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Pooling Sovereignty with the Subsidiarity Principle

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Abstract

This paper considers an economy in which two jurisdictions must choose the level of government – centralized or decentralized - in charge of the provision of a public good. Negotiation, which involves the application of the subsidiarity principle, takes place. Under the centralized system, jurisdictions choose policy jointly and cooperatively. Under the decentralized system, jurisdictional governments choose policy independently, simultaneously and competitively. The paper focuses on the role of spillovers on decision-making when centralization is mutually desirable. Results show that pooling sovereignty with the subsidiarity principle fails to fully internalize spillovers. As a consequence, policy may be inefficiently underprovided.

Key words: Public goods; Centralization; Bargaining.

JEL Classifications: D78, H0, H41.

“Pooling sovereignty means, in practice, that the member states delegate some of their decision-making powers to shared institutions they have created, so that decisions on specific matters of joint interest can be made democratically at European level”. (Europe, n.d.)

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1 Introduction

The fundamental principle of subsidiarity has largely driven the European discussion about which competencies should be given to the European Community and which, instead, retained for the member states alone. The subsidiarity principle applies to all those areas that do not fall within the exclusive competence of the European Union. It states that the European Union will provide a certain policy if this cannot be sufficiently (or efficiently) provided by the member states either by the national or regional governments. The principle implies a benefit criterion stating that the European provision of policies must bring added value over and above what could be achieved by individual governments provision alone.

The goal of this paper is to develop a decision-making model representing international negotiations through which national states bargain over how they will delegate important pieces of sovereignty upwards from the national to the supra-national level. Though the model may be used to study policy formation in most federations not only at the international level, the original aim of this work is to investigate how the European provision of policies is affected by the implementation of the subsidiarity principle. Results show that pooling sovereignty with the subsidiarity principle fails to fully internalize spillovers. As a consequence, policy may be inefficiently underprovided.

The model analyses the process of integration between two polities. Two countries negotiate over the transfer of the national power to implement a particular policy, such as the provision of a public good like the military, to a common supra-national institution. The paper breaks into the traditional issue raised by the fiscal federalism literature of what level of government should be responsible of taxing and spending by exploring the following matters:

- 1) How do national states conduct negotiations in the international arena in order to allocate the power to provide policies to a centralized supra-national institution? And, what is the role played by national constraints in the negotiation?

- 2) How do conflicting interests caused by spillovers and heterogeneity affect the capability of the supranational authority to make decisions?

We consider a cooperative bargaining situation in which the supra-national legislature will be able to implement a policy if and only if the member states reach a unanimous agreement over it. In this case, policy is uniformly provided across countries and its cost is covered by a proportional income tax. Conversely, if an agreement is not reached, then national states remain free to provide their desired policy at the

national level.¹ Policy is provided cooperatively at the centralized or European level and competitively at the decentralized or national level. The choice between centralized and decentralized provision, implies a trade-off between cooperative and competitive outcome, a central issue in the process of pooling sovereignty.

Spillovers play a central role in the model. Positive spillovers, for example, produce a situation in which, a policy implemented by a national government benefits the citizens of the state in which it is located, but has also beneficial effects to the citizens of other states. As a result, in the presence of spillovers, national governments will neglect benefits going to other states by under providing public goods at the national level. Weyerstrass et al's (2006) empirical assessment of the magnitude of economic spillovers and the welfare gains from economic policy coordination in the Euro Area shows that larger spillovers increase interdependence and cooperation in the EU.

A major advantage of centralization is in the internalization of spillovers. Oates (1972) showed that centralization produces a higher level of welfare than does decentralization when districts are identical. If districts are not identical, there is a critical value of spillovers, such that a centralized system produces a higher level of welfare if and only if spillovers exceed this critical level.²

This paper shows that the influence spillovers have on the decentralized outcome also affects policy formation under the centralized system when the subsidiarity principle is adopted to centralize decision-making. Spillovers affect the bargaining outcome because they influence the bargaining power of the countries involved.

The starting point of this analysis is in the building up of a model of bargaining over centralization in a fiscal federalism context. In this framework, member states integrate by pooling their national sovereignty to a shared supra-national institution. For this purpose, a development of Giuranno's (2005) and Besley and Coate's (2003) models are used. Besley and Coate's (2003) introduced a political economy ap-

¹The common European defence policy, which offers potentially large efficiency gains, provides an example in which this model applies. Yet despite numerous efforts to implement an effective European foreign policy, foreign policy continues to be provided by national governments because European states failed to reach an agreement that would transfer this power to the EU. A major cost of pooling sovereignty is associated with the sacrifice of national powers and interests in favour of a common European Policy. Benefits that can be identified are economics of scale, the sharing of the costs and the internalization of spillovers. The case concerning a common European defence policy is well discussed in Fontanel and Smith (1991).

²However, below this level, centralization can still be superior if the assumption of uniform provision is relaxed (Besley and Coate, 2003).

proach into Oates's (1973) decentralization theory. They studied the role of spillovers in the centralized versus decentralized provision of public goods. Giuranno (2005) extended the working of the central legislature in Besley and Coate (2003) by developing a bargaining approach in the legislature's decision-making process to study how income inequality affects the provision of public goods. Here, Giuranno's model is extended in order to represent the process of international integration that is typical of the European Union.³

National constraints play an important role in the bargaining process. International agreements, for example, must be ratified by national legislatures. Several models of international negotiations have shaped the disagreements over the so called Schelling conjecture (Schelling, 1960). This implies that the negotiator with the greatest domestic constraints holds an advantage during international negotiations (Bailer and Schneider, 2006). Putnam (1988) has suggested that the negotiation process can be decomposed into two analytical stages: in the first stage, bargaining takes place between negotiators at the international level; in the second stage, the national legislatures ratify or reject the agreement⁴. Whereas Putnam's theory inspired several bargaining models mainly based on the application of Rubinstein's (1982) alternating-offer model (Mo, 1994; Ida, 1993; Tarar, 2001), this paper builds on it to include national constraints in a Nash cooperative bargaining framework: the disagreement utility for each country is represented by the welfare produced by the national provision. We assume that a necessary condition for an agreement to be ratified by national legislatures is that the utility each country receives from the supranational implementation of policy must be greater than the welfare produced by national provision. Furthermore, international negotiation implies a choice between the non-co-operative national provision of policies and a uniform cooperative supranational provision.

Stokman and Thomson (2004), Thomson et al (2006), and Schneider et al (2006) support the choice of a cooperative bargaining model for our purpose. They assessed the empirical relevance of alternative models of legislative decision-making in the European Union. Their results posit cooperative bargaining models, focusing on the informal bargaining that take place before the legislative proposals are adopted as laws, do much better than procedural models in generating accurate forecasts of decision outcomes.

³However, the same model can be used to study the process of centralization within a single state.

⁴Putnam stated that negotiators have to go back to their domestic constituents if they wanted negotiations to succeed.

The paper is organized as follows: the next section defines the framework and reproduces some standard results concerning policy determination under decentralization and the social optimum under centralization; Section three develops a model of bargaining over centralization; section four presents the results and section five concludes.

2 The framework

Consider two equal sized and independent jurisdictions or states comprising a federation. Each jurisdiction has the same number of people with a mass of unity. There are two types of goods in this economy, a public good g and a private good y , which we consider to be individual income that is used for private consumption. For simplicity and without loss of generality we assume that all citizens in each jurisdiction are endowed with the same income but have different tastes, λ , regarding the public good; i.e., jurisdictions are not homogeneous. Jurisdictions elect their own representatives, who are identified on the median voters. The two median voters have to decide if providing a public good jointly at the centralized level or independently at the local level.

The individual endowments y contributes to finance the public good. Instead, the parameter $\lambda > 0$ tells us how much a median voter prefers g with respect to y . Preferences for the median voter of jurisdiction i are

$$y_i + \lambda_i [(1 - k) \ln g_i + k \ln g_{-i}] \quad (1)$$

The parameter $k \in [0, 1/2]$ indexes the degree of spillovers; when $k = 0$ median voter cares only about the public good in his own jurisdiction, while when $k = 1/2$ he cares equally about the public goods in both jurisdictions. While spillovers are the same for all citizens, those with higher λ 's value public goods more highly.

Under the decentralized (national) system, the public good in each jurisdiction (country) is provided by the government of that Jurisdiction (country) and public expenditure is financed by a uniform head tax on jurisdictional (national) residents. To produce one unit of the public good requires p units of the private good. Thus, if jurisdiction i chooses a public good level g_i , each citizen in jurisdiction i pays a head tax of pg_i . Therefore, the budget constraint for jurisdiction i is⁵

$$ty_i = pg_i; \quad \text{with } i = 1, 2. \quad (2)$$

Accordingly, the utility of median voter in jurisdiction i is

$$u_i = y_i - pg_i + \lambda_i [(1 - k) \ln g_i + k \ln g_{-i}]. \quad (3)$$

⁵Note that population is normalized to one and that all citizens consume the same level of public good g_i .

In order to better show who, between the two median voters, is benefiting (or losing) from the presence of spillovers we rewrite the utility function as follows

$$u_i = y_i - pg_i + \lambda_i \left(\ln g_i + k \ln \frac{g_{-i}}{g_i} \right). \quad (4)$$

In jurisdiction i spillover effect is zero when $g_i = g_{-i}$, increases in g_{-i} and decreases in g_i ; i.e.: $du_i/dk = \ln(g_{-i}/g_i)$. Thus, jurisdiction i gains (losses) in terms of spillover if $g_{-i} > g_i$, ($g_{-i} < g_i$).

2.1 The social optimum

We can apply Besley and Coate's (2003) criterion of aggregate public good surplus for comparing the performance of the decentralized and centralized systems. Given the relation between g and the tax-rate t given by equation (2), the aggregate public good surplus with tax rates $(t_1^D; t_2^D)$ is⁶

$$W(t_1^D; t_2^D) = [\lambda_1(1-k) + \lambda_2k] \ln \frac{t_1 y_1}{p} + [\lambda_2(1-k) + \lambda_1k] \ln \frac{t_2 y_2}{p} + (y_1 + y_2) - (y_1 t_1 + y_2 t_2) \quad (5)$$

The tax rates maximizing social surplus are given by

$$(t_1^{D*}; t_2^{D*}) = \left(\frac{\lambda_1(1-k) + \lambda_2k}{y_1}; \frac{\lambda_2(1-k) + \lambda_1k}{y_2} \right) \quad (6)$$

In each state, the tax rate is inversely related to the median voter's income and directly proportional to λ_1 and λ_2 . As a result, the tax rates in (6) produce the public good levels

$$(g_1^{D*}; g_2^{D*}) = \left(\frac{\lambda_1(1-k) + \lambda_2k}{p}; \frac{\lambda_2(1-k) + \lambda_1k}{p} \right). \quad (7)$$

When λ_1 exceeds λ_2 , country 1's level is higher for all $k < 1/2$.

2.2 Policy determination at the decentralized level

In a decentralized system, policy is assumed to be chosen independently by each jurisdictional government whose object is to maximize public goods surplus in the jurisdiction. Policies are chosen simultaneously in the two jurisdictions. Accordingly, the tax rates (t_1^D, t_2^D) will form a Nash equilibrium. This requires that:

$$t_i^D = \arg \max_{t_i} \left\{ \lambda_i \left[(1-k) \ln \frac{t_i y_i}{p} + k \ln \frac{t_{-i} y_{-i}}{p} \right] - y_i (t_i - 1) \right\}, \text{ for } i \in \{1, 2\}$$

⁶As in Besley and Coate (2003) we will assume throughout that citizens endowments are large enough to meet their tax obligations.

Taking first order conditions and solving yields:

$$(t_1^D, t_2^D) = \left(\frac{\lambda_1 (1 - k)}{y_1}, \frac{\lambda_2 (1 - k)}{y_2} \right). \quad (8)$$

Considering the equivalences $t_i y_i = p g_i = \lambda_i (1 - k)$, the public good levels are

$$(g_1^D, g_2^D) = \left(\frac{\lambda_1 (1 - k)}{p}, \frac{\lambda_2 (1 - k)}{p} \right). \quad (9)$$

Local governments take into account only the benefits received by citizens in their own jurisdiction. Accordingly, public good decisions are surplus maximizing when there are no spillovers. With spillovers, public goods are under-provided in both states and this under-provision is increasing in the extend of spillovers.

When tastes are homogeneous, $\lambda_1 = \lambda_2$, the two national governments choose the same level of public goods provision, which is lower the higher the spillovers. In this case, the wealthier median voter pays a lower tax rate. Instead, when the incomes are the same, i.e. $y_1 = y_2$, the median voter with the higher taste pays a higher tax rate.

Under decentralization median voter i 's welfare is

$$u_i^D = y_i (1 - t_i^D) + \lambda_i \left(\ln g_i^D + k \ln \frac{\lambda_{-i}}{\lambda_i} \right). \quad (10)$$

It useful to distinguish between the "direct" and the "indirect spillover effect" on median voters' utility. For median voter i , the direct spillover effect is represented by $k \ln \frac{\lambda_{-i}}{\lambda_i}$, which is positive when $\lambda_{-i} > \lambda_i$ and negative when $\lambda_{-i} < \lambda_i$. The direct spillover effect benefits the median voter with the lowest taste because public good provision is lower in his jurisdiction and penalizes the median voter with the highest taste whose country provides the highest level of public good. As a consequence, spillovers have an indirect effect on both the decentralized tax rate, t_i^D , and the public good provision, g_i^D . An increase in k , for example, causes both a benefit loss because g_i^D is lower and a saving in terms of tax-rate reduction. The total marginal effect of spillovers is presented in the following lemma:

Lemma 1 *Under decentralization, median voter i 's utility declines in k if either $\lambda_i > \lambda_{-i}$ or $\lambda_i < \lambda_{-i}$ and $\ln \frac{\lambda_{-i}}{\lambda_i} < \frac{k}{1-k}$ and increases when $\lambda_i < \lambda_{-i}$ and $\ln \frac{\lambda_{-i}}{\lambda_i} > \frac{k}{1-k}$.*

Proof. See Appendix. ■

Basically, median voters' utility increases in spillovers when the direct marginal effect is positive ($\lambda_i < \lambda_{-i}$) and greater than the indirect marginal effect. In this case, an increase in spillover increases median voter's welfare when policy is chosen by the decentralized government.

2.3 Policy determination under centralization

The centralized government finances the public good uniformly across countries by levying a proportional income-tax, t .⁷ Once the legislature decides the tax rate t , the public good quantity is automatically determined by the following relation or budget constraint⁸

$$pg = t(y_1 + y_2). \quad (11)$$

In particular, the cost paid by median voter i is $ty_i = \frac{y_i}{y_i + y_{-i}}pg = \gamma_i pg$; that is, regions share the cost according to their relative income, indicated with γ , such that $\gamma_i = \frac{y_i}{y_i + y_{-i}}$ and $\gamma_{-i} = 1 - \gamma_i$. This, in turn, implies that an increase in the income of one median voter leads to an increase of his relative cost. Furthermore, this mechanism of cost sharing implies a tax-income redistribution from the richest median voter to the poorest one. The public good provision in the poorest state is partially financed by the richest state.

Median voters' utility function when policy is determined at the supranational centralized level is

$$u_i = y_i(1 - t) + \lambda_i \ln \frac{t(y_i + y_{-i})}{p}, \quad (12)$$

As expected, in this situation spillovers are fully internalized.

2.3.1 Social optimum under centralization

The centralized outcome is a result of negotiations between jurisdictional delegates. Before explaining the negotiation process we briefly study the centralized optimum; i.e. the policy that a benevolent central planner would choose. With respect to the social optimum studied above, here, the central planner provides a uniform level of public good across jurisdictions.

Let us assume that a central planner maximizes an additive social welfare function based on median voters' preferences. The optimum tax rate, t^e , solves

$$t^e = \arg \max_t \left[(1 - t)(y_i + y_{-i}) + (\lambda_i + \lambda_{-i}) \ln \frac{t(y_i + y_{-i})}{p} \right] \quad (13)$$

⁷This is a fair representation the EU financing, which is characterized by transfers from the member states proportional to the states' GNP. The EU also receives a proportion of the VAT levied by the Member States.

⁸The model can be extended in order to consider the case of non-uniform regional tax-income rates as follows: $pg = t_1 y_1 + t_2 y_2$. In this case, the centralized legislature will choose g , t_1 and t_2 .

it is easily checked that the unique policy outcome is $t^e = \frac{\lambda_i + \lambda_{-i}}{y_i + y_{-i}}$, which gives $g^e = \frac{\lambda_i + \lambda_{-i}}{p}$.

Thus, the optimum centralized outcome is increasing in λ_i and λ_{-i} and decreasing in p . Again, the common level of public good is independent of the level of spillover.

3 Bargaining over centralization

In this section, we analyse the centralized provision of public good when policy is not chosen by the central planner. In this case, jurisdictional representatives form a centralized legislature and make decisions over policy by bargaining.

We assume that before bargaining takes place in the legislature, the status quo consists in the decentralized provision of the public good. The central government has to decide whether it is more convenient to provide a certain policy at the centralized level or let the decentralized governments to provide it. We assume that if an agreement is not reached the status quo will be implemented; that is, policy will be provided by the jurisdictional governments independently and simultaneously. This, in turn, implies that the disagreement utility or inside option of median voter i , u_i^d , is equal to the utility each median voter receives from the decentralized implementation of policy. Accordingly, the disagreement utility for median voter $i = 1, 2$ is $u_i^d = u_i^D$ and it is represented in equation (10), while the tax rates and policy levels are those in equations (8) and (9). Note that the disagreement utility defines the median voters' threat point in the bargaining situation. As a consequence, if for one median voter the marginal utility increases in spillover, then his or her bargaining power is (indirectly) higher the higher the spillover.

If an agreement is reached, policy is uniformly provided across jurisdictions and spending is financed by a uniform head tax on all citizens. Therefore, the agreement utility for median voter i is

$$u_i = y_i - \gamma_i p g + \lambda_i \ln g \quad (14)$$

Consequently, the net gain from pooling sovereignty to the centralized legislature, denoted by $\psi_i = u_i - u_i^D$, is

$$\psi_i = \lambda_i (1 - k) - \gamma_i p g + \lambda_i \ln \frac{p g}{\lambda_i (1 - k)} - \lambda_i k \ln \frac{\lambda_{-i}}{\lambda_i} \quad (15)$$

We can now state the following Lemma, which is a consequence of equation (15) and Lemma 1.

Lemma 2 *For median voter i , the marginal net gain of spillover from pooling sovereignty to the centralized legislature is positive when $\lambda_i \geq \lambda_{-i}$*

or $\lambda_i < \lambda_{-i}$ and $\ln \frac{\lambda_{-i}}{\lambda_i} < \frac{k}{1-k}$; it is negative when $\lambda_i < \lambda_{-i}$ and $\ln \frac{\lambda_{-i}}{\lambda_i} > \frac{k}{1-k}$, with $i = 1, 2$.

Proof. See Appendix. ■

The lemma points out that *the gain from pooling sovereignty at the centralized level is not always increasing in spillovers* for everyone. When a median voter has a positive marginal utility with respect to spillover an increase in spillover decreases his gain from cooperating at the centralized level. Thus, a jurisdiction with negative marginal net gain from spillover gains a higher bargaining power in the centralized legislature. We show the bargaining outcome by maximizing the following Nash bargaining product:

$$\begin{aligned} & \max_t \ln \left[\lambda_i (1 - k) - ty_i + \lambda_i \ln \frac{t(y_i + y_{-i})}{\lambda_i (1 - k)} - \lambda_i k \ln \frac{\lambda_{-i}}{\lambda_i} \right] + \\ & + \ln \left[\lambda_{-i} (1 - k) - ty_{-i} + \lambda_{-i} \ln \frac{t(y_i + y_{-i})}{\lambda_{-i} (1 - k)} - \lambda_{-i} k \ln \frac{\lambda_i}{\lambda_{-i}} \right]. \end{aligned} \quad (16)$$

The first order condition is

$$\frac{-y_i + \frac{\lambda_i}{t}}{\lambda_i (1 - k) - ty_i + \lambda_i \ln \frac{t(y_i + y_{-i})}{\lambda_i (1 - k)} - \lambda_i k \ln \frac{\lambda_{-i}}{\lambda_i}} + \frac{-y_j + \frac{\lambda_{-i}}{t}}{\lambda_{-i} (1 - k) - ty_{-i} + \lambda_{-i} \ln \frac{t(y_i + y_{-i})}{\lambda_{-i} (1 - k)} - \lambda_{-i} k \ln \frac{\lambda_i}{\lambda_{-i}}} = 0 \quad (17)$$

Now, the First Order Condition can be formulated in an alternative form, which will be very useful in the comparative statics.

Definition 1 Define with $\epsilon_i = \frac{\partial \psi_i / \partial g}{\psi_i / g}$ the elasticity of the gain from pooling sovereignty to the centralized legislature for median voter i , with $i = 1, 2$.

The elasticity measures the percent change of the gain from reaching an agreement over policy relative to the percent change in the quantity provided of the public good g .

The First Order Condition can now be formulated as follows:

$$\epsilon_i + \epsilon_{-i} = 0. \quad (18)$$

The compromise characterizing the Nash bargaining equilibrium, is one in which the elasticity of the gains from pooling sovereignty of the two median voters are equal in absolute value and take opposite sign: $\epsilon_i = -\epsilon_{-i}$.

In the next section, we use the Nash bargaining First Order Condition to study how changes in the degree of spillovers affect the equilibrium policy.

4 Influence of spillovers on the centralized equilibrium policy

So far, we have shown that the efficient policy outcome set uniformly across jurisdictions by the central planner is not affected by spillovers because they are fully internalized under centralization. For the same reason, it can be easily shown that the centralized negotiated outcome is also not affected by spillovers when the subsidiary principle is not implemented. To illustrate the case, consider a slightly different bargaining situation in which the competence over a certain policy has been exogenously assigned to the centralized legislature. In this context, the negotiation cannot be affected by the decentralized provision. Thus, spillovers cannot influence in any way the bargaining outcome. Formally, this can be seen by setting the disagreement utility u_i^d equal to zero or to an arbitrarily and exogenously give inefficient value. We refer to this case as the constitutional centralization.

In this section, we show that when the subsidiarity principle is involved, even if spillovers are centrally internalized, they may not be entirely wiped out under the centralized system. The reason is that spillovers by affecting the decentralized provisions also end up influencing the bargaining threat point or disagreement utilities of median voters. This, in turn, affects median voters implicit bargaining power. As a result, policy changes when spillovers change even if they are internalized thanks to the uniform provision. This can be seen as a distortion produced by the subsidiarity principle if we compare this result with the centralized efficient outcome or the situation in which the subsidiarity principle does not apply. We explain this in details in the following Proposition:

Proposition 1 *In the centralized legislature, the tax rate t^* defining the Nash bargaining equilibrium increases if and only if the following inequality holds:*

$$\frac{dt^*}{dk} > 0 \text{ when } \frac{\epsilon_i}{t} \left[\frac{-\lambda_i \left(\frac{k}{1-k} - \ln \frac{\lambda_{-i}}{\lambda_i} \right)}{\psi_i} + \frac{\lambda_{-i} \left(\frac{k}{1-k} + \ln \frac{\lambda_{-i}}{\lambda_i} \right)}{\psi_{-i}} \right] > 0. \quad (19)$$

Proof. See Appendix. ■

In order to provide an intuition of the Proposition and to simplify the discussion, we will focus on the case in which jurisdictions have the same per-capita income and different tastes for the public good; i.e.: $y_1 = y_2$ and $\lambda_1 \neq \lambda_2$. Results are stated in the following Corollary:

Corollary 1 *Under centralization, if $y_1 = y_2$ and $\lambda_1 < \lambda_2$ then the tax rate t^* defining the Nash bargaining equilibrium changes in the degree of spillover as follows:*

$$\frac{dt^*}{dk} \begin{cases} < 0 & \text{if } \frac{k}{1-k} - \ln \frac{\lambda_2}{\lambda_1} < 0 \\ \leq 0 & \text{if } \frac{k}{1-k} - \ln \frac{\lambda_2}{\lambda_1} = 0 \\ > 0 & \text{if } \frac{k}{1-k} - \ln \frac{\lambda_2}{\lambda_1} > 0 \end{cases} . \quad (20)$$

Similarly, if $y_1 = y_2$ and $\lambda_1 > \lambda_2$ the change in t^ is*

$$\frac{dt^*}{dk} \begin{cases} < 0 & \text{if } \frac{k}{1-k} + \ln \frac{\lambda_2}{\lambda_1} < 0 \\ \leq 0 & \text{if } \frac{k}{1-k} + \ln \frac{\lambda_2}{\lambda_1} = 0 \\ > 0 & \text{if } \frac{k}{1-k} + \ln \frac{\lambda_2}{\lambda_1} > 0 \end{cases} . \quad (21)$$

Proof. See Appendix. ■

In conclusion, cooperation declines when free-riding prevails. In this circumstance, the subsidiarity principle is not the best way to pool sovereignty to the centralized legislature. It fails to fully internalize spillovers because the free-riding threat does not disappear. The implementation of the subsidiary principle implies cooperation between the member jurisdictions of a federation. But, cooperation declines in spillovers instead of increasing when free-riding is possible.

5 Conclusion

It is commonly accepted that centralization has the advantage of internalizing spillovers. This analysis shows that the application of the subsidiarity principle fails to fully internalize spillovers when the centralized government is chosen to set policy.

Under decentralization spillovers cause under-provision and this increase the convenience to pool sovereignty to the centralized legislature. The power to provide a certain policy can be assigned to the central government in two different ways: by "Constitution" or by the subsidiarity principle. In the first case, the central government has the exclusive competence over a certain policy and therefore is the only level of government able to implement policy. In the second case, sovereignty is pooled up from the local jurisdictions in a flexible manner. That is, policy is chosen in the centralized legislature only if there are mutual gains from the supra-jurisdictional provision and an agreement is therefore reached over it. Without an agreement, policy will be implemented by the jurisdictional governments. In this way, the choice of centralization versus decentralization implies a trade-off between cooperation versus competition. Inter-jurisdictional competition leads to under-provision because each jurisdiction can benefit from the provision of their neighbours.

Under decentralization, heterogeneous preferences may lead to a very distort situation in which a jurisdiction has a positive marginal utility

from spillovers. Thus, the jurisdiction with positive marginal utility from spillovers uses it to gain more bargaining power in the negotiation over centralization. This bargaining power takes the form of a "free-riding threat", which is more relevant the larger the spillover. Basically, the gain from centralizing public good provision, when it exists, may be either increasing or decreasing in the degree of spillover. If for a jurisdiction, marginal utility increases in spillover, then a higher spillover decreases its net gain from cooperating because its threat point is stronger. This jurisdiction is in the position to affect policy more effectively under the threat of free-riding. Since, the decentralized marginal utility of spillover can be positive only for the jurisdiction that wants less public good provision, an increase in the degree of spillovers leads to a decrease of public goods provision at the centralized level. As a result, spillover produces under-provision under centralization when the subsidiarity principle is adopted in contrast with the case in which sovereignty is pooled to the centralized legislature by "Constitution". Cooperative bargaining over centralization increases social welfare, but cannot avoid free-riding since it fails to fully internalize spillovers.

6 Appendix

Proof. (of Lemma 1). Let us write equation (10) under the form

$$u_i^D = y_i - \lambda_i(1-k) + \lambda_i \left(\ln \frac{\lambda_i(1-k)}{p} + k \ln \frac{\lambda_{-i}}{\lambda_i} \right). \quad (22)$$

The total marginal effect of k is

$$\frac{\partial u_i^D}{\partial k} = \lambda_i \left(-\frac{k}{1-k} + \ln \frac{\lambda_{-i}}{\lambda_i} \right) \begin{cases} < 0 \text{ if } \lambda_i > \lambda_{-i} \\ < 0 \text{ if } \lambda_i < \lambda_{-i} \text{ and } \ln \frac{\lambda_{-i}}{\lambda_i} < \frac{k}{1-k} \\ > 0 \text{ if } \lambda_i < \lambda_{-i} \text{ and } \ln \frac{\lambda_{-i}}{\lambda_i} > \frac{k}{1-k} \end{cases}. \quad (23)$$

This proves the Lemma. Note that it is now simple to verify that the marginal indirect effect of spillover is negative. This is because the marginal indirect effect on the benefit is negative, i.e. $\partial (pg_i^N) / \partial k < 0$, and dominates the marginal indirect effect on the cost, $\partial (pg_i^N) / \partial k > 0$. Thus, for a larger k the marginal indirect loss on the benefit exceeds the marginal indirect reduction of the cost.

■

Proof of Lemma 2. The sign of the marginal net gain of spillover is given by

$$\frac{\partial \psi_i}{\partial k} = \lambda_i \left(\frac{k}{1-k} - \ln \frac{\lambda_{-i}}{\lambda_i} \right) \begin{cases} < 0 \text{ if } \lambda_i < \lambda_{-i} \text{ and } \frac{k}{1-k} < \ln \frac{\lambda_{-i}}{\lambda_i} \\ > 0 \text{ otherwise} \end{cases}. \quad (24)$$

Proof of Proposition 1. Denote the first order condition in (17) with

$$G = \frac{-y_i + \frac{\lambda_i}{t}}{\lambda_i(1-k) - ty_i + \lambda_i \ln \frac{t(y_i + y_{-i})}{\lambda_i(1-k)} - \lambda_i k \ln \frac{\lambda_{-i}}{\lambda_i}} + \frac{-y_j + \frac{\lambda_{-i}}{t}}{\lambda_{-i}(1-k) - ty_{-i} + \lambda_j \ln \frac{t(y_i + y_{-i})}{\lambda_{-i}(1-k)} - \lambda_{-i} k \ln \frac{\lambda_i}{\lambda_{-i}}} = 0. \quad (25)$$

In order to prove Proposition 1 we need to study the sign of $\frac{dt^*}{dk} \equiv -\frac{G_k}{G_t}$; where

$$G_t = \frac{-\frac{\lambda_i}{t^2} \psi_i - \psi_i'^2}{\psi_i^2} + \frac{-\frac{\lambda_{-i}}{t^2} \psi_{-i} - \psi_{-i}'^2}{\psi_{-i}^2} < 0 \quad (26)$$

and

$$G_k = \frac{\epsilon_i}{t} \left[\frac{-\lambda_i \left(\frac{k}{1-k} - \ln \frac{\lambda_{-i}}{\lambda_i} \right)}{\psi_i} + \frac{\lambda_{-i} \left(\frac{k}{1-k} + \ln \frac{\lambda_{-i}}{\lambda_i} \right)}{\psi_{-i}} \right] \begin{matrix} \leq \\ \geq \end{matrix} 0. \quad (27)$$

Since the sign of G_t is negative, the comparative statics takes the sign of G_k . This proves the Proposition.

Proof of Corollary 1. In order to prove the Corollary we first consider the case in which $y_1 = y_2$ and $\lambda_1 < \lambda_2$. A consequence of the considered assumptions coupled with the equilibrium condition (18) is that the elasticity of the net gain in condition (27) is negative for median voter 1 and positive for median voter 2. This, in turn, implies that in condition (19) it is $\frac{\epsilon_1}{t} < 0$. Furthermore, it is straightforward to verify that if $\frac{k}{1-k} - \ln \frac{\lambda_2}{\lambda_1} < 0$, then $\left[\frac{-\lambda_1 \left(\frac{k}{1-k} - \ln \frac{\lambda_2}{\lambda_1} \right)}{\psi_1} + \frac{\lambda_2 \left(\frac{k}{1-k} + \ln \frac{\lambda_2}{\lambda_1} \right)}{\psi_2} \right] > 0$. The sign of the comparative static is ambiguous when $\frac{k}{1-k} - \ln \frac{\lambda_2}{\lambda_1} > 0$. This proves the Corollary.

Similarly, under the assumptions $y_1 = y_2$ and $\lambda_1 > \lambda_2$ it is $\frac{\epsilon_1}{t} > 0$; while, if $\frac{k}{1-k} + \ln \frac{\lambda_2}{\lambda_1} < 0$, then $\left[\frac{-\lambda_1 \left(\frac{k}{1-k} - \ln \frac{\lambda_2}{\lambda_1} \right)}{\psi_1} + \frac{\lambda_2 \left(\frac{k}{1-k} + \ln \frac{\lambda_2}{\lambda_1} \right)}{\psi_2} \right] < 0$. The last sign is ambiguous if $\frac{k}{1-k} + \ln \frac{\lambda_2}{\lambda_1} < 0$.

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