

Allocation of Authority in European Health Policy^{*}

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Highlights:

- We present new data on the allocation of responsibility for key health care policy tasks in 27 European countries
- Bayesian multinomial mixed logit shows how different countries allocate authority to local, regional, and state governments
- The allocation of powers mostly follows the precepts of fiscal federalism for efficient policy-making
- Exceptions reflect ethnic divisions, effects of country and region size, mountainous terrain, and timing of region creation

Abstract. Although many study the effects of different allocations of health policy authority, few ask why countries assign responsibility over different policies as they do. We test two broad theories: fiscal federalism, which predicts rational governments will concentrate information-intensive operations at lower levels, and redistributive and regulatory functions at higher levels; and “politicized federalism”, which suggests a combination of systematic and historically idiosyncratic political variables interfere with efficient allocation of authority. We present new data on the allocation of responsibility for key health care policy tasks (implementation, provision, finance, regulation, and framework legislation) and policy areas (primary, secondary and tertiary care, public health and pharmaceuticals) in the 27 EU member states and Switzerland. We use a Bayesian multinomial mixed logit model to analyze how different countries arrive at different allocations of authority over each task and area of health policy, and find the allocation of powers broadly follows fiscal federalism. Responsibility for pharmaceuticals, framework legislation, and most finance lodges at the highest levels of government, acute and primary care in the regions, and provision at the local and regional levels. Where allocation does not follow fiscal federalism, it appears to reflect ethnic divisions, the population of states and regions, the presence of mountainous terrain, and the timing of region creation.

Decentralization is an ongoing, lively topic in health policy (Costa i Font and Greer, 2012; Peckham et al., 2007; Saltman et al., 2007). When should it be done?, asks a growing literature. How should it be managed? What are its virtues? In other words, what are its consequences and when is it a good idea?

Policy investigations and recommendations are crucial, but only part of the issue. Explaining the allocation of authority—money, legal power, and responsibility—and the reasons for decentralizing (or centralizing) decisions is just as important for understanding the effects of decentralization and different kinds of territorial governance in health. A number of works recount the complex events that produced the allocation of health policy authority in different countries and try to synthesize lessons about general trends (Bankauskaite et al., 2007; Costa i Font and Greer, 2012), but a broader, systematic study is lacking.

Our approach is simple. We use a variety of data sources to analyze the different ways that 28 European countries have allocated responsibility for different aspects of health policy among different elected, territorially defined, general-purpose regional or local governments. Ours is the most detailed overall database on health policy responsibilities, compatible with a more general similar effort (Hooghe et al., 2010) and cross-checked against the most comprehensive research in health policy (Bankauskaite et al., 2007). We use these data to test the central hypothesis of the “fiscal federalism” literature in economics, which broadly predicts countries will centralize health finance and framework law but decentralize health provision, against the possibility of “politicized federalism”, in which a combination of systematic and historically idiosyncratic political variables interfere with efficient allocation of authority, while controlling for still other variables governing the feasibility of federalism. With a few exceptions, and some scope for politically driven variation, we find fiscal federalism dominates the allocation of authority over health.

The first section of the article explains the issue of allocation of authority in health, and the second identifies the hypothesis of fiscal federalism, politicized federalism, and feasible federalism in greater detail. The following sections present the data, our analytical strategy, and results from a Bayesian multinomial mixed logit model. We conclude with a discussion of policy implications.

Decentralization and allocation of authority in health

The concept of decentralization is politically fraught, and it has proven difficult for scholars and policymakers to establish a common terminology for the diverse activities so-labeled—which can be as different as selling a state-owned telecoms company, moving a central government office out of the capital, increasing the power of field offices in a health department, or rewriting the constitution to establish powers for elected governments. Individual countries’ own political vocabularies complicate matters, with words like “devolution”, “federalism”, and “deconcentration” convey-

ing different meanings across countries or even within different parts of a single bureaucracy, and blurring important distinctions, such as between funding and legal power (Peckham et al., 2007). Generally, discussions of decentralization are hampered by the assumptions of the World Bank advisors who popularized the term in the early 1980s, and whose primary goal was reducing the weight of the central state (Rondinelli, 1983; Manor, 1999). However, calling everything that reduces the power of the central state “decentralization” lumps together processes with distinct political origins and policy consequences. We believe the burden of proof should lie on those who wish to argue that privatizing British Telecom, moving health managers from London to Leeds, and creating a new democratic legislature in Scotland with responsibility for health policy are actually the same thing—as Lemieux (2001) had to do as a consequence of adopting World Bank definitions of decentralization.

We focus on *political* decentralization, by which we mean any allocation of authority that involves general-purpose, elected governments. (James Manor similarly defines “devolution” as decentralization to bodies that are at least somewhat democratic and somewhat autonomous of the center.) We thus exclude reorganizations of authority within a single elected government from our definition of decentralization. Central states that delegate extra power to politically dependent regional agencies (as with the French Regional Health Agencies or Polish voivodships) or that move their offices are not likely to create unmanageable externalities or collective action problems internally. Finally, wherever we can, we employ the concept of an “allocation of authority”, which refers to a pattern of governmental responsibility, rather than decentralization, which refers to a process of change in that pattern.

Fiscal federalism and allocation of authority in health

Most studies of decentralization in health care ask whether it is a good policy and how it can be better implemented. They are less likely to ask what allocations of authority are actually feasible, practically or politically. Our goal is to explain the likely outcomes of this evolution, and our rough division of the possible explanations follows Paul Peterson’s (1995) *The Price of Federalism*, which considered the efficient allocation of distributive and regulatory policy between central and regional governments.

Fiscal federalism

The basic economic approach to the territorial allocation of powers is a mixture of normative prescription and positive theory (reviews: Oates, 1999; Boadway and Shah, 2009). The literature, known as “fiscal federalism”, starts with Claude Tiebout, who laid out a model in which local governments bid for mobile citizens and businesses by providing good services at low tax rates (Tiebout,

1956). Such competitive pressures conflict with many concepts of justice. Fully competitive inter-governmental relations, with each government on its own tax base, would mean that poor jurisdictions get weaker public services than richer jurisdictions, so the poor get worse health care and education than the rich. Further, interjurisdictional competition could be part of broader collective action problems in which a government's economic incentive is to permit pollution of neighboring jurisdictions.

Fiscal federalism's basic recommendation, responding to these concerns, is put succinctly by a World Bank paper: "the provision for any given public service should be assigned to the lowest level of government that allows for full internalization of the benefits (and costs) associated with that service" (Wetzels, 2001, 17). The implications are simple enough: to the extent that local knowledge is important, authority should be assigned to a lower level of government, and to the extent that spillovers—such as races to the bottom or failures to manage communicable disease—are important, authority should be invested in higher levels of government. If fiscal federalism accurately describes the allocation of authority over health, we expect to see differential effects across *policy areas* and *policy tasks*, due to the technical characteristics of each (Rodden, 2004). Tasks such as implementation and policy areas such as primary care, which both require extensive local knowledge and have limited external spillovers, should be organized locally or regionally; tasks such as finance and policy areas such as pharmaceuticals, which neither require as much local knowledge nor have substantial spillovers, should be organized at the highest feasible level, usually the state (Boadway and Shah, 2009, 35–50). Finally, policy areas such as public health, which both require extensive local knowledge and produce substantial spillovers, should be mixed by policy task, with local or regional implementation and state-level finance and frameworks.

Politicized Federalism

A skeptical response to this sketch of an economically rational health system notes there is no guarantee the political process in a country will end up codifying an economically efficient allocation of authority. Drawing on the literature, we identify two ways politics might augment or alter the predictions of simple fiscal federalism (for reviews: Rodden 2004, Weingast 2009, Trench 2006, Bednar 2009, Treisman 2007).

One hypothesis focuses on the regulation of ethnic conflict as a dominant factor in explaining much of federalism (Gagnon and Tully, 2001; Amoretti and Bermeo, 2004; Stepan, 2001). Multinational states often employ federalism to bind together their stateless constituent nations; in recent years, Belgium, the UK, and Spain have each given regional governments greater power in response to nationalist pressures. As ethnic minorities often concentrate in specific territories, this literature suggests that multiethnic states have stronger regional governments, with more responsibility for all health policy areas and tasks, regardless of the efficiency of regional authority.

Fiscal federalism's efficiency recommendations may also conflict with day-to-day political demands. A second hypothesis focuses on politicians' incentives and motivations, especially the desire to seek credit for successful policies and to avoid blame for policy failures (Mayhew, 1964; Weaver, 1986; Peterson, 1995). If politicians are pure credit-seekers, the allocation of authority over health might not reflect an economically rational assignment of responsibility, but instead record which governments successfully usurped credit-rich fields of policy and abjured thankless tasks. As Weingast (2009) argues, achieving and preserving an efficient allocation of authority thus depends on political context, and the presence of institutions capable of constraining self-interested politicians. According to this second-generation of fiscal federalism, the political context may pose a variety of threats to federations—such as excessive regional debt (Rodden, 2005) or “overprovision” of services (Berry, 2009)—which may undermine the efficient allocation of authority, or at least vitiate any benefits offered by federalism (Bednar, 2009). This second-generation approach would lead us to expect widely varied and perhaps even systematically inefficient allocations of authority in different countries, with their origins in politicians' responses to institutional incentives.

Even if there were agreement over its central causal mechanisms, testing the politicized federalism hypothesis directly would be difficult, as it incorporates a range of contingent, even path dependent historical processes which confound cross-sectional analysis (Pierson, 2004). Yet a cross-sectional investigation can provide a negative test of the politicized federalism hypothesis, as political contingency is unlikely to routinely produce the allocation of authority recommended by fiscal federalism unless it is *constrained* to do so. Only if these constraints prove weak, and the idiosyncratic differences across countries large, will understanding allocations of authority in health require a more narrative approach focused on political and historical process.

Feasible federalism

If political scientists focus on the ways political factors can produce a given allocation of authority, an eclectic third style of work draws on older geographical thinking and focuses on the costs of territorial control. States, like any organization, face tradeoffs with size. Larger states can gain economies of scale but incur coordination costs in dealing with diverse and far-flung populations, while smaller states may lack economies of scale (Alesina and Spolaore, 2003). The tradeoff between diversity and economies of scale produces three more hypotheses revolving around the feasibility of allocating authority to specific levels of government.

First, there is the size of the state. Smaller or more homogeneous states might not gain any efficiency from intermediate levels of administration; the best economies of scale might lie at the highest levels, ruling out territorial differentiation. At the other end of the spectrum, the Spanish autonomous region of Andalusia accounts for about eight million of Spain's approximately 45 million people, yet this regional government dwarfs the states of Ireland (4.3 million), Latvia (2.7

million), and Malta (404,000). Even if Spanish history and politics did not demand it, it seems rational for Spain to have an intermediate level lacking in Ireland, Latvia, or Malta. Generally, we expect states with larger populations to have regional governments with greater powers in health than states with smaller populations (Treisman, 2006).

Second, there is the size of the regional governments. Larger regional governments, regardless of their political support, might be the right size to interact with diverse populations, while also reaping economies of scale. As a result, we expect regions with larger populations to have greater powers than regions with smaller populations.

Third, not all territory is equal. Some territory is historically more costly to control, with weaker economies of scale and more differentiated and restive populations. Historians and anthropologists have long argued for mountains' importance in structuring societies and social power by increasing the costs of communication and administration (Braudel, 1966, 36; Diamond, 2005). Fearon and Laitin (2003) and Scott (2009) have more recently drawn social scientists' attention to mountains in explaining the costs of centralized administration. Mountainous territory decreases economies of scale and increases local diversity, so we expect states with a greater percentage of mountainous territory to more frequently delegate policy authority to regions or localities.

Data

To measure the allocation of authority over health policy within European countries, we need three kinds of data: our dependent variable, the levels of government in each country responsible for a given policy; two key covariates, the exhaustive pairing of health care policy areas and tasks; and finally, any covariates suggested by second-generation fiscal federalism that might influence the allocation of authority for health policy.

Levels of government

To classify the levels of government, we relied on the European Union. Central states are the titular sovereigns—the members of the EU. Defining regions and local governments is more difficult because some countries have parallel elected and unelected governments, as in France, where elected regions sit side by side with unelected regional health agencies. We started with the EU Nomenclature of Territorial Units for Statistics (NUTS) codings. All EU member states define their territorial governments in the NUTS terms, which give us regions and local governments (usually municipal). The size of regions varies greatly across countries. In keeping with our focus on political decentralization, we included only the subset of NUTS regions and localities that had their own elected governments.

Policy typologies

The next step is to establish typologies of the different policy instruments countries use to set, fund, and administer policy, and the policy areas on which those instruments operate. Our main source of data was the peer-reviewed Health in Transition (HiT) series of country profiles, which describe the institutional features and operation of each health system in a consistent format across countries. The HiT reports (www.euro.who.int/en/home/projects/observatory) are produced by the European Observatory on Health Systems and Policies, an organization supported by the WHO, governments, and universities. We selected reports made between 2002 and 2006, except for eight countries (Belgium, Greece, Italy, Lithuania, Luxembourg, Malta, Switzerland, and the UK) whose latest reports pre-date 2002. We cross-checked recent scientific literature and EuroHealth bulletins, and for a small number of countries consulted experts. We used the same procedures for the post-communist countries due to recent changes in some of their health systems.

We classify policies along two variables drawn from our theoretical approach. The first variable divides up health policies into five tasks (Framework Legislation, Implementation Legislation, Finance, Provision, and Regulation); the second variable designates four health policy areas (Pharmaceuticals, Primary Care, Secondary–Tertiary Care, and Public Health). Altogether, we code the primary allocation of authority—to the central state, the regions, or localities—for each of 16 policy task–area combinations across 28 states, yielding 448 observed cases, as shown in Figure 1.

We operationalize the five policy tasks as follows:

1. *Framework Legislation* refers to the ability to set the definitive legal framework for policy. In social insurance systems this means setting the framework under which payers extract resources and operate. In national health service systems, it refers to the fundamental laws authorizing the system. Perhaps surprisingly, it does not always belong to the central state.
2. *Implementation Legislation* designates responsibility for passing laws implementing policy within framework legislation.
3. *Finance* denotes responsibility for allocating the bulk of the funds for a policy, whether those funds come via a financial formula, or through general or specific taxes. In systems funding health care out of general taxation, the level of government that sets the health budget is responsible. In social insurance systems, it is the body that regulates the insurance funds' revenue (and risk-pooling if it is done). In Germany and Belgium, for example, this means the federal government.
4. *Provision* means different things in different systems depending on whether the state directly hires or contracts with providers (as in the national health systems such as the UK), or whether

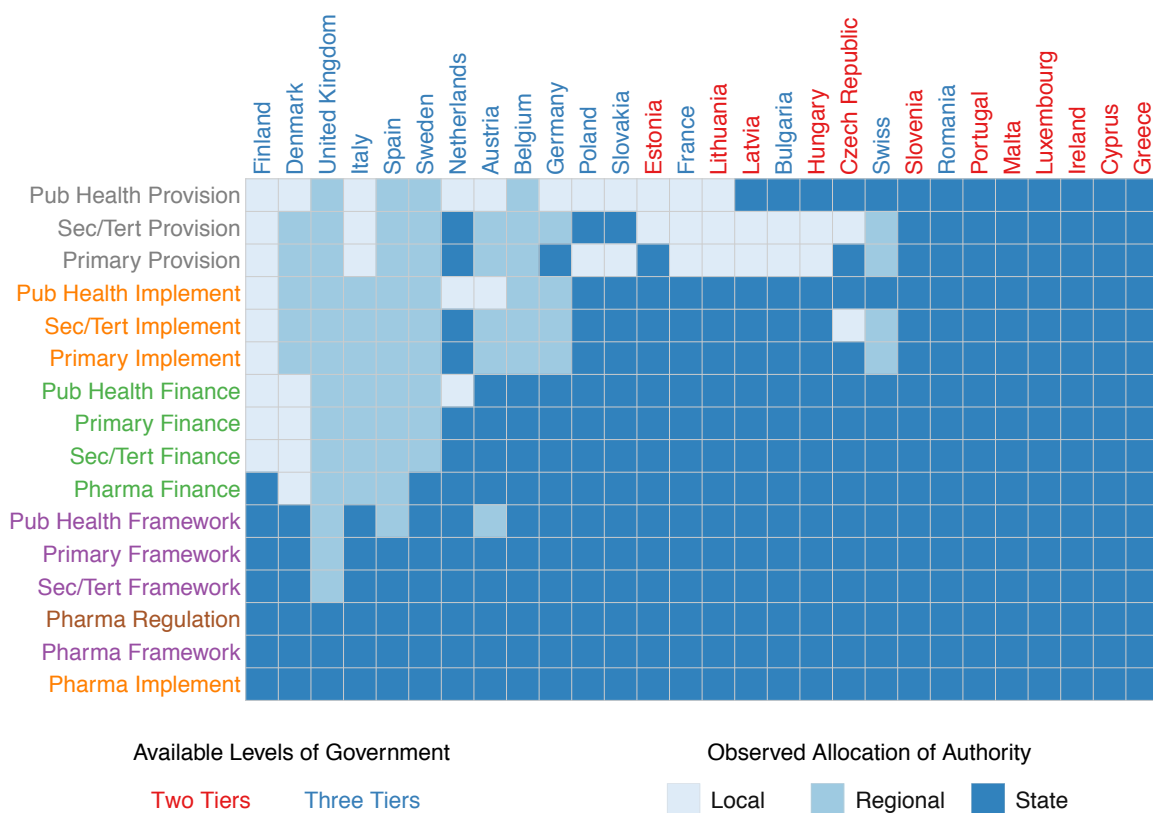


Figure 1. Classification of the allocation of authority for 16 health policies in 28 European countries. Darker colors indicate allocation to higher levels of government (authors' coding). Rows and columns sorted using cluster analysis of cell contents; similar rows and columns are adjacent. Column color indicates presence of elected regional governments; rows colors highlight different policy tasks, which are seen to cluster.

payers and providers are both separate from the state, as is typical in social insurance systems. So, in the Spanish national health system, the central state raises taxes, making it responsible for finance, but the regional governments allocate budgets to health facilities, making provision regional. In the French social insurance system, the central government organizes the funds as well as the facilities, so the main elected government is involved in organizing provision as well as finance. We consider provision to be irrelevant for pharmaceuticals, where the key issues of “provision” are really matters of funding.

5. *Regulation*—responsibility for developing and enforcing restrictions on the activities of private actors—is a category we only applied to pharmaceuticals, where it refers to the decision to license medicines (not the regulation of pharmacies). Outside pharmaceuticals, regulation tended to blend into provision.

We identify and operationalize the four policy areas in similar fashion, following Mossialos

et al. (2007) and European Observatory on Health Systems and Policies (2006):

1. *Primary care* refers to first level contact with health services.
2. *Secondary and tertiary care*: Secondary care is specialised ambulatory medical services and commonplace hospital care (outpatient and inpatient services). Tertiary care is medical and related services of high complexity and usually high cost. For secondary and tertiary care, many social insurance countries have a substantial municipally-owned hospital sector (including disparate states such as Bulgaria, France, Germany, and Poland). In each case, however, the basic legislative framework was set by the state, and the social funds paying for care were also creatures of the state. We therefore coded hospital finance and legislation in these cases as central.
3. *Public Health* is the science and art of promoting health, preventing disease, and prolonging life through the organized efforts of society; e.g., communicable disease control, preventive medicine, and immunization.
4. *Pharmaceuticals* refers to the organization of the pharmaceutical sector and the method of distribution of pharmaceuticals to the public.

Allocation of authority by policy task and area: a first cut

Table 1 cross-tabulates the 448 policies by task and the level of government with primary authority. The full dataset (Panel A) reveals a strong tendency to allocate policy to the central state. Because this pattern could be exaggerated by a dearth of regional options (only 15 of our 28 countries have regional governments), we separate three-tiered cases (Panel B) and two-tiered cases (Panel C). A division then emerges between state-dominated policy tasks—framework legislation, pharmaceutical regulation, and, to a lesser extent, finance—and implementation and provision, which are usually delegated to the regions. In countries without regional governments, provision instead falls to the local authorities, while the state tends to take up full authority for implementation legislation.

Overall, the data comport well with the prescriptions of fiscal federalism: states take responsibility for policy tasks subject to externalities or collective action problems—standard setting, regulation, and, albeit it only half the time, finance—while subsidiary governments handle provision and implementation, which benefit most from local knowledge and accountability. Similarly, Table 2 shows that countries tend to split responsibility for public health, primary care, and secondary–tertiary care among various levels of government, while concentrating all policies pertaining to pharmaceuticals—which benefit least from local administration—to the central state.

A. All countries ($N = 448$)					
	Regulation (Pharma only)	Framework Legislation	Finance	Legislative Implementation	Provision
State	28	107	93	81	36
Region	0	5	11	25	19
Locality	0	0	8	6	29

B. Countries with elected regional and local government ($N = 240$)					
	Regulation (Pharma only)	Framework Legislation	Finance	Legislative Implementation	Provision
State	15	55	44	33	10
Region	0	5	11	25	19
Locality	0	0	5	2	16

C. Countries with local government only ($N = 208$)					
	Regulation (Pharma only)	Framework Legislation	Finance	Legislative Implementation	Provision
State	13	52	49	48	26
Region	—	—	—	—	—
Locality	0	0	3	4	13

Table 1. Observed primary allocation of authority for health policy by policy task. Entries are the total policies allocated to each level across 28 European countries, 15 of which have elected regional governments. Policy tasks are listed from most to least centralized, the modal level of authority for each policy instrument in bold.

Chance and confounders

The *prima facie* evidence that countries allocate authority for health policy in a basically economically rational manner conceals three potential pitfalls. First, we have not controlled for any other covariates (such as country and region size, ethnic diversity, or the age of a country’s regions) which might also influence the allocation of authority. Second, even controlling for observable differences, countries may vary in other ways—owing to history or constitutional design—which render allocation of authority idiosyncratic to each country; that is, countries may constitute random effects on allocation of authority. Finally, while the patterns evident in Tables 1 and 2 are striking,

A. All countries ($N = 448$)				
	Pharma- ceuticals	Primary Care	Secondary Tertiary Care	Public Health
State	109	80	78	78
Region	2	20	21	17
Locality	1	12	13	17

B. Countries with elected regional & local ($N = 240$)				
	Pharma- ceuticals	Primary Care	Secondary Tertiary Care	Public Health
State	57	34	35	31
Region	2	20	21	17
Locality	1	6	4	12

C. Countries with local government only ($N = 208$)				
	Pharma- ceuticals	Primary Care	Secondary Tertiary Care	Public Health
State	52	46	43	47
Region	—	—	—	—
Locality	0	6	9	5

Table 2. Observed primary allocation of authority for health policy by policy area. Entries are the total policies allocated to each level across 28 European countries, 15 of which have elected regional governments. Policy areas are listed from most to least centralized, the modal level of authority for each policy area in bold.

they may have arisen partly by chance. To discount this possibility, we need a probability model of allocation to quantify the uncertainty of our results.

Methods

To solve these three problems, we estimate a multilevel model of the allocation of authority for health policy. Our response variable is the assigned level of government for each combination of country, health policy area, and health policy task in our survey of EU member countries, for a total

of 420 categorical observations. (We omit pharmaceutical regulation from the analysis due to a lack of variance—all countries allocate this function to the state.) Policies more likely to be assigned to one level are less likely to be allocated to either of the other levels. For example, if a country is more likely to assign responsibility for finance to the state, it must also be less likely to assign finance to either regions or localities. Our goal is to model this trio of allocation probabilities, first by showing how they shift as we consider different policy tasks, policy areas, and observed country characteristics, and second, by testing whether these differences are statistically meaningful. Additionally, we quantify the extent to which any particular country, due to idiosyncracies of its history, is more likely to allocate its policies (regardless of task or area) to a given level of government, all else equal.

Formally, we study the allocation of authority in country $i = 1, \dots, N$ over policy instrument $k = 1, \dots, K$, in policy area $j = 1, \dots, J$, across levels of government $\ell = 1, \dots, L$. We denote this outcome—a choice of “state”, “region”, or “local” allocation of authority—as $y_{ijk\ell}$. To model this classification, we employ a Bayesian multinomial mixed logit model, where the probability of a particular country allocating authority over a policy area–task combination to a particular level of government is given by $\pi_{ijk\ell}$ and follows a Multinomial distribution:

$$\left\{ y_{ijk1}, \dots, y_{ijk\ell}, \dots, y_{ijkL} \right\} \sim \text{Multinomial} \left(\pi_{ijk1}, \dots, \pi_{ijk\ell}, \dots, \pi_{ijkL} \right). \quad (1)$$

We use the usual multinomial logit functional form,

$$\pi_{ijk\ell} = \theta_{ijk\ell} / \sum_{l=1}^L \theta_{ijk\ell}, \quad (2)$$

where $\theta_{ijk\ell}$ represents the odds that country i will allocate policy task j in policy area k to level of government ℓ . We decompose these odds into several components:

$$\log \theta_{ijk\ell} = \alpha_{i\ell} + \tau_{j\ell} + \delta_{k\ell} + \mathbf{x}_i \beta + \mathbf{z}_{i\ell} \gamma_{\ell}. \quad (3)$$

In this specification, $\alpha_{i\ell}$ is a country random effect allowing different countries to idiosyncratically tend towards different allocations. The second and third terms are fixed effects capturing the cross-national tendency to allocate certain policy areas (via the $\tau_{j\ell}$'s) or certain policy tasks (via the $\delta_{k\ell}$'s) to each level of government. Treating “local” as the reference category, we set $\alpha_L = \tau_L = \delta_L = \beta = 0$ for identification. Finally, we include a country-specific vector of covariates, \mathbf{x}_i , and a country-and-level-specific vector of covariates, $\mathbf{z}_{i\ell}$, to capture other observed factors influencing the allocation of authority. Our country-specific covariates include the degree of ethnolinguistic fractionalization in the country in 1985, to capture political pressures coming from stateless nations (Roeder, 2001); a dummy variable for countries whose regions were created after 1973, to proxy for recent regional-

ization occurring for efficiency reasons and in the era of the European Union (Hooghe and Marks, 2001, 77–78); and the percentage of municipalities in each country in which the majority of terrain is mountainous, accounting for an important historical source of strong regions (Nordic Centre for Spatial Development, 2004, Figure 3.1). Our country-and-level specific covariates are logged national population and logged average regional population taken from the CIA World Factbook (2008). We estimate the model using Gibbs Sampling.

The Web Appendix [INSERT LINK TO ONLINE FILES] describes further details of the model, including treatment of structural zeros for regional governments in two-tiered countries, our choice of prior distributions, Markov chain Monte Carlo (MCMC) convergence behavior, checks for the independence of irrelevant alternatives, and the raw estimates of the model parameters. The model appears to be well estimated, fits the data well, and seems not to make unreasonable assumptions about the distribution of the response.

We reveal the substantive implications of the estimated model by comparing the predicted probability of allocating authority to the state, to the regions, or to local government under a series of counterfactual scenarios. For each scenario, we vary a specific covariate—either the policy task, policy area, degree of ethnic division, size of country, or number of regions—fixing the remaining covariates at their sample means among two-tiered countries. We then calculate, using posterior draws of the model parameters, the conditional probabilities of allocation to the state or localities. We repeat the procedure for countries with elected regional governments, obtaining for these cases the conditional probabilities of state, regional, and local authority. By exploring the variation across these conditional probabilities, we illustrate whether the variables capturing economic imperatives or political contingencies better explain the allocation of authority over health policy.

Results

We consider first the expected probability of allocating policy tasks to each level of government, holding fixed policy area, national and regional population, degree of ethnolinguistic fractionalization, and whether regions pre-date 1973. Figure 2 shows our findings for both two-tiered and three-tiered countries. Excepting finance and implementation in three-tiered countries, we are 95% confident that countries strongly favored either state or local responsibility for each policy task. Specifically, both two-tiered and three-tiered systems favor provision through local governments. This is strongly consistent with fiscal federalism, as tasks requiring local information fall to lower level governments. Three-tiered countries are equally likely to allocate authority for implementing health policies to regions, states, or localities, while countries lacking regions implement at the state level—the first of several instances in which the smaller two-tier countries (average population 11.5 million) centralize more than the larger three-tier countries (average population 27.5 million). In-

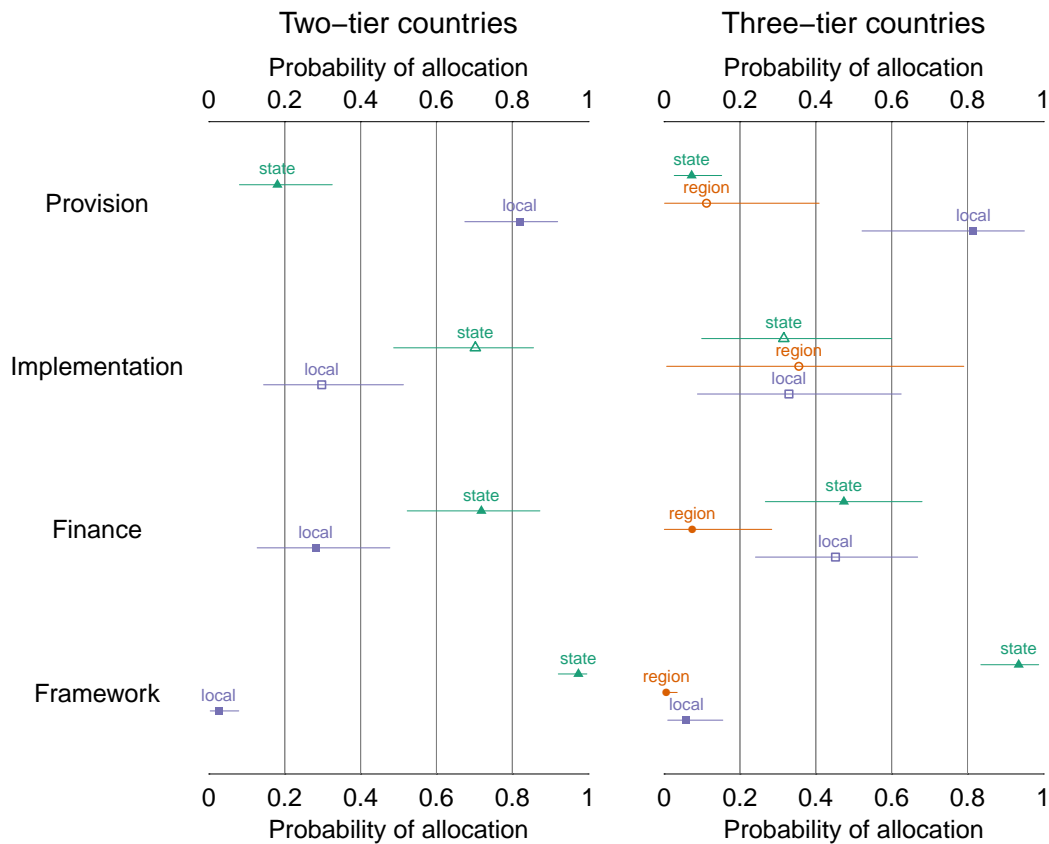


Figure 2. *Probability of allocation of authority by policy task.* Plot at right shows mean posterior probability that authority will be allocated to the state (teal triangles), regions (orange circles), or local governments (purple squares) for different policy tasks, holding constant other variables (including policy areas) at their observed means for three-tiered federal countries. Horizontal lines show 95% Bayesian confidence intervals. Filled symbols indicate 95% confidence probability of allocation to the state differs from the probability of allocation to regions or local governments for the policy task in question. Plot at left shows the same quantities for countries with elected state and local, but not regional, governance.

deed, non-federal states keep finance centralized, while federal countries disagree on the allocation of authority for finance, and are roughly equally likely to be allocated to the state or locality. The ambiguous position of finance in three-tiered systems suggests its allocation may be controversial, a question we revisit below.

Turning to allocation of authority for policy areas, we now hold constant policy tasks and other covariates. Figure 3 shows our findings, again separating our predictions for countries with and without regional governments. In either type of system, we have 95% confidence that countries strongly favor state-level pharmaceuticals policy, as expected by fiscal federalism. Authority over public health tends to be split across the available levels of government, and thus mostly explicable by historical path dependence in this low-profile policy area (Baldwin, 2005). Primary and

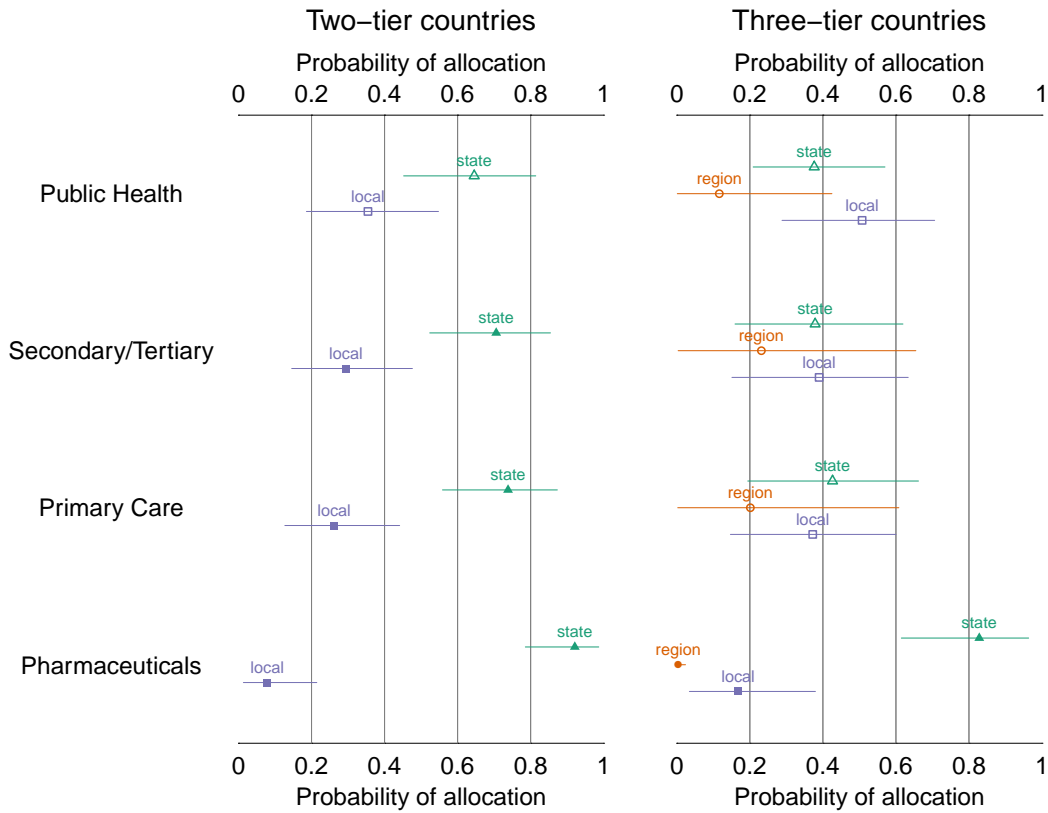


Figure 3. *Probability of allocation of authority by policy area.* Plot at right shows mean posterior probability that authority will be allocated to the state (teal triangles), regions (orange circles), or local governments (purple squares) for different areas of health policy, holding constant other variables (including policy instruments) at their observed means for three-tiered federal countries. Horizontal lines show 95% Bayesian confidence intervals. Filled symbols indicate 95% confidence the probability of allocation to the state differs from the probability of allocation to regions or local governments for the policy area in question. Plot at left shows the same quantities for countries with elected state and local, but not regional, governance.

secondary–tertiary care are likewise split across different levels of government.

Because each policy in our dataset combines a policy task and a policy area, we next consider the predicted probabilities of allocation to each level of government for each of the fifteen policy task–policy area combinations, holding other covariates fixed at their mean levels for the two-tiered and three-tiered systems, respectively. Figure 4 shows the results using two plots: a simple axis (at left) plotting the probability of local governances for two-tiered systems, and a triangular plot (at right) of the trio of probabilities for three-tiered systems. This triangular plot exploits the fact that the probabilities of allocation to state, region, or local government must sum to one. The three fitted probabilities for each scenario can be read off the three axes of the plot by measuring the distance from the marked point to each vertex of the triangle. As the plotted points approach one of the

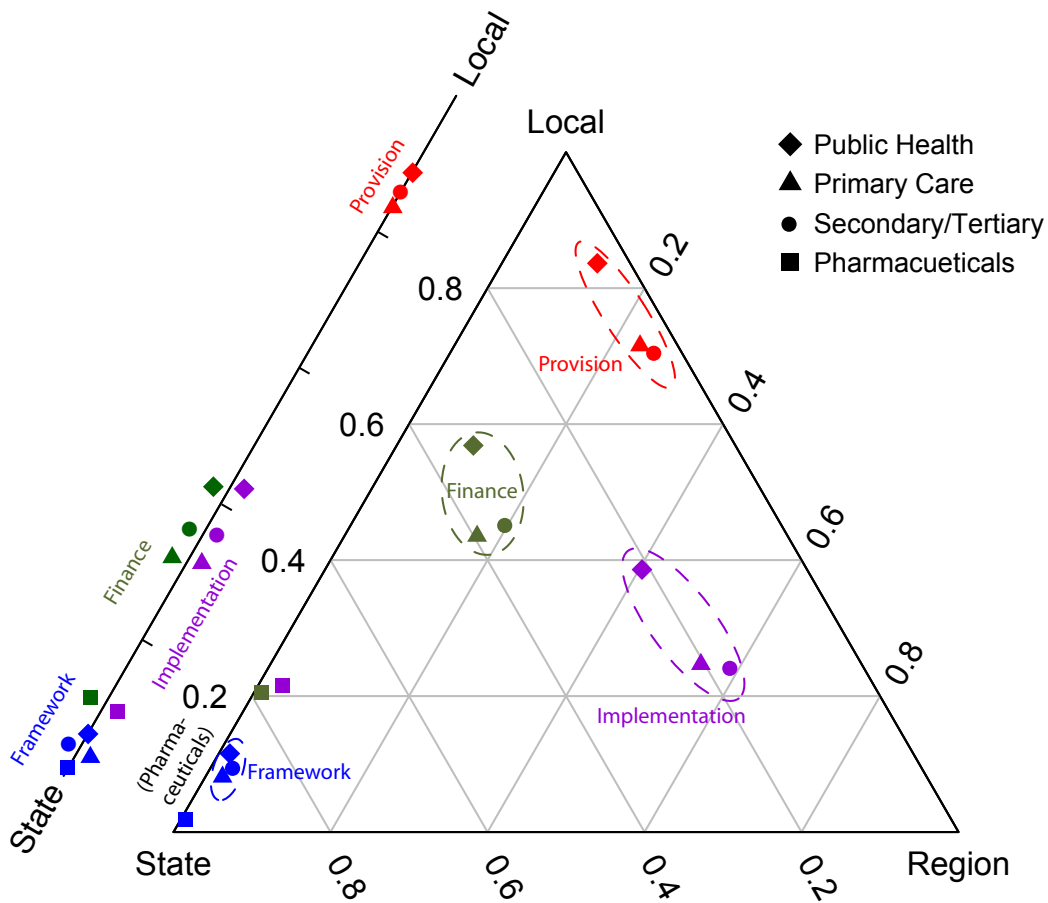


Figure 4. *Combined effect of policy area and task on allocation of authority.* For countries with three-tiered federalism, the triangular plot shows the mean posterior probability that authority was allocated to state, regional, or local government for each combination of policy area and policy task. Points closest to the State vertex—such as the framework legislation for all policy areas, and implementation and finance of pharmaceuticals policy—have the highest probability of allocation to the state; points close to the Region vertex—such as implementation of all areas except pharmaceuticals—are most likely to be assigned to regional governments, and points close to the Local vertex—such as provision of all areas except pharmaceuticals—are most likely to be assigned to local governments. For countries lacking elected regional governments, the axis to the left of the main plot shows the same conditional probabilities for the restricted choice between state and local authority. Other variables and random effects are held at their mean levels for the three-tiered and two-tiered countries, respectively.

three vertices, the probability of allocation to that level of government increases at the expense of the other two. Triangular plots are particularly helpful for assessing the relative impact of our variables: covariates pulling predicted probabilities towards the corners more powerfully explain the allocation of authority. According to fiscal federalism, efficiency demands should push each

policy task–policy area combination to the corner of the triangle whose level of government best provides the service. With the exception of finance, this is clearly the case. Moreover, the plot makes clear that the efficiency demands policy tasks dominate the requirements of policy areas, with the exception of pharmaceuticals.

For two-tiered systems, the combined effects of policy task and area can be simply summarized: framework legislation of all kinds, pharmaceuticals policy, and, to a lesser extent, finance and implementation, tend to rise to the state level, with authority only for provision tending strongly to localities.

The evidence thus far supports the view that countries allocate health authority to maximize economic efficiency. In most cases, policy tasks and areas so strongly determine allocation there is often little for other variables to explain. But where economic factors fail to explain all the variation in authority, four political variables have moderately strong effects. To see this, we hold the policy area and task at their means, which is roughly equivalent to considering the effects of our political covariates on ambiguous policies, such as finance and implementation of public health, primary care, and secondary–tertiary care.

In Figure 5, we plot the effects of political covariates for both two-tiered and fully federal systems. In three-tier systems, we find with 95% confidence that ethnically diverse countries tend to devolve more authority to regions, and less to states or localities, perhaps reflecting the fact that ethnonational contention often produces strong regional governments (as in Scotland, the Basque Country, and Flanders). In two-tiered systems, on the other hand, diversity is associated with state, rather than local, responsibility, a finding with no obvious explanation or antecedent in the literature we reviewed. Buttressing this result is our second finding, that—all else equal and with 95% confidence—local and regional governments have more authority in new federations, while in old federations, the state plays a stronger role. This may also point to the importance of ethnic heterogeneity, and in particular to the effect of the upsurge of regionalisms and nationalisms since the late 1960s on the power of regions and localities in recently formed federations.

Our other two covariates deal with the size of states and regions, and the possibility that larger regions have more bureaucratic and financial capacity than smaller regions. We do indeed find hints that countries with larger regions grant them greater authority than countries with smaller regions, though this result reaches only 84% confidence. Mountainous terrain also emerged as a factor. Our results hint that mountainous countries are more likely to decentralize to the region level, though with only 86% confidence.

sometimes frankly normative, proposing to identify the effects of a given allocation of authority or change (e.g., Fredriksson and Winblad, 2008). But there are fewer that strive to identify patterns and potential reasons for the allocation of authority (Bremner, 2007, 2012). Without empirical theories of what countries actually do, it is hard to tell if normative proposals are realistic or if evaluations are entirely fair. If fiscal federalism, for example, were not politically sustainable in practice, then suggestions based on its application would be somewhere between naïve and counter productive.

But what is realistic? A number of recent descriptive efforts try to characterize both variation in the allocation of authority, and the general direction of change. Most posit decentralizing trends (Hooghe et al., 2010), though a few extrapolate from some Scandinavian experience to posit a centralizing trend (Bankauskaite et al., 2007, 2). We go a step further, and gauge the extent to which European states' allocation of health care authority conforms most to the efficiency claims of economists, or to more cynical, politically-informed arguments suggesting the allocation of authority is a frequently inefficient political outcome, or to geographic approaches that find constraints on feasible federalism in the terrain itself. Each perspective is superficially plausible, especially as it is often possible to find single cases of an area that is centralizing or decentralizing. There has not been, however, a general test of the extent to which efficiency or political considerations explain authority in health systems.

We first built a health care database of unprecedented detail, compensating for the less specific, or financially focused, categories found in previous studies (Hooghe et al., 2010; Paris et al., 2010). These details are essential: good health policy analysis usually requires distinctions between primary care, public health, and other areas of health policy. Our analysis of the data finds the strictures of fiscal federalism, which like many literatures in this field are as often normative as empirical, are quite binding in the real world.

For debates about decentralization, this means that considerations of economic efficiency are important: the many and diverse political systems of Europe do converge on the allocation of health care authority that economists would suggest. Despite the apparent chaos of history and compromises of politics, we find a clear pattern of fiscal federalism. States set frameworks and run pharmaceuticals policy, while responsibility for provision tends to be a regional responsibility, and implementation, finance, and public health responsibilities are widely spread across governments. Three-tiered countries are more likely to allocate the key task of financing to local governments than fiscal federalism theory would predict, but we suspect this reflects the fact that it is in finance that the politics of credit-claiming, blame-shifting, and intergovernmental contestation matter most. But in all other regards, the allocation of authority which predominates in European health policy is also the allocation that minimizes financial risks and negative externalities across borders, while securing the greatest economies of scale in regional health care, all without sacrificing adaptation to local preferences.

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Web Appendix to “Allocation of Authority in European Health Policy”

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This appendix summarizes several details in estimation of the model presented in equations 1–3 in the main text. Although estimation is for the most part straightforward, the presence of structural zeros in the outcome (countries where allocation of authority to elected regional government is impossible because there are no elected regional governments) as well as the inclusion of country random effects offer some complications. Fortunately, Markov chain Monte Carlo methods can easily estimate a Bayesian model which explicitly incorporates these elements, as we show below. Bayesian methods also allow meaningful measures of confidence when analyzing a census of European Union members, where frequentist methods would rely on the nonsensical notion that we are actually sampling from a fictive superpopulation of undiscovered European states (Gill, 2001).

Structural zeros for regions in countries with only two tiers

More than half of our observations come from countries which lack regional governments, and so can only choose between state and local authority for each policy. In these cases, we treat the probability authority will be allocated to regions, π_{ijk2} as a structural zero, and omit θ_{ijk2} from the model. Because the multinomial logistic assumes each pairwise choice is unaffected by the inclusion or omission of a third category, we can still pool all our data to estimate the parameters common to both choice sets: α_{i1} , τ_{j1} , δ_{k1} , β , and γ_1 .

Model priors

We set Normal priors over δ , τ , β , and γ . To improve estimation, we follow Congdon (2005), setting the means of these priors equal to the estimates obtained from a model omitting country random

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effects, and the prior standard deviation of each parameter to 100 times its estimated level in this model. The last step in setting up the model is establishing priors over the country random effects. For observations with only two tiers of government possible, we include a single Normal random effect to capture the tendency of a given country to prefer state to local authority for all its policies:

$$\alpha_{i1} \sim \text{Normal}(0, 1). \quad (\text{A-1})$$

For cases with three levels of government, we include two random effects per country (one each for state and region):

$$\begin{bmatrix} \alpha_{i1} \\ \alpha_{i2} \end{bmatrix} \sim \text{Multivariate Normal} \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \omega_{\alpha_1, \alpha_2} \\ \omega_{\alpha_1, \alpha_2} & \sigma_{\alpha_2}^2 \end{bmatrix} \right), \quad (\text{A-2})$$

using the multivariate Normal distribution to allow the random effects for each country to correlate across the different levels of government. For example, if countries which favor state over local control also tend to favor regional over local control, then the random effects for “State” and “Region” will be positively correlated. We set the variance of the random effect for the State equation at unity for identification, and estimate the covariance $\omega_{\alpha_1, \alpha_2}$ and variance $\sigma_{\alpha_2}^2$ (McCulloch et al., 2000; Congdon, 2005).

Estimation issues

Multilevel multinomial regression models are notoriously difficult to estimate without use of simulation-based techniques (Train, 2003). To improve convergence of the model and ease the computational burden of estimating the random effects, we use the Gibbs sampler as implemented in WinBUGS. This is the primary reason we use Bayesian methods here. (The second reason is that because we collect a near-census of the population of European countries, treating our data as just one sample from a larger population for the purpose of frequentist hypothesis testing makes little sense.)

We follow standard Markov chain Monte Carlo (MCMC) techniques. Using the maximum likelihood estimates as starting values, we initiate three separate Markov chains for each parameter. We iterate each chain using the Gibbs Sampler, and check for convergence by comparing the movement of the chains through the parameter space. We consider the model to have converged to the posterior distributions of the parameters when the chains are mixing interchangeably through the same space. In practice, convergence was slow but successful: after a discarded burn-in of 100,000 iterations, an additional 1,000,000 iterations of each chain, saved every 1,000 samples, achieved thorough mixing ($\hat{R} < 1.1$) for all parameters (see Gelman and Hill, 2007).

A critical assumption of the multinomial logit model is that introducing a new alternative does not alter the relative appeal of the original options because of a greater similarity of the new option to a particular original option. This is known as the Independence of Irrelevant Alternatives

(IIA). Our choice to pool countries with and without regional government depends, then, on the assumption that adding regions to the set of choices will not change the relative desirability of state versus local allocation. We take several steps to check this assumption and make our results robust to any violations of it.

First, the observed proportions of allocation in both two- and three-tier countries appear *prima facie* consistent with IIA. Among countries with all three tiers, 61 percent of policies are allocated to the state, 28 percent to regions, and 10 percent to localities, while countries with only two tiers gave authority to the state in 90 percent of cases, and localities in the other 10 percent. Assuming for the moment that these two sets of countries are interchangeable, IIA implies the ratio of state policies to local policies should be the same regardless of whether regions are available as an alternative. We note that among three-tiered countries, the ratio of state to local allocation is 86 percent to 14 percent, very similar to the observed split among two-tiered countries. Similarly, if two-tiered countries added regions while preserved their relative preferences for state and local government, they would have a 64 percent to 28 percent 7 percent split, very close to actual three-tiered countries' allocation. Of course, these comparisons do not control for covariates that might make our two- and three-tiered cases different without breaking IIA. For example, two-tiered countries tend to be smaller—with a mean population of 4.8 million—compared to 29.1 million for three-tiered countries. Nevertheless, similar allocations of authority across our three-tiered and two-tiered states suggests that we might benefit from pooling these cases, and that our analysis can take the Independence of Irrelevant Alternatives as a reasonable starting point.

Second, we employ a random intercepts or multinomial mixed logit model. Thus we partially relax IIA by allowing correlated random effects for countries. (Ideally, we would add random effects to all model coefficients, completely removing the IIA restriction from the model (Train, 2003); however, the fully mixed MNL is very weakly identified, and estimation is often impractical (Congdon, 2005).) If countries which allocate policies to regions are also systematically more likely to allocate to localities, this will be captured in the model through the correlation of the random effects. On the other hand, if the random effects are uncorrelated across levels of government, we have further evidence that the choice of state, region, or locality does respect IIA.

Table A1 presents the raw results of our estimation procedure. The model finds no evidence of correlation between the random effects, supporting our choice to use multinomial logit, despite its IIA assumption. The table also presents summaries of the posterior distributions of model parameters, but because these parameters are estimated on the logit scale, and because the parameters for policy tasks and areas must be compared with each other, rather than zero, the confidence intervals for these parameters cannot be interpreted in the usual way. Instead, it is easier to explore the substantive implications of our results by comparing the conditional allocation probabilities for specific scenarios of interest, as we do in the main text.

	State vs. Local (logit scale)		State vs. Regions (logit scale)	
	Mean	95% Interval	Mean	95% Interval
Pharmaceuticals	2.4	[-6.8, 11.5]	-1.9	[-11.2, 8.3]
Primary Care	1.1	[-7.9, 10.3]	1.7	[-7.5, 11.4]
Secondary/Tertiary Care	1.0	[-8.1, 10.2]	1.8	[-7.4, 11.7]
Public Health	0.7	[-8.4, 9.8]	0.8	[-8.6, 10.5]
Framework Legislation	5.2	[-5.6, 16.7]	0.4	[-10.9, 10.9]
Implementation	3.1	[-7.6, 13.9]	3.2	[-7.7, 13.7]
Finance	3.2	[-7.7, 14.2]	0.3	[-10.7, 10.7]
Provision	0.8	[-9.8, 11.6]	0.6	[-10.3, 10.9]
Late Regions (Post-1973)	-3.6	[-5.2, -2.0]	-2.7	[-11.8, 7.1]
Ethnolinguistic Fractionalization	3.9	[0.9, 7.1]	6.3	[-10.0, 22.4]
% Mountainous municipalities	-0.4	[-2.3, 1.6]	5.2	[-6.4, 16.2]
log(Population)	1.2	[0.9, 1.5]	2.3	[-3.0, 7.2]
Standard dev. of random effects	1.0		3.7	[1.8, 7.7]
Correlation of random effects	0.0	[-0.5, 0.5]		
<i>N</i>	420			
Deviance	272.8			
Deviance Information Criterion	311.0			

Table A1. *Multinomial mixed logit estimates of the allocation of authority over health policy in 28 European countries.* Entries are mean posterior estimates of multinomial logistic parameters, with 95% Bayesian confidence intervals in brackets.

Goodness of fit

The model presented in the main text includes country level random effects, which capture any country-level similarities in the allocation of authority across policy tools and areas which is *not* already accounted for by other covariates. Here, we investigate these country-level effects graphically. Figure A1 shows the predicted allocation of authority for an “average” policy task and area (which we read, as in the main text, as representing controversial policies like finance), but with the idiosyncracies of the listed country. The unexplained country-level variation is substantial and much of it may reflect idiosyncratic historical factors such as Scandinavia’s historically strong local governments. Further investigation into institutions and their incentives, along the lines of second-generation fiscal federalism, may be able attribute some of this variation to specific institutional or political variables.

Indeed, a cluster of outlying country random effects in an earlier iteration of the model suggested the inclusion of a control for mountainous countries. In the model presented in the main text, we control for mountains using the percentage of mountainous territory in a country (Nordic Centre for Spatial Development, 2004, Figure 3.1). However, other measures might capture the

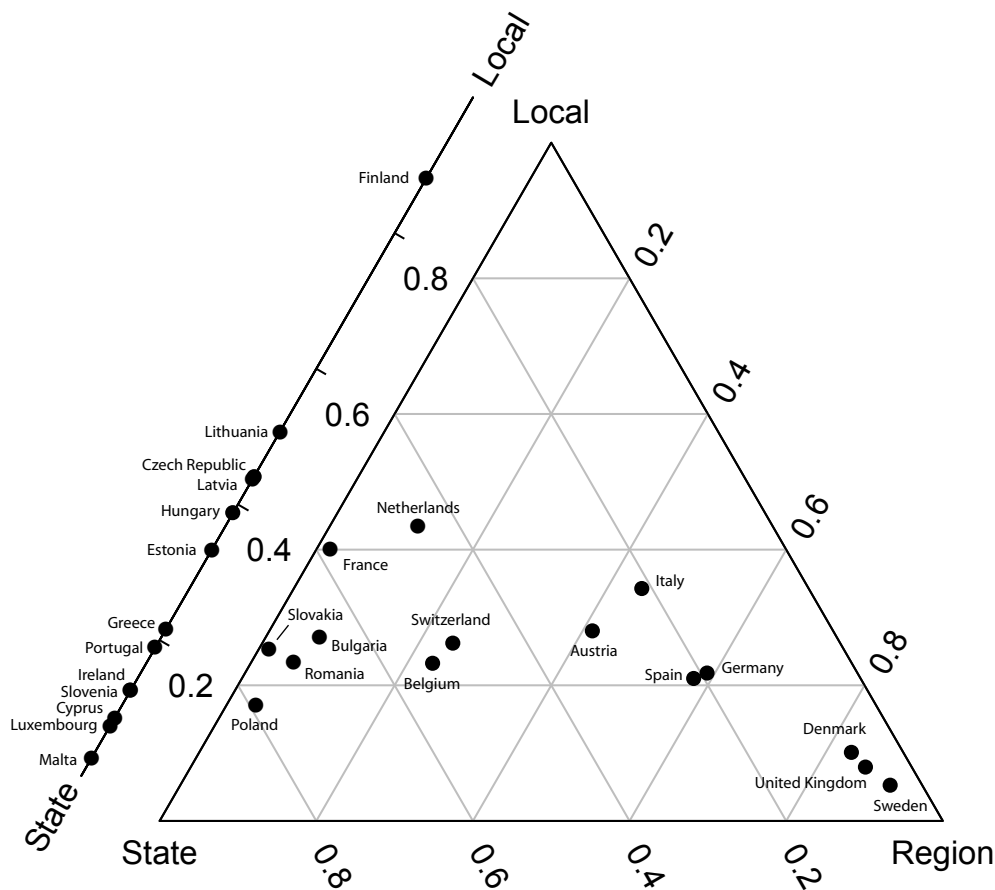


Figure A1. Residual country-level variation in the allocation of authority. For two-tiered countries (the axis at left) and three-tiered countries (the triangular plot), these plots isolate idiosyncratic country differences in the allocation of authority by plotting the mean posterior probability of allocation of authority to each level of government for the average health policy area and task, in a country with average ethnolinguistic fractionalization, population, number of regions, age of federalism, and mountainousness, but with the mean random effect of the listed country.

same the underlying concept of a territory which is geographically challenging to govern from a central authority. Recent work by Ramcharan (2009) suggests that *surface roughness*, which is the standard deviation in elevation across the extent of a territory, might be a plausible alternative to simpler measures of mountainousness, either for explaining concentration of economic activity, development of widespread infrastructure, or centralization of authority in an effective state bureaucracy. In our case, the point is moot, as we obtain similar results on all other covariates whether we use mountains as a control or surface roughness, though we find somewhat stronger effects of the mountains variable itself compared to surface roughness.

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