

All Policies Are Glocal: International Environmental Policymaking with Strategic Subnational Governments

Online Appendix

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This appendix provides more detailed results and a discussion of limitations, extensions, and scope conditions.

1 Interdependence between Subnational Policymakers: Policy Balancing

Since subnational policy choices in both countries affect the outcome of international negotiations over environmental governance, subnational policymakers will anticipate these effects and choose strategic subnational policies to achieve a more favorable outcome. This leads to a mechanism that we label cross-country policy balancing. To provide an illustration of this mechanism Figure 1 shows how subnational policy choices in one country (A) respond to variation in the number of brown subnational authorities and the total number of subnational policymakers in the *other* country (B).¹

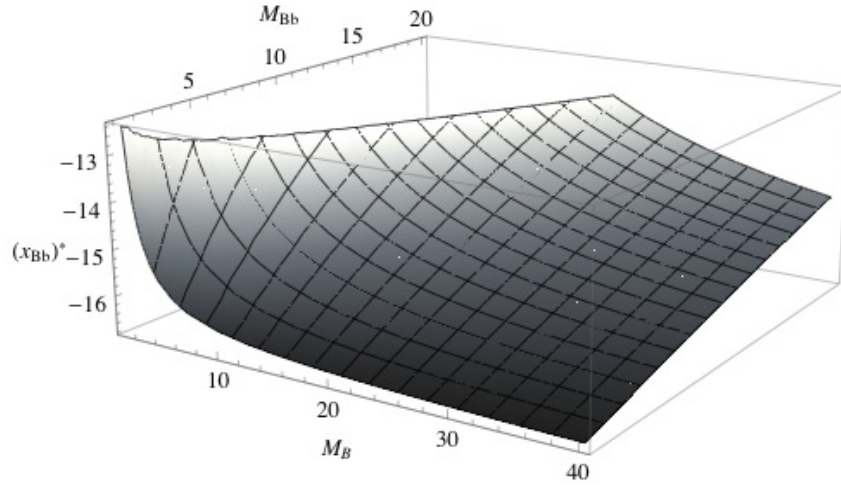
As the number of brown subnational policymakers in B increases, a subnational policymaker in country A counterbalances the increase's downward-pulling effect on the international treaty by adopting a greener policy. As shown in Figure 1, the optimal subnational policy depends on the total number of subnational policymakers in country B in a non-linear way. If this number is low, increasing the number of brown policymakers in B leads subnational policymakers in country A to change the level of subnational environmental policy more drastically than if the total number is high. This relationship reflects strength in numbers. For a large number of subnational policymakers, a given change in environmental policies adopted by brown policymakers has a smaller effect on the policy preferred by that nation's government at the international level than if the total number of subnational policymakers is low. This results in smaller effects on the international

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¹We have set all other parameters at what appear reasonable values. Since the number of brown subnational policymakers is always less or equal to the total number of subnational policymakers, the domain of the function is restricted at $M_{B,b} \leq M_B$.

Figure 1: Transboundary Strategic Policy by Brown Subnational Policymakers



Note: The figure shows the optimal strategic policy of a brown subnational policymaker in country B (vertical axis) as a function of the number of brown subnational policymakers in country B , $M_{B,b}$, and the total number of subnational policymakers in B , M_B . The other parameters have been set as follows: $b = -10, g = 10, y_A = -20, y_B = 20, x_{A,b} = x_{B,b} = -10, x_{A,g} = x_{B,g} = 10, M_A = 30, M_{A,b} = 20$. The domain of the function is restricted at $M_{B,b} \leq M_B$.

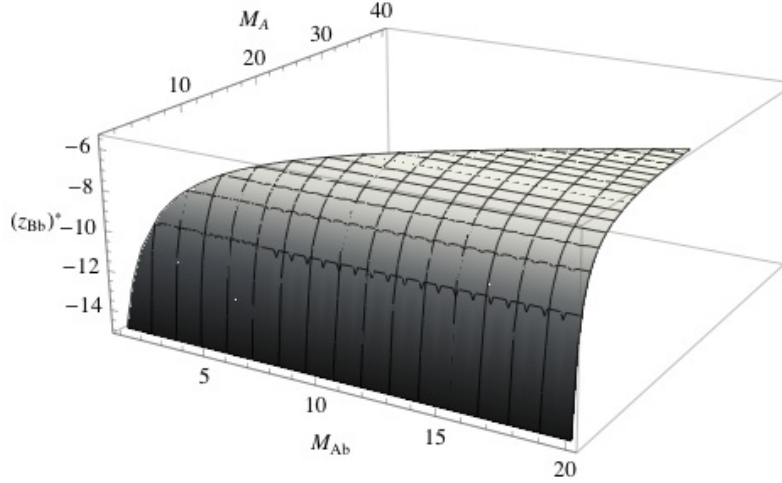
bargain, which in turn reduces the incentive to subnational policymakers in the other country to counterbalance changes in policy. In our numerical simulation, with five local policymakers in B , increasing the number of brown subnational policymakers from one to five increases subnational environmental policies in country A by about 3 points (from -16 to -13). With 20 subnational policymakers, the same change leads to a reduction by approximately one point (from -16.6 to -15.8).

We can also illustrate the within-country interdependence between subnational and international policymaking through the impact of the number of subnational policymakers on the national governments' preferred level of international policy brought to the negotiations. Figure 2 shows how the preferred international treaty changes in response to variations in M_A and $M_{A,b}$. We set all other parameters at the same values as in the previous simulation. Since the number of brown subnational policymakers is always less or equal to the total number of subnational policymakers, the domain of the function is again restricted at $M_{B,b} \leq M_B$.

Given this setup, the total number of subnational policymakers plays a major role and again enters the function nonlinearly, indicating strategic interaction. With more subnational policymakers in A , the national government prefers a higher level of international policy. This relationship decreases considerably in strength as M_A reaches higher levels.

In some political systems, constitutional or governmental constraints suggest an *a priori* restriction of the set of policies from which subnational authorities can choose. This resembles a special case of the more general theory we have presented. For example, a national government may set a certain level of regulation that then constitutes a lower bound for state-level regulations. Such a lower bound would obviously reduce brown subnational policymakers' ability to strategically *underregulate*, i.e., to fall below the level of federal regulation. It does not, however, prevent strategic *overregulation*. Thus, such a lower bound empowers subnational policymakers that prefer high-regulating policies. If only one of the two countries that engage in international treaty negotiations has such a lower bound, subnational authorities in the country without this restriction will

Figure 2: National Government's Policy Position at the International Negotiation Stage and the Number of Subnational Policymakers



Note: The figure shows the national government's policy position in country B (vertical axis) as a function of the total number of subnational policymakers, M_A and the number of brown subnational policymakers, $M_{A,b}$. The other parameters have been set as follows: $b = -10, g = 10, y_A = -20, y_B = 20, x_{A,b} = x_{B,b} = -10, x_{A,g} = x_B = 30, M_B = 30$. The domain of the function is restricted at $M_{A,b} \leq M_A$.

have relatively more influence on national policy and therefore on international treaty outcomes. For national government that hold a relatively brown (green) ideal policy, such a lower bound may consequently constitute a disadvantage (advantage) at the international negotiation stage.

2 Limitations and Extensions

Lower Bounds on Policy Choices and the Putnam Conjecture

In some circumstances the national policy may be regarded as a “floor” below which subnational regulations must not fall. In the United States, for instance, the Clean Air Act mandates a minimal air pollution regulation for all states. To uphold a minimum degree of generality, our main model does not impose such a constraint. Including a lower bound on policy then represents a special case of our general model. If we included such a constraint, then opponents of stringent regulation would lose some of their ability to influence the national government's bargaining position on the international level. Yet proponents of stringent regulation would continue to behave strategically, and thus the empirical expectations would remain largely aligned with our current propositions. In this regard, the absence of a floor constraint is an innocuous simplification of the more general model we develop and analyze for which a lower bound on strategic underregulation presents a special case.

Relatedly, one might ask under which conditions having subnational actors advancing their own policies as this allows benefits the national government by allowing him to extract greater concessions. As Mo (1994) has shown for Putnam's canonical two-level model, the precise conditions under which the national government succeeds in extracting greater concessions depends on the relative preference configurations of both national and the subnational policymakers. While our model focuses on the policymaker's induced preferences that depend on the number and ideal points

of subnational governments, the national policymaker may gain bargaining leverage from subnational policymakers with relatively extreme preferences; for example, an environmentally-oriented government could benefit from new high-regulating policymakers in each country. At the same time, however, the national government will suffer utility losses due to subnational policy changes that deviate from its own ideal point. Building on other relevant research (Chapman, Urpelainen and Wolford 2012), future work may start to examine the trade-offs and comparative statics of international policymaking with strategic subnational jurisdictions with a focus on identifying the consequences for a national governments' bargaining power in international negotiations.

Sequence of Moves

One might also ask to what extent the results depend on the order of play, with subnational governments moving first and followed by national governments that negotiate an international agreement. Reversing the sequence of moves means that national governments first agree on an environmental treaty and subnational units can then decide on their own environmentally relevant policies. As a consequence, national governments will select their preferred treaty and each subnational policymaker will choose a policy that minimizes the joint loss from deviating from the treaty and the policymaker's own ideal point. In this scenario, subnational policymakers no longer behave strategically because they can only react to the treaty.

Mixing Strategic and Non-Strategic Subnational Policymakers

In the theory presented above we have assumed that subnational policymakers place at least some – possibly small – nonzero weight $\beta_\theta \in (0, 1)$ on international policy decisions. One might argue that only some subnational actors engage in strategic decisionmaking, either because they do not care at all about a certain policy field or because they lack the resources to do so. First, the degenerate case in which not a single subnational actor engages at least in some degree of strategic policymaking resembles our benchmark model. Therefore, if researchers look for theoretical guidance that precludes any strategic decisionmaking at the subnational level, they can turn to this special case of the more general, strategic model that we present. Second, even in the presence of some non-strategic actors, we find that our model and its predictions remain instructive. If a subset of all subnational policymakers act non-strategically, their choices remain unaffected by international policymaking attempts. Consequently, these factors remain constant, and we can restrict our attention to those subnational units that engage in at least some degree of strategic policymaking, so that our comparative static predictions remain intact.²

Interdependence of Subnational Policy Choices

The potential interdependence between policymakers has attracted strong attention among scholars in international relations and comparative politics. Does our model reflect that subnational policy choices may depend on those made by other subnational units? Since subnational policy choices potentially affect international bargaining outcomes through their impact on national policymaking, and because subnational units are capable of acting strategically, their equilibrium policies are also a function of all other subnational units' and the national governments' choices.

²Alternatively, one might interpret $\beta_\theta \in (0, 1)$ as a population parameter that reflects the share of subnational governments that engage in strategic policymaking.

Thus, our model provides an explicit account of the interrelatedness of subnational, national, and international policymaking.

Information about Actors' Preferences and Choices

Our model abstracts away from information dynamics. We assume that all actors are fully informed about other players' preferences and choices and that this is common knowledge. Under incomplete information about others' preferences and or choices, subnational policymakers would formulate their policies based on their expectations of international treaty outcomes and – depending on the equilibrium concept used to solve the game – possibly update their beliefs in a Bayesian fashion. While this may give rise to different types of equilibria, in which information would sometimes be revealed and sometimes not, the basic idea of the model would remain unchanged. Subnational policymakers would remain strategic and they would use the available information to engage in different types of policy balancing (Urpelainen 2009). Nevertheless, we think that further developing the theory we have presented by including information asymmetries might yield very insightful predictions. For example, incomplete information could allow us to examine the probability of bargaining failure. Thus, including information asymmetries may improve our understanding of how subnational policymaking affects the success of international cooperation.

Multilateral Negotiations

We have not attempted to model multilateral negotiations, because coalition formation would greatly complicate the solution of the game. Including multiple players in the model would complicate the behavior of national governments, and this would in turn prompt subnational policymakers to reconsider their strategies. Moreover, the inclusion of multiple national governments would reduce the influence of any particular subnational policymaker, especially in smaller and less powerful countries. In the case of multilateral negotiations, for example, we suspect that subnational policymakers in key countries that emit a lot of carbon, such as the United States, China, and India, than in small countries.

3 Scope Conditions

The model extends to other settings if several scope conditions are met. First, subnational policymakers responsible for policy formation – provinces, states, municipalities, cities – must have at least some structural power. If a single subnational policymaker is so small that it cannot individually affect a national government's optimal level of regulation, it has no incentive to act strategically. In this case, researchers can safely apply Putnam's (1988) original model. However, if subnational policy choices and the policy patterns arising from these decisions carry some costs to the national government, subnational policymakers can exert influence on them and therefore, their own policy choices may also matter for which international bargains their national government prefers. In this case, our formal model applies. Second, subnational policies must be "sticky," or somewhat difficult to reverse after they have been enacted. When subnational policymakers can quickly change policies at zero costs, national governments will likely understand that previously enacted subnational policies will automatically adjust in response to the international negotiation outcome. Under such circumstances, subnational policymakers remain unable to shape the international negotiations through strategic policy formation.

National governments have incentives to avoid inconsistencies between subnational and national policies because incompatible regulations increase the transaction costs of economic exchange (Vogel 1995). Environmentally relevant policies may induce technological adjustments by private actors. Once they have been set, reversing them will be costly because another round of adjustments is necessary (Kline 2001). Finally, in many countries – especially federal political systems – subnational policymakers implement important environmentally relevant regulatory decisions that cannot be removed without considerable cost (Rabe 2004). Thus, even if subnational policymakers cannot *legally* constrain the national government, they can nonetheless influence the material cost-benefit ratio of different national regulatory policies by implementing environmentally relevant regulation in traditional subnational policy fields like transport, waste, buildings, or housing.

This implies that even if subnational policymakers do not have authority to decide on, say, national CO₂ reduction targets, there remain numerous policy fields that allow them to implement environmentally-relevant regulation. This suggests that our model is applicable to various different countries, e.g., China, France, Germany, the United Kingdom, or the United States. For example, the national government in the UK emphasizes that when it comes to climate change, “local authorities are free to decide how best to address these challenges and take advantage of any opportunities” and offers recommendations to local governments on how to implement climate-friendly policies in areas such as public transport waste, planting, buildings and infrastructure, housing, and sustainable transport.³ Even in France, a country with a particularly centralized political system, subnational governments still enjoy considerable room to implement their own environmentally-relevant policies because of two reasons because there has been a general trend of political decentralization in France and second because environmental policy still is a relatively new policy field with comparably little existing national regulation (Bodiguel and Buller 1994).

The adoption of European emission standards by local governments in China further illustrates the leading role of subnational policymaking for national-level policy decisions. Large cities such as Beijing and Shanghai had adopted the European Euro 4 automobile emission standard long before the Chinese national government decided to adopt it in 2010. The U.S. Mayors’ Climate Protection Agreement constitutes yet another example. Approximately 1,000 U.S. cities have joined the agreement so far, which was deliberately created in response to the Bush administration’s refusal to ratify the Kyoto Protocol. It aims to “set a leadership example in initiating programs which will reduce global warming.”⁴

³UK Department for Environment, Food and Rural Affairs. 2010. Adapting to Climate Change: A Guide for Local Councils.

⁴Mayor Mark Stodola of Little Rock, AR, cited in Schaffer (2009, 3).

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