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RESEARCH ARTICLE

Gubernatorial use of executive orders: unilateral action and policy adoption

Simon Devylder[1], Christoph Bracks[2] and Poppy Siahaan[3]

[1]Université de Neuchâtel, Institut de Mathématiques, Rue, Rue Emile-Argand 11, CH-2000 Neuchâtel, Switzerland
[2]Département de mathématiques et de statistique, Université Laval, Pavillon AlexandreVachon, 1045, av. de la Médecine, Québec, Qc G1V 0A6, Canada
[3]Département de mathématiques et de statistique, Université de Montréal, CP 6128 succ Centre-Ville, Montréal, QC H3C 3J7, Canada

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Abstract
Given a smooth compact hypersurface M with boundary $\Sigma = \partial M$, we prove the existence of a sequence M_j of hypersurfaces with the same boundary as M, such that each Steklov eigenvalue $\sigma_k(M_j)$ tends to zero as j tends to infinity. The hypersurfaces M_j are obtained from M by a local perturbation near a point of its boundary. Their volumes and diameters are arbitrarily close to those of M, while the principal curvatures of the boundary remain unchanged.

1. Introduction

Let M be an n-dimensional smooth compact Riemannian manifold with boundary $\Sigma = \partial M$. The Steklov eigenvalue problem on M consists in finding all numbers $\sigma \in \mathbb{R}$ for which there exists a nonzero function $u \in C^\infty(M)$, which solves

$$\begin{cases} \Delta u = 0 & \text{in } M, \\ \partial_\nu u = \sigma u & \text{on } \Sigma. \end{cases}$$

Here, Δ is the Laplacian induced from the Riemannian metric g on M, and ∂_ν is the outward pointing normal derivative along the boundary Σ. The Steklov eigenvalues form an unbounded increasing sequence $0 = \sigma_0 \leq \sigma_1 \leq \sigma_2 \leq \cdots \to \infty$, each of which is repeated according to its multiplicity. Note that if M is connected, then $\sigma_1 > 0$.

Presidential scholars have long emphasised the role of the executive branch in federal policymaking. Presidents develop policies formally through unilateral action, but they also pursue their objectives in the legislative arena. Governors fill an analogous role within their states. They manage the bureaucracy and help set the policy agenda through speeches, calling special sessions or taking unilateral action. I analyse factors that explain gubernatorial use of executive orders, and I consider how these same executive orders influence statute adoption, using lesbian, gay, bisexual and transgender (LGBT) employment protections as an illustrative case. Presidential scholars have long emphasised the role of the executive branch in federal policymaking. Presidents develop policies formally through unilateral action, but they also pursue their objectives in the legislative arena. Governors fill an analogous role within their states. They manage the bureaucracy and help set the policy agenda through speeches, calling special sessions

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or taking unilateral action. I analyse factors that explain gubernatorial use of executive orders, and I consider how these same executive orders influence statute adoption, using lesbian, gay, bisexual and transgender (LGBT) employment protections as an illustrative case.

Presidential scholars have long emphasised the role of the executive branch in Barclay and Fisher (2003) federal policymaking. Presidents develop policies formally through unilateral action, but they also pursue their objectives in the legislative arena. Governors fill an analogous role within their states. They manage the bureaucracy and help set the policy agenda through speeches, calling special sessions or taking unilateral action. I analyse factors that explain gubernatorial use of executive orders, and I consider how these same executive orders influence statute adoption, using lesbian, gay, bisexual and transgender (LGBT) employment protections as an illustrative case. Presidential scholars have long emphasised the role of the executive branch in federal policymaking. Presidents develop policies formally through unilateral action, but they also pursue their objectives in the legislative arena. Governors fill an analogous role within their states. They manage the bureaucracy and help set the policy agenda through speeches, calling special sessions or taking unilateral action. I analyse factors that explain gubernatorial use of executive orders, and I consider how these same executive orders influence statute adoption, using lesbian, gay, bisexual and transgender (LGBT) employment protections as an illustrative case. They manage the bureaucracy and help set the policy agenda through speeches, calling special sessions or taking unilateral action. I analyse factors that explain gubernatorial use of executive orders, and I consider how these same executive orders influence statute adoption, using lesbian, gay, bisexual and transgender (LGBT) employment protections as an illustrative case.

Once data are disseminated, whatever contractual or other obligations are placed on those receiving Berry and Berry (1990, 1999) the data, the data are effectively out of a data providers' control. Data providers must be certain that the data disseminated do not provide a risk of disclosure necessitating a reduction in the detail available, or they are constrained to using a resource intensive auditing regime, and are likely to discover any data misuse only after it has happened. Once data are disseminated, whatever contractual or other obligations are placed on those receiving the data, the data are effectively out of a data providers' control. Data providers must be certain that the data disseminated do not provide a risk of disclosure necessitating a reduction in the detail available, or they are constrained to using a resource intensive auditing regime, and are likely to discover any data misuse only after it has happened.

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2. Gubernatorial and presidential use of executive orders across the various states

Presidents develop policies formally through unilateral action, but they also pursue their objectives in the legislative arena. Governors fill an analogous role within their states. They manage the bureaucracy and help set the policy agenda through speeches, calling special sessions or taking unilateral action. I analyse factors that explain gubernatorial use of executive orders, and I consider how these same executive orders influence statute adoption, using lesbian, gay, bisexual and transgender (LGBT) employment protections as an illustrative case.

2.1. Presidential use of executive orders is largely consistent with expectations and previous literature

The remainder of the findings is largely consistent Berry et al. (1998) with expectations and previous literature. Diffusion plays a positive role on states adopting sexual orientation protections; yet, it is not statistically significant in explaining the adoption of transgender-inclusive statutes. As anticipated, legislatures are more likely to adopt both forms of legislation in states where the citizens are more liberal.

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3. Results

3.1. Determinants of executive orders

The probability of a state adopting legislation protecting Boehmke (2009) sexual orientation increases by a factor of 1.11 for a one-unit increase in Liberal Citizen Ideology, and the probability increases by a factor of 2.24 for a five-unit increase in citizen ideology. This effect is even more pronounced for transgender protections. A one-unit increase in Liberal Citizen Ideology increases the likelihood of adoption by a factor of 1.20, and the probability increases by a factor of 2.44 for a five-unit increase in citizen ideology. The findings regarding the Evangelical population hint at a similar conclusion.

Estimation

Using Multilevel Event History Analysis, with the state/year as the unit of analysis Bolton and Thrower (2015), I evaluate the following:

1. The probability that a governor i will issue an executive order protecting LGBT employees in time t, given that no executive order is in place.

   They manage the bureaucracy and help set the policy agenda through speeches, calling special sessions or taking unilateral action.
2. The probability that the state legislature i will adopt an LGBT-inclusive employment nondiscrimination statute in time t, given that it has not already done.

Multilevel modelling accounts for these differences and within-state patterns of adoption seen throughout the years Brewer (2007). The effect of determinants that lead to successful statute adoption of LGBT

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Figure 2. *This is an example of short caption this is an example of short caption*

Table 1. *Tables which are too long to fit, should be written using the "table*" environment as shown here.*

Projectile	Energy	σ_{calc}	σ_{expt}	Energy	σ_{calc}	σ_{expt}
Element 3	990 A	1168	1547 ± 12	780 A	1166	1239 ± 100
Element 4	500 A	961	922 ± 10	900 A	1268	1092 ± 40
Element 3	990 A	1168	1547 ± 12	780 A	1166	1239 ± 100
Element 4[1]	500 A	961	922 ± 10	900 A	1268	1092 ± 40
Element 3	990 A	1168	1547 ± 12	780 A	1166	1239 ± 100
Element 4	500 A	961	922 ± 10	900 A	1268	1092 ± 40
Element 3	990 A	1168	1547 ± 12	780 A	1166	1239 ± 100
Element 4	500 A	961	922 ± 10	900 A	1268	1092 ± 40

protections share common elements, but differ based on the type of protections added – sexual orientation versus gender identity.

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Multilevel modelling accounts for these differences and within-state patterns of adoption seen throughout the years. The effect of determinants that lead to successful statute adoption of LGBT protections share common elements, but differ based on the type of protections added – sexual orientation versus gender identity.

The final covariates analyse social factors that influence gubernatorial use of executive orders. These results differ across the models. Diffusion is not statistically significant for the sexual orientation model, but reaches conventional statistical significance for the analysis of gender identity protections. This tentatively suggests that governors are more likely to issue executive orders as more neighbouring states add similar protections. Governors are more likely to issue executive orders to protect sexual orientation when the states are more liberal, and composed of fewer Evangelicals. Both terms reach conventional statistical significance. However, this does not hold when the analysis turns to the determinants of

executive orders that protect gender identity. Citizen ideology is not statistically significant and, counter to sexual orientation protections, governors are more likely to issue executive orders when the Evangelical rate increases. These discrepancies may be related to the changing strategies of governors and LGBT advocates in later years, or it may be a reflection of the late adopters that added protections through executive orders, i.e. the remaining governors in states that were still "at risk" of adopting transgender protections were in more socially conservative states. Both models show that governors are more likely to issue protections later into the time frame, and the variance across the states is statistically significant.

Diffusion plays an inconsistent role in policy adoption, but overall it seems that the diffusion of pro-LGBT policies encourages the issuance of executive orders and adoption of similar legislation. However, diffusion does not come up as statistically significant and positive across the board, and thus caution should be taken when examining its role in policy adoption. Governors used executive orders more commonly to establish protections for sexual orientation, whereas legislation was more prevalent for gender identity; therefore, this might explain why diffusion is only statistically significant in those respective models. One possible explanation for why diffusion of LGBT protections does not function as previous diffusion studies suggest is because states consider several competing policies at once. Throughout the time periods, states do not simply consider adopting one form of the protections. Rather, neighbouring states adopt different variants of these policies (sexual orientation or gender identity) through their executive and legislative branches. This process cannot be captured in a single diffusion variable.

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References

Arizona Memory Project (2014) Arizona Executive Orders, http://azmemory.azlibrary.gov/cdm/search/ collection/execorders (accessed 14 October 2014).

Barclay S and Fisher S (2003) The states and the differing impetus for divergent paths on same-sex marriage, 1990-2001. *Policy Studies Journal* **31**, 331–352.

Berry FS and Berry WD (1990) State lottery adoptions as policy innovations: an event history analysis. *American Political Science Review* **84**, 395–415.

Berry FS and Berry WD (1999) Innovation and diffusion models in policy research. In Sabatier PA and Weible CM (eds.), *Theories of the Policy Process*. Berry and Berry-Boulder, CO: Westview Press, 307–360.

Berry WD, Ringquist EJ, Fording RC and Hanson RL (1998) Measuring citizen and government ideology in the American States, 1960-93. *American Journal of Political Science* **42**, 327–348.

Boehmke FJ (2009) Approaches to modeling the adoption and diffusion of policies with multiple components. *State Politics & Policy Quarterly* **9**, 229–252.

Bolton A and Thrower S (2015) Legislative capacity and executive unilateralism. *American Journal of Political Science* **60**, 649–663.

Brewer PR (2007) *Value War: Public Opinion and the Politics of Gay Rights*. New York: Rowman & Littlefield Publishers.

Burke JP (1992) *The Institutional Presidency*. Baltimore: John Hopkins University Press. Council of State Governments (2014) The Book of States 2014. Council of State Governments http:// knowledgecenter.csg.org/kc/category/content-type/bos-2014 (accessed 10 October 2014).