POLICY INNOVATION IN FEDERAL SYSTEMS

by

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Abstract: Conventional wisdom has it that policy innovation is better promoted in a federal rather than in a unitary system. Recent research, however, has provided theoretical evidence to the contrary: a multi-jurisdictional system is characterized—due to the existence of a horizontal information externality—by under-provision of policy innovation. This paper presents a simple model that introduces political competition for federal office. Under such competition political actors use the innovative policies in order to signal ability to the electorate. In the equilibrium analyzed policy innovation occurs more frequently than in a unitary system. It is thus shown that, once electoral motives are accounted for, the conventional wisdom is validated.

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1 Introduction

A commonly held view is that fiscal federalism promotes innovative public programs and speeds up the process of policy experimentation and its diffusion.[1] This view is rooted in the argument that the division of the economy into a number of independent localities gives them the opportunity to experiment with policies. With several jurisdictions experimenting, the likelihood of finding the best policy is higher than if the control of the policy choice is left to the central government.[2] This view is most vividly summarized in the following citation by Justice Brandeis:

> 'It is one of the happy incidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory and try novel social and economic experiments without risk to the rest of the country.'[3]

While this statement has received widespread support, recent theoretical analysis suggests the contrary: a decentralized system is conducive to producing fewer policy innovations than a centralized one. This might be, for instance, the case either because of political risk—as in Rose-Ackerman (1980)—or because of a horizontal information externality, as in Strumpf (2002). It is this latter explanation that is, partly, at the heart of this paper.

Strumpf (2002) considers a model in which local policymakers decide on policy experiments the outcomes of which are correlated across states. This correlation creates a learning externality and therefore an incentive for the policymakers to free-ride on each other's innovative efforts. This incentive to free ride leads, typically, to under-

[1]This view has been recently expressed by the U.S federal government with regards to abatement technologies. The administration's chief climate negotiator, Harlan Watson, defended the U.S climate policy listing a variety of initiatives by states and communities. This 'bottom-up approach' is based on the fact that states are like 'laboratories where new and creative ideas and methods can be applied and shared with others and inform federal policy.' Herald Tribune, December 11, 2003, p.1, 'Warming feud: states vs. Bush team', by A. Revkin and J. Lee.

[2]See, for instance, the insightful survey of Oates (1999), but also Inman and Rubinfeld (1997), Kollman *et al.* (2000), and Besley (2001). For an early empirical analysis of the diffusion of innovations among the U.S states see Walker (1969).

[3]Brandeis, J. *dissenting*, New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932).

experimentation relative to the social optimum that could be generated by a unitary government.[4]

An important aspect that is absent from Strumpf (2002) concerns the federal political institutions and, more importantly, the electoral incentives faced by the state policymakers in a federal system.[5, 6] Arguably, the implementation of new and unknown policies is more demanding than running 'business as usual' since it requires imaginative leadership on the part of a governor, rather than operational routine. One, therefore, would expect that in federal contests, being innovative at the state level, may positively influence the voters' perception of the ability of a governor standing for federal office.[7] This is, then, the objective of this paper: to incorporate federal elections into an analysis of policy experimentation by local jurisdictions.

In the model presented in Section 2, two state governors, each of whom can be of different ability, choose between an experimental policy and a policy with a certain outcome. After the policy has been implemented, both governors run for the federal presidency and the winner of the elections chooses a federation-wide policy. In this framework a learning externality, arising from correlation of policy outcomes across states, exists. This creates incentives for each governor to avoid the cost of experimentation and, if elected president, to make use of the information procured in the other state. This incentive, however, is mitigated by two effects; the signaling and the policy effect. The

[4]This conflict (and the need for more research on this topic) between the conventional wisdom and the conclusions arrived at by the contributions of Rose-Ackerman (1980) and Strumpf (2002) is also emphasized in Oates (1999).

[5]This is insightfully discussed but not formally analyzed in Rose-Ackerman (1980).

[6]It is quite common observation that in federal systems regional governors run for federal office. Consider, for instance, the U.S experience: with the exception of George Bush senior all of America's past five presidents previously have been governors. The same is true, to give another example, for Germany where four out of the last five chancellors were ex-premiers of federal states. Though this does not show the innovativeness of the governors prior to the federal elections, it does show their level of political aspirations.

[7]This view is shared by political observers too. In a commentary, for example, J. Podhoretz notes, '...although he is not a bold politician, Bush is an innovator. On all these issues [education, social security and medicare] he has fresh proposals that derive from state and local politics – from **experiments** by the Republican governors like himself who have come to dominate the 50 state capitals.' *The Times*, October 13, 2000. Commentary: 'Gore has made his bed, but nobody wants to lie in it.' Bold face emphasis added.

former, and to some extent the most obvious, effect refers to the incentive of a governor to signal ability to the electorate by experimenting. The policy effect refers to the nature of the federal political career: a governor anticipating to become president and then to govern the entire nation will take into account the benefit procured to the other state by her own choice of policy experimentation. It is the combination, and strength, of these two effects that make governors opt for the experimenting public policy.

The simple framework analyzed is rich in implications. It is shown that, strikingly, the possibility that a federal system is more conducive to policy experimentation than a unitary system, once the political process for federal office is accounted for, is a real one. This reverses the conclusion of Rose-Ackerman (1980) and Strumpf (2002) and validates the conventional wisdom that has been vividly expressed in the quotation by Justice Brandeis.[8]

The paper is organized as follows. Section 2 describes the model. Section 3 analyzes the equilibrium of the model, and Section 4 compares it to the unitary outcome. Finally, Section 5 concludes.

2 The model

We study a dynamic two period model which incorporates signaling and an election between both periods. We abstract, for simplicity, from discounting between the two periods. There are two states that are identical in all respects. In period 1 in each state a governor is in charge of choosing policy. In the end of that period both governors run for the federal presidency. In period 2 the president selects policy for both states.[9]

Policymakers are of two abilities: high, denoted by $\overline{\alpha}$, and low, denoted by $\underline{\alpha}$, with, in particular, $\overline{\alpha} > \underline{\alpha} > 0$. Ability is private information. Each policymaker is of high

[8]This conclusion, though derived in an entirely different context, is reminiscent of the idea that the existence of a federal government may over-turn the (negative) inefficiencies arising from non-cooperative behavior at the state level, Keen and Kotsogiannis (2002).

[9]The issue at the heart of the paper is to compare the incentives of governors for experimentation arising within a given federal election. We so abstract from incentive considerations arising from the re-election of the president of the federal system after period 2 (and of the unitary president of Section 4).

ability with probability $\lambda \in (0,1)$. The abilities of the two governors are independent of each other.

In both periods incumbents decide whether to introduce or not a new and innovative public policy whose return is probabilistic and depends on the policymaker's ability. In particular, with probability θ its quality[10] is high, and denoted by $q_h + \alpha$, and with complementary probability $1-\theta$ it is low, $q_l + \alpha$, where $\alpha = \overline{\alpha}, \underline{\alpha}$.[11] Alternatively, they use a public policy whose return is certain and given by q_o. This policy can have a dual interpretation: it can be either an old one that has been used in the past or a new policy with a certain return. It is natural the returns of the policies to be ranked according to

$$q_h + \overline{\alpha} > q_h + \underline{\alpha} > q_o > q_l + \overline{\alpha} > q_l + \underline{\alpha} > 0\,. \tag{1}$$

Central to this paper are the incentives of the policymakers to experiment and so it is imperative to restrict attention to a policy innovation which is not from the outset superior to the old policy. We, therefore, assume that

$$\theta \leq \frac{q_o - (q_l + \overline{\alpha})}{q_h - q_l} \equiv \theta^*\,. \tag{2}$$

This restriction simply says that the innovative policy does not provide a short run benefit to a governor.[12] It is then clear, following (2), that any incentive to innovate arises from the dynamic nature of the model. We turn to this next.

During the first period, citizens observe the quality q_i ($q_i = q_h + \overline{\alpha}, q_h + \underline{\alpha}, q_o, q_l + \overline{\alpha}, q_l + \underline{\alpha}$) of the policy in both states and form beliefs about the ability of both governors. The posterior probability that the governor of state i is of high ability given the quality q_i of the policy is denoted by $\mu_i(q_i)$. At the end of the first period there is an election. Voting is retrospective and citizens elect for president the governor who is more likely to be of high ability. That is, if $\mu_i > \mu_j, i = 1,2, i \neq j$, then citizens elect for president the

[10]Policies are costly and, without loss of generality, their cost has been suppressed.

[11]Combining ability and random policy outcome in an additive specification is a convenient way to describe the main effects while keeping the notational burden to a minimum. The basic insights provided by the analysis appear in undiminished force with alternative and more general specifications.

[12]Though the restriction in (2) refers to the high ability governor it, too, holds, following from $\overline{\alpha} > \underline{\alpha}$, for the low ability one.

governor of state i. In case $\mu_i = \mu_j$ they toss a coin and each governor is elected with probability 1/2.

The outcome of the experimenting policy is perfectly correlated across states implying that the quality of the new policy becomes common knowledge if a state innovates.[13] Consequently, if at least one experiment was performed, whoever is in charge of the policy decision in period 2, is informed about the quality of the new policy.

Policymakers derive utility from the per-period quality of the policy chosen provided they are in office. In period 2 the governor who is not elected president receives zero utility.

This model defines a game between both types of the policymakers in both states. At the beginning of the game Nature chooses the ability type of both governors. A strategy for each type of governor in state $i = 1, 2$ consists, first, of a policy decision for state i in the first period. The second component is a rule, possibly depending on the policy outcomes observed in period 1, that specifies the policy choices for both states in period 2, should the governor of state i be elected as president. An equilibrium of this game consists of a strategy for each ability type of the governor of each state and of citizens' beliefs satisfying two requirements. Firstly, given the beliefs of the citizens and the strategies of both types of governor in state $j \neq i$, the strategy of the governor of state i has to be optimal whenever this governor is called upon to decide. Secondly, the beliefs must be consistent with the governors' strategies.

3 The federal system

We start by analyzing the president's choices in the second period after the first period election. In the second period the president has no re-election motives and thus chooses the policy which yields the highest expected quality. If the new policy has been chosen in the first period, in at least one of the two states the president is informed about the new policy's quality. She then chooses the new policy in both states if the quality is

[13] This is for simplicity. Imperfect correlation across states is feasible but it obscures the main forces at work.

q_h yielding a payoff $2(q_h + \alpha)$ where α is the president's ability. If the quality is q_l she returns to the old policy obtaining the payoff $2q_o$. If no state has experimented with the new policy then she chooses, following (2), the old policy with again payoff $2q_o$.

As noted in the introductory Section, the purpose of this analysis is to show the possibility that a federal system produces over-experimentation relative to a unitary state. We do so by picking an equilibrium which is indeed characterized by more innovation relative to a unitary state.[14] In this equilibrium in both states the high ability governor experiments and the low ability governor selects the old policy. This leads to beliefs $\mu_i(q_h + \overline{\alpha}) = \mu_i(q_l + \overline{\alpha}) = 1$ and $\mu_i(q_h + \underline{\alpha}) = \mu_i(q_l + \underline{\alpha}) = \mu_i(q_o) = 0$ for $i = 1, 2$.

Consider now, given these beliefs, the choices open to a high ability governor in state i assuming that the governor of state $j \neq i$ behaves according to the hypothesized strategies. If the governor of state i chooses the new policy her expected first period payoff is given by

$$\theta\left(q_h + \overline{\alpha}\right) + (1 - \theta)\left(q_l + \overline{\alpha}\right) . \tag{3}$$

By this choice, she reveals her high ability to the electorate ensuring a belief $\mu_i = 1$. If the governor of state j is of high ability, her strategy being the same, she also reveals her type implying $\mu_j = 1$. In this case the governor of state i wins the election with probability $1/2$. If, now, the governor of state j is of low ability she chooses the old policy which leads to $\mu_j = 0$ ensuring that the governor of state i is elected with probability 1. Using the prior probabilities, the likelihood of governor i winning the election is $\lambda/2 + 1 - \lambda = (2 - \lambda)/2$.

If the governor of state i is elected president, in the second period, she knows with certainty the quality of the new policy, having experimented in the first period. Conditional upon being elected the second period payoff after innovating in the first period—following the discussion in the first paragraph of this Section—is

$$2\left[\theta\left(q_h + \overline{\alpha}\right) + (1 - \theta)\, q_o\right] . \tag{4}$$

[14] A full characterization of the equilibria of the model can be provided. This, however, will not provide any further insights into the effects leading to innovation in a federal system. For the sake of brevity these equilibria are therefore omitted.

Multiplying now (4) with $(2-\lambda)/2$ and adding to (3), one obtains the payoff from choosing the new policy that is,

$$\theta\left(q_h+\overline{\alpha}\right)+(1-\theta)\left(q_l+\overline{\alpha}\right)+(2-\lambda)\left[\theta\left(q_h+\overline{\alpha}\right)+(1-\theta)\,q_o\right]. \tag{5}$$

If the governor of state i chooses the old policy the first period payoff is q_o. Having chosen the old policy the governor of state i is taken to be, following $\mu_i(q_o)=0$, of low ability. If the governor of state j is of high ability, this happens with probability λ, the governor of state i is defeated in the elections obtaining zero second period payoff. With probability $1-\lambda$ the governor of state j is of low ability implying $\mu_j=0$. In this case the governor of state i is elected with probability $1/2$. Since no experiment has taken place, the second period payoff for the governor of state i in this case is $2q_o$. The total payoff from choosing the old policy, then, is

$$(2-\lambda)\,q_o\,. \tag{6}$$

Comparing (5) and (6) it is immediate from $q_h+\overline{\alpha}>q_o$ that it is optimal for the high ability governor of state i to choose the new policy.

We now turn to the low ability type governor in state i. If this governor chooses the old policy then in the first period her payoff is q_o. In this case she is defeated in the election if the governor of state j is of high ability and she is elected with probability $1/2$ if the governor of state j is of low ability. In the latter case the second period payoff, conditional on winning the election, is given by $2q_o$. Consequently, the total payoff from choosing the old policy for the low ability type is given by (6).

If the low ability governor chooses the new policy in the first period then the first period benefit is given by (3) with $\overline{\alpha}$ replaced by $\underline{\alpha}$. In this case she is elected with probability $1/2\,(1-\lambda)$. Since she has experimented with the new policy the expected payoff in the second period, conditional on being elected, is then given by (4) with $\overline{\alpha}$ replaced by $\underline{\alpha}$. Combining first and second period payoffs one obtains

$$\theta\left(q_h+\underline{\alpha}\right)+(1-\theta)\left(q_l+\underline{\alpha}\right)+(1-\lambda)\left[\theta\left(q_h+\underline{\alpha}\right)+(1-\theta)\,q_o\right]. \tag{7}$$

Comparison between (7) and (6) reveals that the low ability governor of state i chooses the old policy if

$$\theta \leq \frac{q_o - (q_l + \underline{\alpha})}{(q_h - q_l) + (1 - \lambda)(q_h + \underline{\alpha} - q_o)} \equiv \underline{\theta}_g \,. \tag{8}$$

Close inspection of (8) reveals that $\underline{\theta}_g$ is positive and strictly below θ^* as defined in (2). We, therefore, arrive at:

Proposition 1 *For all $\theta \in [0, \underline{\theta}_g]$ there exists an equilibrium where in both states the high ability governor experiments and the low ability governor selects the old policy.*

We turn now to the benchmark case in which policies are chosen by the president of the unitary nation.

4 The unitary nation

The president of the unitary nation in the first period chooses the policy for each state. There are three choices open to her: choose the new policy in both states; choose the new policy in one and the old policy in the other state; and choose the old policy in both states.

Consider the high ability type and the first of these options. Choosing the new policy in both states in the first period she obtains payoff, in each state, given by (3). In the second period, having experimented in the first, she obtains a payoff given by (4). Adding these payoffs one obtains

$$2\left[2\theta\left(q_h + \overline{\alpha}\right) + (1 - \theta)\left(q_l + \overline{\alpha} + q_o\right)\right]. \tag{9}$$

If now she chooses the new policy in one state and the old in the other, in the first period she obtains payoff $\theta\left(q_h + \overline{\alpha}\right) + (1 - \theta)\left(q_l + \overline{\alpha}\right) + q_o$. In the second period, being informed about the quality of the new policy, she again receives the payoff given by (4). Total payoff from this choice, then, is

$$\theta\left(q_h + \overline{\alpha}\right) + (1 - \theta)\left(q_l + \overline{\alpha}\right) + q_o + 2\left[\theta\left(q_h + \overline{\alpha}\right) + (1 - \theta)\, q_o\right]. \tag{10}$$

Finally, if she chooses the old policy in both states she obtains a total payoff of $2q_o$ from each state.

Comparing the payoffs arising from these three choices we first observe that, from $\theta \leq \theta^*$, the payoff in (9) is dominated by the payoff in (10). Comparing now the payoff in (10) with the payoff $4q_o$ (obtained from choosing the old policy in both states) one concludes that it is optimal for the high-ability president to experiment in one state if

$$\theta \geq \frac{q_o - (q_l + \overline{\alpha})}{(q_h - q_l) + 2(q_h + \overline{\alpha} - q_o)} \equiv \overline{\theta}_p. \tag{11}$$

Similarly, following analogous reasoning, the low ability president chooses to experiment in one state if $\theta \geq \underline{\theta}_p$, where $\underline{\theta}_p$ is defined as $\overline{\theta}_p$ in (11) but with $\overline{\alpha}$ replaced by $\underline{\alpha}$. It is easy to verify, following $\overline{\alpha} > \underline{\alpha}$, that $\underline{\theta}_p > \overline{\theta}_p$. Moreover, both $\overline{\theta}_p$, $\underline{\theta}_p$ are positive and strictly less than θ^*. We so have:

Proposition 2 *(i) For all $\theta \in [0, \overline{\theta}_p]$, it is optimal for both types of the president of the unitary nation to choose the old policy in both states.*

(ii) For all $\theta \in [\overline{\theta}_p, \underline{\theta}_p]$, it is optimal for the high ability type president of the unitary nation to choose the new policy in one and the old policy in the other state. For the low ability type it is optimal to choose the old policy in both states.

(iii) For all $\theta \in [\underline{\theta}_p, \theta^*]$, it is optimal for both types of president of the unitary nation to choose the new policy in one and the old policy in the other state.

In order to compare the outcome in the federal system of Proposition 1 with that of the unitary system of Proposition 2 we now need to relate the critical values $\underline{\theta}_g$ and $\underline{\theta}_p$. A simple comparison between (8) and (11) (with $\overline{\alpha}$ replaced by $\underline{\alpha}$) shows that $\underline{\theta}_p < \underline{\theta}_g$. Consequently, the interval $[\overline{\theta}_p, \underline{\theta}_p]$ is contained in $[0, \underline{\theta}_g]$.

To progress further in the comparison, we now define a measure of innovation. A natural measure in the present context is the expected number of times the new policy is chosen in the first period. In the equilibrium described in Proposition 1 three cases can arise. If there is a high ability type governor in both states, which happens with probability λ^2, the new policy is chosen twice. With probability $2\lambda(1-\lambda)$ there is a high

ability type governor choosing the new policy in one state only. Finally, with probability $(1-\lambda)^2$ both governors are of low ability type producing no innovation. Altogether the expected amount of innovation is $2\lambda^2 + 2\lambda(1-\lambda) = 2\lambda$.

Turning now to the choice of the president of the unitary nation, as given in Proposition 2, we observe that for $\theta < \overline{\theta}_p$ there is no innovation. For $\theta \in [\overline{\theta}_p, \underline{\theta}_p]$ the president only chooses the new policy in one state if she is of high ability. In this case the amount of innovation is λ. Finally, for $\theta \in [\underline{\theta}_p, \theta^*]$, whatever the type of the president, she chooses the new policy in one state and the old in the other. The amount of innovation is, then, 1. Summarizing:

Proposition 3 *A federal system produces more innovation than the unitary nation for all* $\theta \in [0, \underline{\theta}_p)$. *For all* $\theta \in [\underline{\theta}_p, \underline{\theta}_g]$ *a federal system produces more innovation than the unitary nation if* $\lambda > 1/2$.

The trade-off leading to the optimal decision of the president of the unitary nation, as stated in Proposition 2, is rather simple. On the one hand, innovation is costly because in expected terms the new policy fares worse than the old policy in period 1. On the other hand, the information produced in period 1 by experimenting allows for a higher payoff in the second period. Therefore, if θ is not too low, as in case *(ii)* of Proposition 2 for the high ability type, and in case *(iii)* for both types, the learning benefit outweighs the short term cost of innovation. Hence, the president of the unitary nation finds it optimal to innovate. If, conversely, θ is too low, then no innovation takes place in the unitary nation. The president of the unitary nation, however, never performs two experiments since, due to the perfect correlation of policy outcomes across states, a second experiment does not provide any additional learning benefit.

In the federal system the same trade-off exists because the governors, too, have an incentive to learn. The difference between the two systems arises from two considerations introduced by electoral competition. Firstly, with the probability for each governor of winning the election being less than one, the benefit of learning is not fully internalized. Secondly, the high ability governor enhances her electoral prospects by innovating,

thereby communicating her ability to voters. For this type, the electoral benefit always outweighs the costs of innovation. To see this clearly, consider the extreme case where the new policy is of low quality with certainty, that is, $\theta = 0$. Switching from the new to the old policy confers a first period gain of q_o but in the same time reduces the probability of winning the election by 1/2. Since the second period payoff, conditional on being elected president, is $2q_o$, deviating to the old policy does not pay off. Thus, the high ability governor innovates even if there is no benefit from learning. Obviously, in the case where both governors are of high ability both have the same electoral motives to innovate. Consequently, in this case, there may be double innovation in the federal system.

A low ability governor prefers not to reveal her ability to the voters and hence she has no electoral motive for choosing the new policy. As a consequence, her decision is entirely determined by the trade-off faced also by the president of the unitary nation: the trade-off, that is, between the short term costs of innovation and the benefit of learning. Because of the information externality, $\underline{\theta}_g$, the minimum value for θ such that she innovates, is higher than $\underline{\theta}_p$, the minimum value of θ required to induce the low ability type of the president of the unitary nation to innovate. For this reason, if θ is between these values, the federal system produces more innovation than the unitary nation only if the prior probability of the high ability type is larger than 1/2.

5 Concluding remarks

Conventional wisdom has it that federalism promotes policy innovation. In contrast, recent research has emphasized that a multi-jurisdictional system is characterized by under-provision of policy innovation. The present paper has presented a simple model introducing political competition into the analysis of a federal system. In the equilibrium analyzed, policy innovation occurs more frequently than in a unitary nation. This shows that once electoral motives are accounted for, the conventional wisdom is validated.

The model suggests a number of extensions. Firstly, learning across states and

between periods may be less than perfect. Secondly, the signal about the governor's ability conveyed by innovating may not be fully informative. Finally, another avenue for research is to incorporate other forms of political competition in federal systems. Certainly, there remains much scope for the analysis of experimentation in richer models of political competition. We hope to have shown that the task is worthwhile and that the conclusions can be instructive.

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