or subject to a "ratchet effect" or "displacement effect" (Peacock and Wiseman 1961; Rasler and Thompson 1985). According to this argument, once an increase

in tax revenue is achieved by the ruler, especially as a result of war, it is seldom allowed to return to the pre-war level. In general then, we expect that innovations in extraction will lead to increased revenue extraction.

DATA AND METHODS

We test the competing causal mechanisms using an m-STAR model, which is able to capture the spatial effects of interstate rivalry, geographic contiguity, trade, membership in economic IGOS, and regime similarity using spatial lags (Franzese and Hays 2008; Hays, Kachi and Franzese 2010). The model accounts for spatial dependence by including a lagged dependent variable on the right-hand side of the equation, taking the form:

$$\mathbf{y} = \mathbf{W}\mathbf{y} + \phi\mathbf{V}\mathbf{y} + \mathbf{X}\beta + \boldsymbol{\varepsilon}, \tag{1}$$

$$\mathbf{W} = \sum_{r=1}^{R} \rho_r \mathbf{W}_r, \tag{2}$$

where $\mathbf{y}$ is a vector of the dependent variable, ρ_r the coefficients on spatial lags, $\mathbf{W}_r$ the $NT \times NT$ matrices whose elements represent the weighted relationship between i and j, φ the coefficient on the first-order temporal lag $\mathbf{Vy}$, $\mathbf{V}$ the $NT \times NT$ matrix with 1's on the minor diagonal and 0's elsewhere, $\mathbf{X}$ the NT matrix of k exogenous state-level covariates, β the vector of coefficients, and while $\boldsymbol{\varepsilon}$ is a vector representing random error. Spatial autocorrelation is accounted for by the disturbance in the lagged dependent variable weighted by the connectivity matrices (contiguity, rivalry, trade, joint memberships in economic IGOs, and regime similarity), whereas temporal autocorrelation is captured by the lagged dependent variable.

The effect of geographical diffusion on state i's tax extraction, ρ_{contig}, for instance, is modeled as a parameter on the average tax ratio of state i's contiguous geographic neighbors, by multiplying the geographical contiguity matrix W_{contig} by a vector of the dependent variable values $\mathbf{y}$. Thus, Tunisia's tax extraction, for example, is modeled as a function, in part, of the average tax extraction of Tunisia's geographical neighbors of Libya and Algeria, whereas Libya's tax extraction, in turn, is a function of the average tax extraction of Tunisia, Algeria, Nigeria, Chad, Sudan, and Egypt. Notably, the model allows for indirect spatial effects: Tunisia's tax extraction is also indirectly a function of it's neighbors' neighbors, that is, Egypt's tax extraction affects Tunisia through Libya, and vice versa. Finally, Tunisia's tax extraction is also a function of its own tax extraction, directly through a temporal lag, and indirectly through the feedback loop, in which Tunisia affects its neighbors, who then affect Tunisia back. The effect reverberates through these feedback loops, decreasing with magnitude over time and with distance in the spatial connectivity matrix, until the system reaches equilibrium. The spatial connectivity matrices, in other words, operate as a straightforward way to capture state i's dependence on the outcomes of other states: that is, how sensitive a state is to interdependence (for a more in-depth discussion of the model, see Anselin 2003; Beck, Gleditsch and Beardsley 2006; Franzese and Hays 2007b; Franzese and Hays 2008; Hays, Kachi and Franzese 2010).

We include 137 countries in our analysis from 1960 to 1999, yielding 4098 non-missing observations. The dependent variable represents a state's fiscal capacity and is consistent with the predatory state theory used here. We measure fiscal capacity as *tax ratio*, which is a state's tax revenue as a percent of GDP. This measure reflects the ability of the state to extract resources from its citizens. The tax ratio is obviously a rough proxy for state fiscal capacity. It is the only measure for which data is available for a large number of countries. Data reflecting the

composition of the tax ratio is incomplete—especially for developing countries. Ideally, we would assess predatory theory using data on direct taxes, as the theoretical expectation is that individuals bargain with the ruler over their payment for protection. Unfortunately, this data is just not available for most countries. The total tax take represented by the tax ratio is often the only available measure, and has become the standard in the predatory theory literature (Campbell 1993; Cheibub 1998; Thies 2005; Thies 2010).

Our primary independent variables represent the causal mechanisms by which external factors influence state's tax extraction capabilities: coercion, competition, learning, and emulation. These are operationalized as interstate rivalry and territorial contiguity (direct and soft coercion), trade networks (competition), shared economic IGO membership (learning), and political regime similarity (emulation). We treat each of these variables as a spatial lag in order to appropriately test their theorized effects. This means, for example, that each spatial variable is an $N \times N$ matrix whose cells represent the number of shared economic IGO memberships between states i and j.

Territorial *contiguity* is measured as a dichotomous variable where 1 indicates that states share a land border and 0 otherwise. *Rivalry* is measured using the *enduring rivalry* variable taken from Klein, Goertz and Diehl (2006). According to the dichotomous coding of this variable, *rivalry* is an ongoing, conflictual bilateral relationship that includes at least six militarized disputes over at least a 20-year period. *Trade* is measured as bilateral trade flows between two countries and is obtained from Barbieri, Keshk and Pollins (2008). Joint membership in an *economic IGO* is treated as a binary variable, which is coded as 1 if both states are members and 0 otherwise. IGO membership data is obtained from Pevehouse, Nordstrom and Warnke (2004) and IGO type from Boehmer, Gartzke and Nordstrom (2004). Each of these variables is row standardized, giving greater weight to states with which state i interacts more frequently (Plümper and Neumayer 2010). Finally, in order to provide a realistic test of the emulation mechanism, we disaggregate regime similarity into seven categories. Recent work demonstrates substantial variation among regimes that is not captured using blunt coding instruments, such as whether a state is a democracy or not (Lai and Slater 2006; Chyzh 2014). We use Banks' (2011) study and Polity (Marshall and Jaggers 2008) to construct two types of democracy—*presidential* and *parliamentary*—and four types of autocracy—*monarchy*, *military*, *single-party* and *personalist dictatorships*, and *other*.[3] Political *regime similarity* is coded as 1 if two states share the same regime type, and as 0 if they do not or are coded as *other*.

In order to test for interstate diffusion, we must isolate or control for the alternative causes of spatial clustering, such as common exposure—similar unit-level response to the same stimuli—and homophily—self-selection by similar units into similar treatments (Hays, Kachi and Franzese 2010). We account for common exposure by (1) including a number of monadic state-level variables that are typically used to explain a state's capacity for tax extraction, (2) by estimating a model with country fixed effects, and (3) capturing temporal clustering by including a lagged dependent variable and an annual control for global oil prices.

We include a number of monadic state-level variables that are typically used to explain a state's capacity for tax extraction, which are gathered from Thies (2010). Each variable is

[3] We treat a state as democratic if it has a score of 7 or greater on the *Polity2* variable of the Polity IV data set. To separate democracies into *presidential* or *parliamentary*, we rely on Banks' measure of whether a president or member of the legislature operates as the head of government. Autocracies are coded using Banks' measure of whether they are ruled by a monarch, the military, or are a dictatorship. We further separate dictatorships into *single-party* when the regime scores 3 or greater on the *executive constraints* variable of the Polity IV dataset, and *personalist* otherwise (Lai and Slater 2006). Finally, when a state does not fit into any of the previous categories, they are coded as *other*.

obtained from Fearon and Laitin (2003), unless otherwise noted. *Trade openness* measures a state's imports and exports as a percent of GDP. *Civil war* is coded as 1 if a state is currently engaged in a civil war and 0 otherwise. *Debt* measures the amount of guaranteed government debt that a state has as a percent of GDP. *Inflation* is the log of price deflator for GDP. *Agriculture* is measured as agriculture value added as a percent of GDP. *Foreign aid* is official development assistance that a state receives as a percent of GDP. *Federalism* is a dichotomous variable that is 1 when a state's subnational units have extensive taxing, spending, or regulatory authority (Beck et al. 2001). *Income/capita* is measured in thousands of 1985 US dollars. *Ethnic* and *religious fractionalization* is the probability that two randomly chosen individuals within a state belong to different ethnic–linguistic or religious groups. *New state* is a dichotomous variable coded as 1 if a state is in its first or second year of independence. *Instability* is a binary measure, which is coded as 1 if a state experiences a change of 3 or more in its polity score within the last three years. *Oil* is coded as 1 if a state receives one-third of its export revenues from oil and 0 otherwise. Finally, in contrast to Thies (2010), we include each of the regime types described above, using *parliamentary democracy* as the reference group. We include these as they are constitutive parts of the *regime similarity* measure. Moreover, including a more refined measure of regime type may help uncover why previous studies of state capacity and democracy have produced mixed results.

Country fixed effects are a more stringent tool to separate spatial diffusion from domestic-level sources of spatial clustering on the dependent variable. In particular, country dummy variables help capture possible unobservable similarities, such as culture, that may also be highly correlated with geographical proximity or other of our primary independent variables. Despite the strong leverage of controlling for country-level sources for spatial clustering, the obvious disadvantage of using country fixed effects is in the resulting limitations on cross-sectional inference: by "dummying out" individual countries, fixed effects also discard from the analysis any observations with no temporal variation in the domestic-level variables (Beck and Katz 2001). This may be particular problematic for drawing inferences regarding institutional variables, such as regime type and federalism, that tend to exhibit high degrees of stability. Therefore, while our primary empirical models include country fixed effects, we also include a specification without fixed effects.

Finally, we account for the temporal dependence in our data in two ways. We model temporal shocks by controlling for global annual oil prices, measured as price per barrel of crude oil, in 2009 USD. In addition, we model temporal clustering, or over-time continuity in the levels of tax extraction, by including a one-year temporal lag of the dependent variable (ChartsBin Statistics Collector Team 2014). Although not a perfect solution, temporal lag also helps account for homophily or the possibility that countries with similar tax-extraction policies tend to join similar economic IGOs, trade with one another, or even build similar domestic regime institutions. Although self-selection presumes policy continuity among already similar units (i.e., states with high tax extraction self-select in the same economic IGOs), controlling for last year's tax extraction helps model this continuity, ensuring that our resulting inferences capture fluctuations in tax revenues (i.e., states that are self-selected into the same economic IGOs also exhibit similar fluctuations in tax revenues), rather than their continuity.[4] Summary statistics of all variables are presented in Table 1.

EMPIRICAL ANALYSIS

The results of the empirical analysis are presented in Table 2. To get a closer look at the spatial dynamics posited in the theory, we first estimate a series of models (Models 1–5) that include

[4] For similar approaches to capturing homophily, see Hays, Kachi and Franzese (2010) and Pevehouse (2002).

TABLE 1 *Summary Statistics*

Variables	Mean	SD	Minimum	Maximum	Observations
DV: Tax ratio	0.157	0.087	0.002	1.185	4098
Trade openness	0.629	0.419	0.008	4.253	4098
Civil war	0.167	0.373	0	1	4098
Debt	0.289	0.486	0	8.234	4098
Inflation	0.148	0.336	–0.345	5.593	4098
Agriculture	0.214	0.164	0.002	0.78	4098
Foreign aid	0.054	0.135	–0.012	2.783	4098
Federalism	0.169	0.375	0	1	4098
Income/capita	0.884	1.074	–1.537	3.951	4098
Ethnic fractionalization	0.412	0.29	0.004	0.925	4098
Religious fractionalization	0.366	0.22	0	0.783	4098
New state	0.008	0.087	0	1	4098
Instability	0.147	0.355	0	1	4098
Oil	0.142	0.349	0	1	4098
Presidential democracies	0.123	0.328	0	1	4098
Monarchy	0.063	0.243	0	1	4098
Military regime	0.169	0.375	0	1	4098
Single-party regime	0.231	0.422	0	1	4098
Personalist regime	0.134	0.34	0	1	4098
Other regime	0.046	0.209	0	1	4098
Global oil price	34.84	23.369	9.94	95.89	4098
Spatial weights					
Contiguity	0.008	0.061	0	1	442,080
Rivalry	0.003	0.048	0	1	442,080
Regime similarity	0.009	0.021	0	0.333	442,080
Trade	0.009	0.039	0	1	442,080
Economic IGOs	0.009	0.004	0	0.045	442,080

IGOs = intergovernmental organizations.

the spatially lagged dependent variables one by one (along with the control variables and country fixed effects).[5] We then run a combined model including all five spatial lags (Model 6). Finally, we include a full model without country fixed effects (Model 7). It is important to note that the coefficients on spatial lags represent the instantaneous, pre-dynamic effects (i.e., the effects in the absence of spatio-temporal feedback) (Franzese and Hays 2007b). The dynamic effects created by the "feedback loops" of the spatial and temporal lags are explored using counterfactuals and simulation methods following the discussion of the initial results.[6]

In order to evaluate our causal mechanisms, we need to look at the top part of the table that displays the temporal and spatial lags. First, the temporally lagged dependent variable is always positive and statistically significant. This suggests high levels of path dependency within the data, that is, the rates of tax extraction in the previous year are positively correlated with the rates in the current year. This result provides face validity to the empirical analysis, highlighting the expected trend. The result is also important because it means that spatial effects will re-enter the equation through the temporal lag, exercising a continuing effect on the dependent variable even after the initial time period. This effect will become more evident, as we present and discuss the predicted marginal effects graphs.

[5] Country fixed effects are included to account for unit-level heterogeneity. Estimates from each spatio-temporal model are stationary ($\varphi + \rho < 1$).

[6] Simulations are an alternative tool to the delta method for examining dynamic spatial feedback among units. With sufficient iterations, simulations provide more precise results than the delta method.

TABLE 2 *Multi-Parametric Spatio-Temporal Autoregression on Tax Ratio, 1960–1999*

Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	No
Temporal lag	0.744 (0.010)***	0.749 (0.010)***	0.749 (0.010)***	0.747 (0.010)***	0.747 (0.010)***	0.743 (0.010)***	0.881 (0.007)***
Contiguity spatial lag	0.047 (0.012)***					0.039 (0.012)***	0.026 (0.007)***
Rivalry spatial lag		0.021 (0.011)*				0.014 (0.011)	0.006 (0.007)
Trade spatial lag			0.002 (0.028)			–0.018 (0.029)	0.028 (0.019)
Economic IGOs spatial lag				0.045 (0.015)***		0.030 (0.016)*	0.024 (0.015)
Regime similarity spatial lag					0.050 (0.028)*	0.016 (0.030)	–0.024 (0.030)
Trade openness	0.008 (0.004)**	0.008 (0.004)**	0.008 (0.004)**	0.008 (0.004)**	0.008 (0.004)**	0.008 (0.004)**	0.004 (0.002)**
Civil war	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	–0.002 (0.002)
Debt	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	–0.001 (0.001)
Inflation	0.005 (0.002)**	0.004 (0.002)**	0.004 (0.002)**	0.004 (0.002)**	0.004 (0.002)**	0.004 (0.002)**	0.002 (0.002)
Agricultural development	–0.036 (0.012)***	–0.037 (0.012)***	–0.037 (0.012)***	–0.034 (0.012)***	–0.035 (0.012)***	–0.035 (0.012)***	–0.031 (0.007)***
Foreign aid	–0.061 (0.007)***	–0.060 (0.007)***	–0.060 (0.007)***	–0.061 (0.007)***	–0.060 (0.007)***	–0.062 (0.007)***	–0.023 (0.005)***
Federalism	–0.002 (0.003)	–0.001 (0.003)	–0.001 (0.003)	–0.001 (0.003)	–0.001 (0.003)	–0.001 (0.003)	–0.003 (0.002)
GDP/capita	0.001 (0.003)	0.002 (0.003)	0.002 (0.003)	–0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	–0.005 (0.001)***
Ethnic fractionalization	0.037 (0.053)	0.033 (0.053)	0.032 (0.053)	0.030 (0.053)	0.033 (0.052)	0.035 (0.052)	–0.001 (0.002)
Religious fractionalization	–0.060 (0.036)*	–0.048 (0.036)	–0.050 (0.036)	–0.052 (0.036)	–0.051 (0.036)	–0.058 (0.036)	0.004 (0.003)
New state	–0.007 (0.006)	–0.009 (0.006)	–0.009 (0.006)	–0.006 (0.006)	–0.008 (0.006)	–0.006 (0.006)	0.002 (0.006)
Instability	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)
Oil	–0.012 (0.003)***	–0.012 (0.003)***	–0.012 (0.003)***	–0.012 (0.003)***	–0.012 (0.003)***	–0.012 (0.003)***	–0.001 (0.002)
Presidential democracies	0.005 (0.004)	0.005 (0.004)	0.005 (0.004)	0.004 (0.004)	0.007 (0.004)	0.006 (0.004)	–0.005 (0.002)**
Monarchy	–0.007 (0.008)	–0.007 (0.008)	–0.007 (0.008)	–0.007 (0.008)	–0.006 (0.008)	–0.007 (0.008)	–0.007 (0.003)**
Military regime	0.003 (0.004)	0.002 (0.004)	0.003 (0.004)	0.002 (0.004)	0.005 (0.004)	0.003 (0.004)	–0.007 (0.003)***
Single-party regime	0.003 (0.004)	0.002 (0.004)	0.003 (0.004)	0.003 (0.004)	0.004 (0.004)	0.004 (0.004)	–0.004 (0.002)**
Personalist regime	–0.001 (0.004)	–0.002 (0.004)	–0.002 (0.004)	–0.002 (0.004)	0.001 (0.004)	–0.001 (0.004)	–0.007 (0.003)***
Other regime	–0.001 (0.005)	–0.002 (0.005)	–0.002 (0.005)	–0.001 (0.005)	0.007 (0.007)	0.002 (0.007)	–0.012 (0.006)**
Global oil price	0.001 (0.001)	0.001 (0.001)*	0.001 (0.001)*	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Constant	0.035 (0.009)***	0.036 (0.009)***	0.037 (0.010)***	0.036 (0.009)***	0.030 (0.010)***	0.034 (0.011)***	0.025 (0.006)***
Sigma	0.033 (0.001)***	0.033 (0.001)***	0.033 (0.001)***	0.033 (0.001)***	0.033 (0.001)***	0.033 (0.001)***	0.035 (0.001)***
Log-likelihood	8186.632	8180.480	8178.700	8183.203	8180.280	8190.141	7982.468
Observations	4098	4098	4098	4098	4098	4098	4098
Countries	137	137	137	137	137	137	137

Note: coefficients reported with standard error in parentheses. Fixed effects coefficients are suppressed.
IGOs = intergovernmental organizations.
*p < 0.1, **p < 0.05, ***p < 0.01.

Second, in the first five models of Table 2, each of the spatial lags, with the exception of *trade*, is positive and statistically significant. In the combined model with country fixed effects, however, only *contiguity* and *economic IGOs* are positive and statistically significant. Finally, in the model without country fixed effects, only *contiguity* is positive and statistically significant. The differences in statistical significance between the models suggest overlap and a degree of substitutability among the spatial connectivity matrices, even despite the mathematically low correlations among them.[7] Each spatial lag included in isolation may be picking up the effects of the other omitted spatial lags. Theoretically, this suggests that the five types of international connectivity explored here may act in a complementary manner.

The statistically significant coefficient on *contiguity* is consistent with the expectations of the soft coercion hypothesis: states converge in their level of fiscal capacity, as a result of the latent competition (military or other) with their geographical neighbors. The statistically significant effect on *economic IGOs* in Models 4 and 6 also provides some support for the learning mechanism, which postulates that governments both share and acquire important information on tax policy innovations through IGOs, either directly (IGOs serve as teachers of policy innovations) or indirectly, from IGO-facilitated interaction with elites from more fiscally successful states. Neither *rivalry*, *regime similarity*, nor *trade* is statistically significant, once other forms of interdependence are accounted for, that is, there is no support for the competition and emulation mechanisms.

Turning to the monadic variables in the bottom half of the table, it is worth noting that the control variables replicate the existing literature. *Trade openness* and *inflation* are positive and statistically significant across all models, whereas *agricultural development*, *foreign aid*, and *oil* are negative and statistically significant across all models. Interestingly, *global oil price*, the variable capturing common shocks, is statistically insignificant. This result suggests that common shocks exert little additional impact on a state's extractive capacity (beyond that already captured in the model, as a result of standardizing the dependent variable by GDP).

One important point to discuss here is, however, the disaggregated effect of regime type. Model 7, the model without country fixed effects, shows that the effects of all regimes (including *presidential democracies*) are negative and significant compared with *parliamentary democracies*. Moreover, post-estimation Wald χ^2 tests reveal that there is no statistical difference between any of the other groups, including between presidential democracies and any of the autocracies. This is consistent with the comparative literature, which often notes that presidential democracies act similar to autocracies (e.g., Linz 1990; O'Donnell 1994). This result suggests that parliamentary democracies drive the positive effect associated with democracy in previous work and highlights the importance of using a more refined theoretical and conceptual definition of regime type. Note that the regime effects are no longer statistically significant in Models 1–6, which include country fixed effects. This is easily explained, as the low levels of regime variation within countries makes regime type highly correlated with country effects (Beck and Katz 2001; Plümper and Troeger 2007).

An advantage of our estimation approach is that it permits investigation of spatio-temporal feedback dynamics. The spatial variables enter the model as the coefficients on the average effects of state *i*'s geopolitical neighbors' values on the dependent variable. This means that the spatial lags operate as feedback loops that channel the effect of the states that state *i* is connected to, exhibiting non-linear effects on the dependent variable.

In order to assess the overall effect of the spatial lags, we construct two separate counterfactuals. In each of the counterfactuals, we select a suitable country and shock one of its

[7] The spatial weights matrices are not highly correlated, the highest and the only correlation that is >0.2—between contiguity and rivalry—is $r = 0.27$.

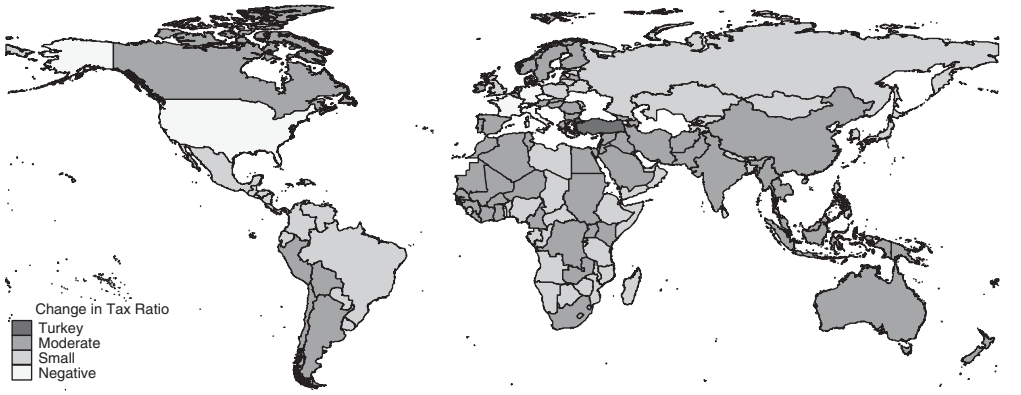

Fig. 1. Predicted long-term cumulative changes in tax revenue, resulting from a 1 SD counterfactual shock to economic development (decrease in agriculture) in Turkey

independent variables, while holding all other variables at the values they exhibited in the last year for which the data is available. We then calculate the difference between the predicted value of the dependent variable between the counterfactuals with and without a shock. This allows us to explore the cumulative effects of such shocks on spatial dynamics: (1) the direct effects transmitted via a state's own connectivities, as well as (2) the indirect effects channeled through the connectivities of the second degree and beyond.

For the first counterfactual, we give a permanent $20 billion (1 SD) decrease to Turkey in agriculture/GDP. Without changing Turkey's GDP, this reduction represents an increase in economic development, as greater levels of agriculture as a percent of GDP are associated with lower levels of industrialization and economic development (Gollins, Parente and Rogerson 2002). We selected Turkey as the counterfactual country because it has an abnormally high level of agriculture/GDP compared with neighboring states, which means that a $20 billion change would not be altogether surprising. Moreover, the 1 SD change is panel specific to Turkey, meaning that Turkey has undergone similar variation within the sample.

Using a spatio-temporal approach, we can calculate the predicted cumulative long-run effect of this shock on Turkey, as well as the effects on its neighbors, such as Greece and Syria, via the feedback mechanisms, over a 20-year period (see Figure 1). In Figure 1, greater increases in *tax ratio*, in response to the shock to Turkey, are represented by darker shades of gray. The 20-year period roughly corresponds to the point in time when the effect from the initial shock returns to its long-run steady state, or long-run equilibrium. Note that one can think of the predicted cumulative long-run effects in terms of the best responses or optimal policy outcome in neighboring states, given the permanent change in Turkey (Franzese and Hays 2008, 746).

In accordance with the estimates of our model (Model 6), this shock leads to a rather large increase in Turkey's tax revenue (*tax ratio*)—a $2.78 billion (1.11 percentage points) increase over the 20-year period. Note, that as a result of the feedback loops described above, the increase for Turkey also includes its own response to the changes it caused in its neighboring states, as the shock reverberates back and forth through a network of states. As shown in Figure 1, the shock also leads to changes in a number of other states connected to Turkey. Greece and Syria, contiguous neighbors of Turkey, increase their tax revenue (*tax ratio*) by $55 million (0.046 percentage points) and $8.3 million (0.044 percentage points), respectively.

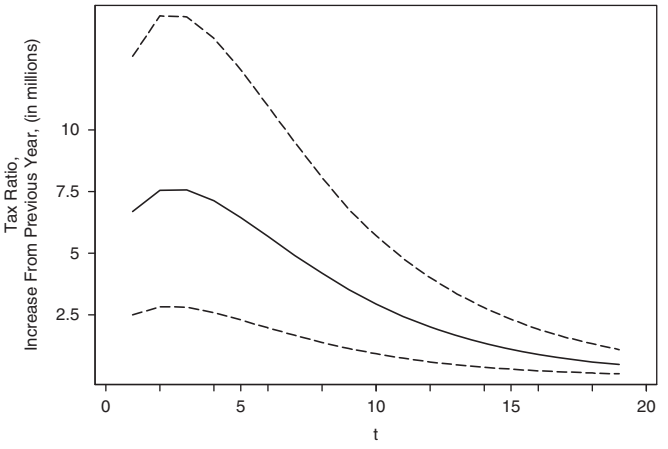

Fig. 2. Spatio-temporal effects on tax ratio in Greece from a 1 SD counterfactual shock to economic development (decrease in agriculture) in Turkey
Note: dashed lines represent 90% confidence interval.

Interestingly, even states that are geographically distance are impacted through the other forms of political space. This is evident by Australia, which shares 14 economic IGOs with Turkey, experiencing a $18.8 million (0.005 percentage point) increase in tax revenue (*tax ratio*).

On the theoretical level, we can think of a negative shock to Turkey's agricultural production, holding GDP constant, as leading to an improvement in Turkey's tax extraction (e.g., it is easier for government to tax industries than agricultural areas because of more professional accounting, higher spatial concentration in the cities, etc.). Improvements in Turkey's tax revenues, in turn, affect its neighbors, who do not want to fall too far behind, owing to the competition induced via (soft) coercion. An improvement in Turkey's tax extraction similarly affects other states with whom Turkey comes in frequent interaction on the international level (e.g., its economic IGO partners). States, whose elites interact with those of Turkey through international economic IGOs, are more likely to adopt or mimic successful policies from Turkey, because frequent interaction keeps them up to date on Turkey's economic policies and progress. This effect is larger for states with larger overlaps in economic IGO memberships. Policy changes in Turkey, for example, exert more influence on Australia, who shares 14 of its 1133 joint IGO memberships with Turkey, than on more geographically proximate states, such as Germany (16/1398) and France (18/1558);[8] that is, Turkey carries more relative weight for policies related to tax extraction for Australia than it does for either Germany or France.

To further illustrate, Figure 2 presents the changing temporal effect of this shock to Turkey on Greece. The y-axis represents the change in Greece's *tax ratio*, or its extractive capabilities, from the previous year given the shock to Turkey, whereas the x-axis represents the number of years since the initial shock. As GDP is held constant in this illustration, this increase can be attributed

[8] The number of joint IGO memberships between two states is the total number of IGOs in which both states are members partners. For example, according to the Correlates of War IGO dataset, Australia has 131 joint IGO memberships through the WTO in 1999, for example, one of which is with Turkey. Overall, Australia has a total of 1133 joint economic IGO memberships with all states in the dataset, 14 of which are with Turkey. As *economic IGOs* is row standardized in the analysis, the measure captures weighted influence of the number of shared memberships of i and j as a proportion of i's total number of shared memberships.

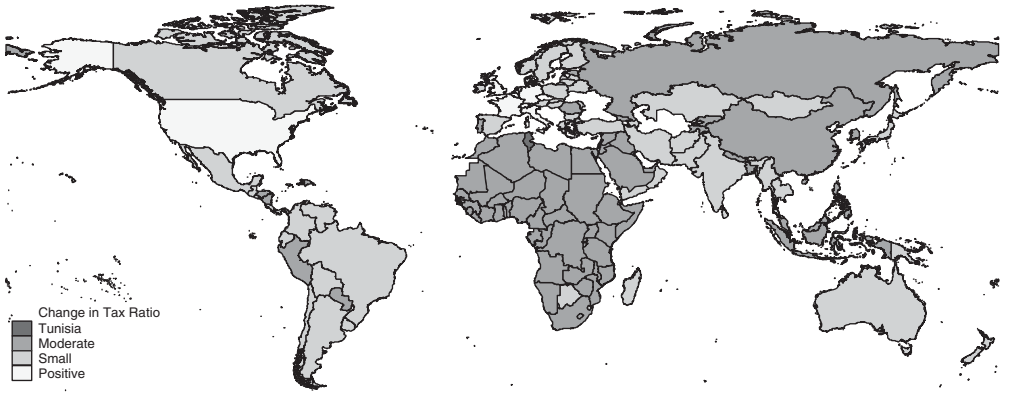

Fig. 3. Predicted long-term cumulative changes in tax revenue, resulting from a 1 SD counterfactual shock (increase) to Tunisia's foreign aid

solely to tax extraction.[9] We can see that the shock produces a relatively large initial effect, which increases in the first three time periods before moderating and gradually decreasing back to 0, or reaching the long-run equilibrium. The cumulative effect of these changes, of course, results in the aforementioned permanent 0.046 percent point increase in Greece's *tax ratio*. Although relatively small, it is important to keep in mind that this change is the isolated effect of the spatio-temporal feedback from the shock to just one neighboring country.

In the second counterfactual, we investigate the effects of a permanent $50 million (13.6 percent) increase in foreign aid to Tunisia, which translates into a 2.427 percentage point increase in the amount of its foreign aid as a percent of GDP. We select Tunisia because it is the state whose democratization initiated the Arab Spring in 2011, triggering an increase in foreign assistance from the United States and other donors. This, as well as the continued instability within the region, makes Tunisia a suitable choice for our counterfactual example.

We again calculate the predicted cumulative long-run effect of this shock on Tunisia, as well as a sample of its neighbors, over a 20-year period (see Figure 3). In Figure 3, darker shades represent states that have undergone the largest decrease in tax revenue (*tax ratio*) in response to the shock to Tunisia. As was the case in the previous example, the 20 years reflects the approximate amount of time before the effect of the initial shock dissipates, and *tax ratio* returns to its long-run steady state. Tunisia experiences a $12 million (0.058 percentage point) decrease in tax revenue (*tax ratio*), whereas its contiguous neighbors, Algeria and Libya, suffer a $3.8 million (0.007 percentage point) and $2.7 million (0.006 percentage point) drop, accordingly. As was the case with Turkey, Tunisia experiences both direct and indirect effects from the initial shock, as it responds to the changes in its neighboring states as the shock feeds back through the network of states with whom it share borders and memberships in economic IGOs. Interestingly, this example highlights that an effect can be negative, as other states can essentially face less pressure in regards to their own extractive practices, given the weakening of a neighboring state.

Theoretically, a positive shock to Tunisia's foreign aid also has wide-ranging effects. An increase in foreign aid provides additional disposable funds to the Tunisian government, relaxing pressure to extract revenue from its population. As a result, the government becomes

[9] All economic variables in the model are standardized by GDP; therefore, GDP is held constant in the counterfactuals.

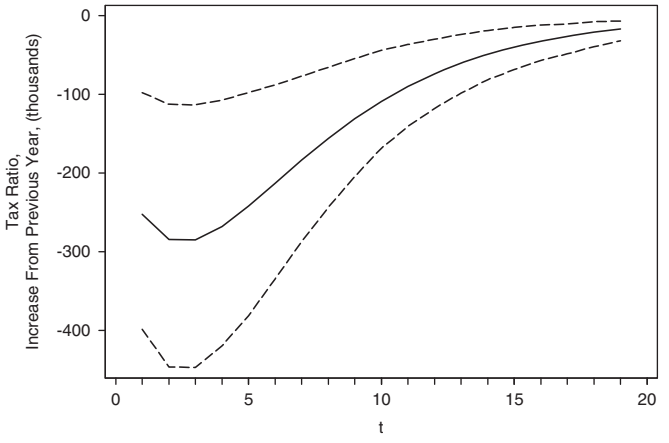

Fig. 4. Spatio-temporal effects on tax ratio in Libya from a $50 million counterfactual shock to foreign aid in Tunisia
Note: dashed lines represent 90% confidence interval.

more willing to grant exemptions (or less willing to enforce current tax law) to its constituents. This change in Tunisian tax extraction has implications for other states, especially those with frequent interaction with Tunisia (e.g., through economic IGOs). Investors and traders group these states within the same reference category as Tunisia in terms of development or economic risk. States that fall within the same reference category, such as China and Russia, must compete with the now more lax Tunisian policies. Although not its geographical neighbors, both of these states are in rather frequent interaction with Tunisia, with China sharing with Tunisia nine of its total 1166 joint memberships in economic IGOs, the corresponding number for Russia being 10/1181, and only 12/1566 for the more geographically proximate Italy.

To better investigate the temporal element of the feedback loop, we examine the effect of a shock on Tunisia's foreign aid on Libya's extraction capacity in Figure 4. As was the case above, we find that the effect of the shock is relatively strong in the first time period, increases in periods 2 and 3, before gradually dissipating until it reaches the long-run equilibrium and returns to 0.

Although the raw values of the substantive effects are rather small, it is important to remember that they represent just the *isolated* effects of a relatively small shock on only one covariate in a single country. Such isolated cases of a country undergoing economic development are, in reality, quite rare. The literature shows that economic and political shocks tend to cluster in both time and space (e.g., the Asian Tigers, democratic waves), which suggests that the observed cumulative effects of these shocks would likely be much larger.

CONCLUSION

We build on the predatory theory of state administrative development by positing and exploring several causal mechanisms acting on a state from outside of its borders: coercion, competition, learning, and emulation, that operate to channel information through interstate rivalries, territorial contiguity, trade networks, and the political space associated with regime similarity and IGO membership. We test our predictions using a multi-parametric spatio-temporal autoregressive model with five spatial lags capturing the theoretical mechanisms. We find

support for the two of the four mechanisms. First, our empirical results indicate that states respond to the policy outcomes in their contiguous neighbors: a state that finds itself in a neighborhood of states with growing fiscal capacity tends to respond by adopting the policies that increase its own capacity. Such geographical clustering of states with similar levels of extractive capacity suggests support for the soft form of coercion—our first causal mechanism.

Second, we find that states tend to respond to fiscal policy changes of their economic IGO partners: there is a direct relationship between the extractive capacity of states with shared membership in economic IGOs. This provides support for the learning mechanism that views the role of IGOs as the legitimizers of policy models for their members and the source of information regarding the consequences of particular policies.

Our results also have important policy implications, especially in the area of developmental assistance. We show, for example, that exogenous shocks to a state's development, such as an increase in foreign aid, affect more than just the recipient state. Operating through feedback loops created by the spatio-temporal lags, these shocks also affect countries that are connected to the recipient, either through territorial contiguity or shared IGO membership. Our results suggest, therefore, that the spillover effects must be taken into account in decisions regarding aid allocation. The potential negative externalities associated with the spatial effects of developmental aid may undermine the strategic considerations of the donor.

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