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Self-Defeating Subsidiarity*

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The subsidiarity principle was formally adopted in 1992 by the European Union to limit excessive centralization of competences. According to the subsidiarity test, a given policy responsibility should be allocated to the lowest possible level of government, unless there is evidence that the central government (the Union) has a comparative advantage in fulfilling the task under consideration. Contrary to its stated goal, the adoption of the subsidiarity principle was followed by a wave of intense centralization. In this paper, we address this paradox by studying the effects and the limitations of the subsidiarity test in promoting an optimal level of centralization.

1. INTRODUCTION

According to a fundamental principle of constitutional design, powers should be allocated to the level of government that can best exercise them (Parisi, 2003). This canon of constitutional design provides the underlying rationale for the subsidiarity principle, which guides the allocation of competences between the central government (union or federation) and the local (state) governments (Parisi, 2003:110). The subsidiarity principle tackles a fundamental question of federalism. The principle is applied to verify whether competences are optimally allocated between federal governments and states. The principle does this by looking at the comparative advantage of different levels of government in fulfilling specific

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functions (Parisi, 2003). In a nutshell, the subsidiarity principle states that the reallocation of functions to the central level should be permitted only if the reallocation brings added value over and above what member states or individuals could achieve by acting at the local level (the so-called “subsidiarity test”).

There is a flourishing economic and legal literature examining the concept of subsidiarity as an instrument for achieving an optimal level of centralization of policy responsibilities (for a comprehensive analysis, see Inman and Rubinfeld, 1998). This literature focuses on the trade-offs between the costs and benefits of centralization. In the law and economics literature, Kirchner (1997) studied the effects of subsidiarity by comparing it to the alternative of fixed competence catalogues. Kirchner concluded that subsidiarity was overly static in its nature.

Another relevant contribution to this field is Alesina, Angeloni and Etro (2005). According to their paper, the main benefit of centralization is the possibility of exploiting economies of scale through the central allocation of policy responsibilities. The paper characterizes the costs of centralization as the result of the heterogeneity of preferences across the member states: one size does not necessarily fit all. Balancing the benefits from economies of scale with the varying preferences of the citizenry, the optimal degree of centralization should ensure that all activities in which economies of scale are predominant are carried out at the central level, whereas all activities with high heterogeneity of preferences are carried out at the local level. In a related paper, Alesina, Angeloni and Schuknecht (2005) provide empirical evidence on the expansion of the policy-making role of the European Union (EU) in the years between 1971 and 2000. They found that the range of competences attributed to the central level (for instance to the European Commission, to the Parliament, or to the Court of Justice) has expanded markedly, “far away from the EEC’s original mandate,” which only established a free market zone and harmonized trade policy. Moreover, they found that in the European Union, the allocation of policy responsibilities has become unbalanced and now varies from the optimal balance of economies of scale and the heterogeneity of preferences defined in the previous literature.

In this paper, we contribute to this literature by providing a formal model of subsidiarity to unveil the particular features of the centralization process triggered by application of this principle. We study the optimal allocation of policy functions in multi-level governments, discussing the interplay between economies.

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1 As Inman and Rubinfeld (1998), define it, “subsidiarity is a principle of governance designed to give meaning to the divisions of power and responsibility between the central government and constituent states in a federal system. The principle seeks to allocate responsibilities for policy formation and implementation to the lowest level of government at which the objectives of that policy can be successfully achieved.”
of scale, economies of scope and heterogeneity of preferences. We distinguish three alternative forms of subsidiarity (centralized, decentralized and democratic) and develop an economic model to understand the process of progressive centralization triggered by these principles. The frameworks of the previous literature on the optimal level of centralization have been static, i.e., the structure of costs did not change over time. In contrast, our model is dynamic such that the structure of costs evolves according to previous centralization decisions.

The paper is organized as follows. Section 2 provides a description of the subsidiarity principle and of its main characteristics. In Section 3 we introduce a simple model to illustrate the optimal choice of governmental activities when states choose independently at the local level. In Section 4 we consider how the optimal supply of governmental activities changes when the competences are centralized at the federal or union level. We use these results to consider the optimal allocation of competences between local and central levels of government. We distinguish three forms of subsidiarity and consider the impact of these alternative decision rules on the process of centralization.

Section 5 models the centralization process under subsidiarity by which competences can be lumped together. We observe the possibility of lock-in effects when subsidiarity is applied in the early stage of centralization. This is because economies of scope are largest when all functions are concentrated at one level. The first functions that are moved from the local to the central level suffer higher losses in terms of forgone economies of scope. In Section 6 we address the puzzle of self-defeating subsidiarity and consider the application of the subsidiarity test for proposed devolution of competences. We explain the puzzling increase in centralization observed after the adoption of the subsidiarity principle, showing that the effects of subsidiarity are possibly reversed if the test is introduced after several functions have been previously centralized. This occurred in the European Union where the subsidiarity principle was formally adopted after several important functions had already been allocated at the central level through political decision-making and without a blueprint for expansion. We further show that the problem of excessive centralization is potentially solved when subsidiarity is used to test the desirability of previous centralization decisions, leading to a possible devolution of competences. Section 7 concludes with some policy considerations and suggestions for possible extensions.

The main contribution of the paper is to show the critical role of timing in the application of subsidiarity. The interplay between economies of scale and scope (at the local and central levels) can create lock-in effects and problems of excessive centralization at different stages of the centralization process. Lock-in effects may be observed when the process of centralization (or, for this matter,
decentralization) is stalled at a local, rather than global, optimum. We further show that the likelihood of these lock-in effects changes when multiple competences can be bundled and reallocated together. Problems of excessive centralization may be observed when subsidiarity is introduced after an initial phase of centralization. Here, the subsidiarity test may have perverse effects, favoring further centralization rather than putting a limit to it, with path-dependent effects on later centralization decisions. The paper further discusses the different effects of alternative forms of subsidiarity when states have heterogeneous preferences. We consider the role of alternative cost-sharing rules to allow for convergence of centralization decisions of heterogeneous states. These results shed some light on the desirability (or lack thereof) of alternative interpretations of the subsidiarity principle to allow optimal levels of (de)centralization.

1. THE SUBSIDIARITY PRINCIPLE
The concept of subsidiarity has ancient roots and has been used by many politicians and political theorists such as Althusius, Montesquieu, Locke, Tocqueville and Abraham Lincoln (Carozza, 2003). The Articles of Confederation, created by the United States in 1781, relied heavily on the subsidiarity principle, resulting in deference toward state government over a federal government. In the nineteenth century the concept of subsidiarity re-emerged in political thought as an alternative to the competing claims of decentralized capitalism and centralized Marxist socialism. The major concern at the time was to protect society against the rise of totalitarianism. Subsidiarity was viewed as an instrument to combat the inexorable forces of progressive centralization, known as Popitz’s law. In the 1930s the concept of subsidiarity gradually evolved into a principle advocating a cooperative balance between the

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2 Some historians trace the concept of subsidiarity back to classical Greece. Subsidiarity made a new appearance in the Middle Ages, taken up by Thomas Aquinas and medieval scholasticism.

3 See Bermann, (1994:331), comparing protection of Member State sovereignty pursuant to the subsidiarity principle to the political safeguards of U.S. federalism. See also, Wechsler (1954), which argues that the structural representation of state interests in the institutions of the federal government make it unnecessary for the judiciary to independently protect state interests. For a later expansion and restatement of the analysis, see Choper (1980).

4 Catholic social theorists started to apply the concept of subsidiarity to social life at the end of the nineteenth century. In 1891 Pope Leo XIII included the subsidiarity principle in his encyclical “Rerum Novarum.”

5 According to Johannes Popitz (1927:348-49), “in a realistic consideration of politics, the power of attraction of the central government becomes inevitable. There is no effective panacea against it.” This hypothesis was pronounced so emphatically by Popitz as to become known as “Popitz’s law.”
state and the civil society, setting limits on centralized authority and protecting various social groups from failures of the state.6

In the following we provide a brief history of the events that led to the adoption of subsidiarity as a constitutional principle of the European Union through the 1992 Maastricht Treaty.

1.1. CENTRALIZATION OF COMPETENCES PRIOR TO THE SUBSIDIARITY PRINCIPLE

The distribution of powers between the central government of the Union and member states has been one of the most contentious points throughout the history of the European Union. Since the early years of the European Economic Community (created through the Treaty of Rome in 1958), member states have resisted the expansion of activities and the progressive centralization of competences at the Community level.7 Although the original intention was that the Community could obtain the transfer of competences by the member states only on the basis of limited special authorization (German doctrine of “begrenzte Einzelermächtigung”), this fell apart in practice. In practice, the reallocation of competences took place on a merely political basis via a broad interpretation of the EC Treaty. Everling (1997) provides a number of examples of reallocation of competences that were hardly warranted by the original treaty provisions. One such example was the creation of more than twenty organizations entrusted with a variety of powerful intervention instruments. Examples of these instruments included production quotas, aids or levies, special monetary systems, and rules for product quality. The legal basis for the creation of these organizations was found in a small subparagraph of Article 37 of the EC Treaty governing agricultural policy. Another example concerned the implementation of Articles 94 and 95 of the EC Treaty which

6 The perspective on subsidiarity changed markedly in the 1930s. In a famous passage of his “Quadragesimo Anno” Pius XI wrote “the more faithfully this subsidiarity principle function is followed and a graded hierarchical order exists among the various associations, the greater also will be both social authority and social efficiency, and the happier and more prosperous too will be the condition of the commonwealth” (Bermann, 1994). It seems that originally subsidiarity was not seen as a way to achieve social efficiency or as an instrument for political compromise, reasons for which it was later included in the Treaty on the European Union. Rather, subsidiarity was and is primarily a declaration about the inherent and inalienable dignity of individual human beings. It reflects the belief that the individual should be “ontologically and morally prior to the state or other social groupings” (Carozza, 2003:42). See also Vittadini (2007).

7 The 1958 Treaty of Rome articulated the principal goals of the European Community in Article 2, and specified the instruments for the achievement of these goals in Article 3. These two articles laid the boundaries of the original competence of the Community, consisting in the creation of a common market and the harmonization of related policies.

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led to a de facto reallocation of the lawmaking authority for national economic law to the central powers of the Community. As pointed out by Everling, this wave of centralization found little constraint within the Community rules. Article 308 of the EC Treaty authorized the Council to decide if actions by the Community were necessary to achieve one of its objectives, in practice making it possible for the Community to reallocate state competences to itself.

The resistance of member states to centralization grew stronger after the 1986 Single European Act, which strengthened the powers of Community institutions and opened new fields of activity in areas such as research, finance, economic convergence, social policy and environment. The momentum generated by the Single European Act and the end of the Cold War led to intergovernmental conferences exploring the new boundaries of a political, economic and monetary union – efforts which culminated in the Maastricht Treaty (Marquardt, 1994). In the face of such growing expansion of competences, member states demanded a more restrictive interpretation of the original treaties and the introduction of constraints to new proposals for centralization. European leaders stressed the role of subsidiarity in balancing central and state powers and constraining unwarranted centralization in an attempt to assuage the fears and the skepticism voiced by several member states.8

1.1. THE ADOPTION OF THE SUBSIDIARITY PRINCIPLE

The subsidiarity principle was formally adopted in 1992 by the Treaty of the European Union (Treaty of Maastricht, signed on 7 February 1992, entered into force on 1 November 1993). The subsidiarity principle is currently codified in Article 5 of the consolidated version of the Treaty Establishing the European Community9 and is also included in the proposed European Constitution, under Article 9.10

8 Bermann (1994:332) observes that, all in all, “the institutional support for a theory of political safeguards of subsidiarity in the European Community is not very impressive. Despite appearances, neither the Council of Ministers nor the Parliament is structured to ensure that political decisions on any given issue are made at the lowest level of government possible.” On a similarly skeptical note, Marquardt (1994) observes that subsidiarity provided a useful cover to national politicians (such as John Major, who relied heavily on the principle in his public speeches) all of which were facing Euro-skeptical criticism of Maastricht in their home states. The Edinburgh summit of December 1992 gave additional content to subsidiarity in the hope to facilitate the critical moment surrounding the ratification of the Maastricht Treaty. The Summit issued a detailed communiqué, specifying that all institutions of the Union were to use a test of subsidiarity as a condition precedent to their policy action, giving the European Court of Justice some role in ensuring compliance with the principle.

9 Art. 5 of the Treaty reads “The Community shall act within the limits of the powers conferred upon it by this Treaty and of the objectives assigned to it therein. In areas which do not fall
The institutions of the European Union have struggled with the interpretation and implementation of the subsidiarity principle. In the Edinburgh summit of December 1992, the European Council provided some clarification on the meaning of subsidiarity, specifying that action at the central level should be carried out only upon evidence of clear benefits of scale or effectiveness when compared to the independent action of member states. The Council stressed that the conclusions reached by the organs of the Union on matters of subsidiarity were to be substantiated by qualitative or quantitative analyses (Marquardt, 1994). Despite these attempts at clarifying its meaning, the subsidiarity principle remains an obscure concept, lacking formal guidelines for its implementation, in the opinion of both scholars and policymakers.

The lack of a formalization of the subsidiarity test has engendered much skepticism about the real utility of this principle in providing a principled constraint to the process of progressive centralization of the European Union. As pointed out by van den Bergh (1997): “Because law on its own does not provide sufficiently accurate and reliable standards for evaluating the effects of legal rules, economic theory must be incorporated into the legal analysis. … The wording of Article 5(2) itself invites an economic analysis: to justify the exercise of powers by European Community institutions ‘the scale or effects of the proposed action’ must be taken into account. This formulation allows for the consideration of scale economies and externalities; both factors are powerful efficiency arguments in favor of centralization.”

In the following, we take up this challenge. We address the question of how the subsidiarity principle should be constructed and applied in practice in order to ensure an effective safeguard for the sovereignty of individual states and to promote cooperation and intervention of superior hierarchical layers when efficient.11 Our simple model of subsidiarity strives to unpack the loaded

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11 As effectively put by Carozza (2003), subsidiarity is, in itself, a paradoxical principle since it is instituted to limit the intervention of higher layers of hierarchy, yet it also justifies those very interventions.

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concept of “comparative advantage of the central government” by providing an economic framework for the subsidiarity test. We add economies of scope to the standard analysis. Economies of scope are economies that arise when there is an advantage in administering or producing sets of services within the same governmental unit rather than in each service separately. Adding economies of scope to the usual analysis introduces a potential “lumpiness” or non-linearity into the subsidiarity decision. The efficiency performance of overall government may be lowered when an important service is moved to the central government without its productive counterpart. When economies of scope are included in the analysis, a centralization decision under subsidiarity should be made globally by examining all combinations of services and not simply by making assignments separately, service by service, as is the usual approach to reallocation of governmental competences. The analysis seeks to balance the competing aims of the subsidiarity principle and to bring reason to the alternative political and philosophical perspectives on subsidiarity.12

2. BASIC MODEL: THE CASE OF DECENTRALIZED GOVERNMENTAL ACTION

In this section, we consider the optimal choice of governmental activities when local governments can independently choose the quantity or quality of their governmental activity while taking into account their own heterogeneous preferences. Once we have found the optimal solution to the local government’s problem, we can use this solution to characterize the maximal payoffs when the states operate in a fully decentralized fashion. These results will be used in Section 4 to model the states’ and the union’s centralization decisions under three alternative forms of subsidiarity.

In our model, we make three assumptions. The first two assumptions concern economies of scale and economies of scope. We assume the presence of both economies of scale and economies of scope in the provision and/or enforcement of two or more governmental activities. Third, we assume the heterogeneity of preferences of the member states over governmental goods.13 When considering

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12 Political scientists and philosophers frequently disagree on the proper way to apply the principle, and, when applied in different ways, the subsidiarity principle can have very different outcomes.

13 The problem of heterogeneity of preferences arises at two different levels: first, within a given nation state and second at a supranational level upon aggregation of the preferences of the diverse states in the group. According to well-known canons of methodological individualism, individual actors have preferences but institutions and states do not. For the purpose of the present analysis, we assume that preferences may be heterogeneous across nation states as a proxy for the differences of individual preferences within each state.
centralization decisions in Section 4, we allow for the fact that there may be unequal apportionment of the central government’s costs among the member states, i.e., some states may pay a proportionate share of the costs. The comparison of the cost functions of local and central governments allows us to identify which level of government has a “cost advantage” in carrying out a given function. Also in Section 4, we will evaluate the impact of states’ heterogeneity of preferences on centralization decisions under the subsidiarity principle.

In our framework, economies of scale are present when the cost of producing an additional unit of governmental output (i.e., the marginal cost) decreases as the volume of output (i.e., the scale of production) increases. In our model, economies of scale can be observed at both local and central (supranational) levels. When the economies of scale at the central level are larger than those at the local level, centralization yields lower costs. In Definition 1 below, we refer to this situation as the “cost advantage” of the central government. According to the empirical evidence, there appears to be a cost advantage in having central government in the areas of market policies, monetary policy, and environmental protection (Alesina, Angeloni and Etro, 2005). The cost advantage in these areas arises due to positive externalities in the local provision of governmental goods. When policies are formulated at the central level, the externalities are fully internalized and governmental action is more easily carried out at the optimal level. Breton and Scott (1978) had previously formulated a similar argument focusing on cost minimization of services.

Economies of scope are present when the supply of two or more governmental activities together costs less or is more effective than providing them separately. Typically, economies of scope are present when one policy responsibility requires some fixed resource that can also be used for another policy responsibility at no additional cost. In our framework, the concept of economies of scope also includes situations in which governmental activities are structurally dependent on one another and can be more effectively carried out at the same level of government. For example, the centralization of monetary policy in the European Central Bank has greatly reduced the degrees of freedom and the effectiveness of fiscal policy at the national level (Stephan, Parisi and Depoorter, 2003). We suggest that economies of scope are likely to be present in many policy areas. For instance, the regulation of the banking and insurance sectors may share many common fixed and infrastructure costs and scope economies may be present (e.g., a centralized enforcement agency can effectively monitor these two sectors at a lower cost than enforcement by multiple, local entities). Although governments occasionally handle this problem by grouping relevant services into broader functional
categories, we can identify several functions in which scope economies exist. In our estimation it seems plausible that, in a given policy area, governmental activities (like administration, enforcement, regulation, etc.) may be characterized by economies of scope.

The heterogeneity of states’ preferences plays an important role in our model of subsidiarity. States may differ in their preferences pertaining to the quantity or quality of governmental goods because of many reasons unique to that state, such as the average income level, ethnic background, race, or religion of their population. This heterogeneity may lead to heightened difficulties in coming to a consensus on the optimal level of centralization of governmental functions. Large unions may be characterized by a larger spread in the distribution of preferences concerning the desired quality or quantity of public goods, and local governments are likely to have an informational advantage about their citizens’ preferences: a higher degree of heterogeneity hence tilts the balance in favor of decentralization.

These three assumptions previously identified in the literature play a critical role in the process of centralization through subsidiarity. We consider the trade-off between economies of scale, economies of scope and heterogeneity of preferences, studying how the subsidiarity test selects different equilibria with respect to centralization levels.

2.1. THE ANALYTICAL FRAMEWORK

We consider a federation or union of states (like the European Union), composed of a finite number of member states. Analytically the federation or union is composed of \( N \) states, indexed with the subscript \( i = 1, \ldots, N \). Member states

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14 Cooperative arrangements, such as those referred to as “marble-cake” federalism, indicate the presence of economies of scope. Synergies between national and local providers of services (e.g., the Federal Bureau of Investigation and local police bodies) can on some occasions be handled through ad hoc coordination (e.g., a joint task force). Such arrangements impose costs that could be avoided by aggregating such competences.

15 The issue of heterogeneity of preferences has been investigated from a variety of perspectives. La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999) show that the quality of government is higher in less fragmented societies; Easterly and Levine (1997) show that lower growth levels are experienced in more ethnically fragmented nations.

16 Ethnic fragmentation is regarded as an important source of heterogeneity of state preferences: Alesina, Baqir and Easterly (1999) point out that ethnic fragmentation appears to be quite important in the European context and conclude in favor of decentralization.

17 Empirical analysis investigates the role of the three factors. Among others, Mazzaferrro and Zanardli (2008) show, using a sample of European countries in a median voter framework, that centralization dominates decentralization for a number of public expenditure programs (healthcare, education, unemployment benefits), even in the absence of economies of scale and interregional spillovers.
have different preferences and different valuations of governmental public goods. Hereinafter, we will refer to the union or federation as the “central level” (labeled with $C$) and the member state as the “local level” (labeled with $L$).

Each state $i$ chooses the level of activities to be supplied for each governmental competence $j$, $g_{ij}$, where $g_{ij}$ characterizes the quantity or quality of the goods or services inherent in governmental activity $j$ (say, higher education or defense). We assume that there is a set of $M$ governmental activities, $j = 1, \ldots, M$. Let $g_i = (g_{i1}, \ldots, g_{ij}, \ldots, g_{iM})$ be the vector $1xM$ of governmental activities levels chosen by state $i$. Each state $i$ sustains a cost $C^L(g_i)$ to supply $g_i$. The total cost of state $i$’s fulfillment of its governmental activities is equal to the sum of the costs incurred to supply all goods and services inherent to its governmental activities $j = 1, \ldots, M$, i.e.:

$$C^L(g_i) = \sum_{j=1}^{M} C^L_j(g_{i1}, \ldots, g_{ij}, \ldots, g_{iM})$$

Each member state is characterized by the following welfare function:

$$W_i = \alpha_i H(g_i) - C^L(g_i)$$

where $H(g_i) = \sum_{j=1}^{M} H(g_{ij})$ and is the state $i$’s total benefit from the provision of its $M$ governmental activities, where $H_{g_j} > 0$ and $H_{g_jg_j} < 0$. The parameter $\alpha_i$ captures the heterogeneity of preferences across states, indicating how much each state $i$ values the provision of governmental public goods. With no loss of generality we assume that the parameters $\alpha_i$ are observable and member states within the union can be ordered such that $\alpha_1 \leq \alpha_2 \leq \cdots \leq \alpha_N$.

The union and its member states have to decide whether policy responsibilities should be allocated at the central or local level. In the following, we model the

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18 This formulation is analogous to the formulation used by in Alesina, Angeloni and Etro (2005), with the use of a representative agent. However, we have chosen to use states’ aggregate welfare functions to facilitate the reader’s understanding and to allow an easier comparison of states’ benefits and costs in the fulfillment of their governmental activities.

19 For the purpose of the present analysis we refer to state’s preferences as a proxy for the aggregate preferences of the population within each state. Further analysis should consider the effect of subsidiarity and decentralized policymaking on individuals that are imperfectly represented within their state’s political system.

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centralization (or decentralization) decision, starting from a situation in which all governmental activities are initially carried out by states at the local level. When deciding whether to centralize, states compare the possible cost advantages of centralization with the forgone economies of scope at the local level and the adjustment costs due to heterogeneity of preferences.  

3.2. THE EQUILIBRIUM IN THE FULLY DECENTRALIZED CASE

In a fully decentralized environment, each state \( i \) independently chooses \( g_i = (g_{i1}, \ldots, g_{ij}, \ldots, g_{iM}) \), the level of governmental activity \( j \) to maximize its welfare:

\[
\max_{g_{i1}, \ldots, g_{ij}, \ldots, g_{iM}} W_i = \alpha_i \sum_{j=1}^{M} H(g_{ij}) - \sum_{j=1}^{M} C_j^L(g_{i1}, \ldots, g_{ij}, \ldots, g_{iM})
\]

The first order conditions are:

\[
\alpha_i H_j = C_j^{L \ast} + \sum_{\nu \neq j} C_{\nu}^{L \ast}; \quad j = 1, \ldots, M
\]

where \( H_j = \frac{\partial H(g_{ij})}{\partial g_{ij}} \) and \( C_j^{L \ast} = \frac{\partial C_j^L(g_{i1}, \ldots, g_{ij}, \ldots, g_{iM})}{\partial g_{ij}} \).

Define \( g_i^* = (g_{i1}^*, \ldots, g_{ij}^*, \ldots, g_{iM}^*) \) and the vector \( 1 \times M \) consisting of the optimal quantity of governmental activity \( j \) for each state \( i \) (i.e., such that the \( M \) first order conditions are simultaneously satisfied). Not surprisingly, \( g_i^* \) is chosen such that the weighted marginal benefit of supplying an additional unit of function \( j \) for state \( i \) is equal to the marginal cost of producing one more unit of function \( j \). It should be noted that there are two terms that determine the total marginal cost of activity \( j \): the first term \( C_j^{L \ast} \) represents the direct marginal cost of carrying out activity \( j \), while the term \( \sum_{\nu \neq j} C_{\nu}^{L \ast} \) represents the indirect marginal cost effect of producing \( j \) on the other governmental activities carried out by the state. These two arguments of the cost function will help us characterize the economies of

\[\text{\textsuperscript{20}}\text{ In the present model adjustment costs are therefore endogenous. In previous work, we considered the impact of exogenous adjustment costs on the process of progressive centralization under the subsidiarity test (Carbonara, Luppi and Parisi, 2009).}\]

\[\text{\textsuperscript{21}}\text{ The second order condition of the maximization problem is satisfied under the assumption that } |\lambda_i H_j| > \sum_{\nu \neq j} C_{\nu j}^{L \ast}. \text{ Note that } H_j < 0.\]
scale and scope of the governmental activity of state $i$. As stated above, economies of scale are present when there are decreasing marginal costs $C^M_{ij}$.\footnote{Decreasing marginal costs guarantee that average costs are always decreasing.}

Economies of scope are captured by the indirect marginal effects of an activity on the cost of carrying out the other activities, $C^M_{ij}$. It is now possible to prove the following properties of the equilibrium.

**Lemma 1:** (a) The optimal vector of public goods $g^{rL}_i=(g^{p1L}_i,...,g^{pM}_i)$ is increasing in $\alpha_i$; (b) Under the full decentralization regime, with $\alpha_1 \leq ... \leq \alpha_i \leq ... \leq \alpha_N$, $W^{rL}_1 \leq ... \leq W^{rL}_i \leq ... \leq W^{rL}_N$.

**Proof:** Part (a) follows from the first order conditions in (4). Part (b) follows from the properties of the equilibrium vector $g^{rL}_i$ and from the Envelope Theorem.

We can immediately see that Property (a) of the equilibrium has a fairly straightforward interpretation which plays an important role in the analysis that follows. Countries with a higher intensity of preference for governmental activities (high values of $\alpha_i$) are more willing to provide public goods when choosing at the local level than are countries with a lower intensity of preference for governmental activities.

### 4. CENTRALIZING GOVERNMENTAL FUNCTIONS: THE SUBSIDIARITY TEST

In this section, we build on the previous analysis to explain how the subsidiarity test works in an economic framework. We model the decision to allocate policy responsibilities either at a local or central level according to the subsidiarity principle. As argued above, the optimal allocation of competences between local and central levels of government can be thought of in terms of cost advantages due to economies of scale and economies of scope. When transferring competences from one level of government to another, economies of scope signify that if one or more competences are shifted to the central level, the cost of carrying out the remaining activities at the local level will be greater.\footnote{Given that we assume economies of scope both at the local and at the central levels, the same logic applies when decentralizing some functions, as discussed in section 6.2.}

In order to study the decision process for the allocation of competences between local and central levels, we begin in Section 4.1 by defining the welfare
function of the union or federation. In Section 4.2 we characterize the centralization decision under three alternative forms of subsidiarity.

4.1. THE UNION

In the general case, some governmental activities are allocated at the central level and some others at the local level. Let us assume that the set of governmental activities allocated at the central level has cardinality \( k \), where \( 1 \leq k \leq M \). The union of member states chooses the level of each governmental activity \( j \) that it carries out at the central level, \( g_j^C \), \( j = 1, \ldots, k \) where \( g_j^C \) characterizes the quantity or quality of the goods or services inherent to activity \( j \) supplied by the central government to each member state. The aggregate level supplied by the union equals \( N g_j^C \), where \( N \) is the number of member states in the union. Let \( g^C = (g_1^C, \ldots, g_k^C) \) be the vector \( 1 \times k \) of governmental activity levels chosen by the union for each single state (e.g., education, defense or environmental regulation) and let \( N g^C = (N g_1^C, \ldots, N g_k^C) \) be the vector \( 1 \times k \) of aggregate levels provided by the union.

The total cost sustained by the central government is \( C^C(N g^C) \), which is equal to the sum of the costs that the union incurs in order to carry out all the governmental activities allocated at the central level \( j = 1, \ldots, k \):

\[
(5) \quad C^C(N g^C) = \sum_{j=1}^{k} C_j^C(N g_1^C, \ldots, N g_j^C, \ldots, N g_k^C)
\]

As discussed above, the decision to allocate a specific activity at the central level or to keep it at the local level is driven by the interplay of two countervailing incentives: economies of scale versus economies of scope. The cost function of the union is characterized by the presence of economies of scale: economies that can be exploited by concentrating the local competences.

---

24 Without loss of generality, we assume that the functions allocated at the central level are the first \( k \) functions out of \( M \) and the remaining \( M-k \) remain at the local level. The assumption is only needed for expositional clarity but is not critical for our results, since we are not assuming the existence of any particular joint impact of the functions on the union and state cost functions.
to the central level. This implies that, for any activity $j = 1, \ldots, k$, the marginal cost $C_{jC}^j$ will be decreasing, i.e., $C_{jC}^j < 0$.

**Definition 1:** The Union has a cost advantage with respect to a member State when:

$$\frac{C_j^M(g)}{C_j^C(g)} > 1$$

In our setting, the presence of a cost advantage implies that for any given state $i$, the allocation of competences to the central level yields lower per-unit costs than the allocation of competences at the local level. The cost advantage may be due to economies of scale, to the use of different technologies, or to institutional settings that affect production costs.

It is possible that some of the activities for which the central government has a cost advantage are best done in conjunction with other activities at the same level of government (economies of scope). As with the local economies of scope discussed in Section 3.2, economies of scope at the central level are captured by the indirect marginal effects of an activity on the cost of carrying out the other activities, $C_{jC}^j$.

It follows immediately that in case of a centralization of $k$ governmental activities, each state benefits from the provision of $k$ competences chosen at the central level, and $M - k$ competences that remain chosen at the local level. The vector of governmental activities of state $i$ is therefore given by these two categories of competences $g_i = (g_1^C, \ldots, g_k^C, g_{k+1}^P, \ldots, g_M^P)$, where the subvector $(g_1^C, \ldots, g_k^C)$ of dimension $1 \times k$ represents the centrally-supplied governmental activities which is equal for all states, and the subvector $(g_{k+1}^P, \ldots, g_M^P)$ of dimension $1 \times (M - k)$ represents the locally-supplied governmental activities which are individually chosen by each member state.

---

25 One argument most often brought forward in support of centralization and harmonization is that producing public services at the central level results in economies of scale, thus reducing the overall cost of carrying out that specific activity. See Schäfer (2006). The idea of economies of scale is also included in Art. 5 of the Treaty on European Union (TEU or Maastricht Treaty), stating that the Community must demonstrate the need to interfere at the local level by proving the existence of either “economies of scale or cross-border externalities.”

26 For instance, there is evidence that economies of scale are best exploited at the central level in areas like common market policies, monetary policy, and environmental protection (Alesina, Angeloni and Schuknecht, 2005:276).
This means that each state will locally provide the $M-k$ decentralized functions, and will face a direct local cost for the supply of those governmental activities. Each state will also bear a share $s_i$ of the union’s cost of providing the $k$ centralized activities, $C^C(Ng^C)$, where such shares can be freely assessed in our model using any number of methods (e.g., equal shares, shares that are proportional to the costs pertaining to a given member state, shares based on population or political factors, etc.). The sharing rule $s_i$ has an impact on the individual states’ welfare and their centralization choices under the democratic and decentralized subsidiarity tests discussed in Sections 4.2.2 and 4.2.3. However, the sharing rule does not have any effect on the aggregate welfare of states or on the centralization choice undertaken under the centralized subsidiarity test discussed in Section 4.2.1.

Given the sharing rule $s_i$, state $i$’s welfare function can be expressed as:

$$W_i = \alpha_i H(g_i) - C^L(g_i^p) - s_i \sum_{j=1}^{k} C_j^C(Ng_1^C, ..., Ng_i^C, ..., Ng_k^C)$$

where the vector of governmental activities of state $i$ is $g_i = (g_1^C, ..., g_k^C, g_{ik+1}^D, ..., g_{ikM}^D)$.

We construe the welfare function of the union as the Kaldor-Hicks summation of the welfare functions of the $N$ member states in the union, which can be written as follows:

$$W^C = \sum_{i=1}^{N} (\alpha_i H(g_i) - C^L(g_i^p) - C^C(Ng_i^C))$$

since $\sum_{i=1}^{N} s_i = 1$.

Define $g_i^* = (g_1^C, ..., g_k^C, g_{ik+1}^D, ..., g_{ikM}^D)$ as the vector $1 \times M$ of optimal quantities supplied by state $i$ for each (centralized and decentralized) activity $j$. The subvector $(g_1^C, ..., g_k^C)$ of dimension $1 \times k$ is chosen at the central level by the union in order to solve the union’s maximization problem:

$$\max_{(g_1^C, ..., g_k^C)} W^C(g)$$
and the subvector \((g_i^{eD}, \ldots, g_i^{eM})\) of dimension \(1 \times (M - k)\) for the competences remaining at decentralized level is chosen by each country in a separate maximization problem:

\[
\max_{(g_i^{eD}, \ldots, g_i^{eM})} W_i(g_i)
\]

where \(W_i(g_i)\) is defined according to equation (7) and \(W^C(g)\) according to equation (8).

The optimization problem for the central government and for each member state \(i\) for cases of partial centralization of \(k\) competences requires the satisfaction of the following first order conditions:

\[
(9) \quad \sum_{i=1}^{N} \alpha_i H_j(g_i^C) = NC_j^\mu(Ng_1^C, \ldots, Ng_N^C) + N \sum_{i=1}^{k} C_j^\mu(Ng_i^C, \ldots, Ng_N^C); \ j = 1, \ldots, k
\]

\[
(10) \quad \alpha_i H_j(g_i^{eD}) = C_j^\mu(g_i^{eD}) + \sum_{i'=1}^{N} C_j^{i'}(g_i^{eD}); \ j = k+1, \ldots, M; \ i = 1, \ldots, N
\]

If we compare the first order conditions of this partial centralization case to those observed in (4) for the case of full decentralization, we can observe that the centralization of the \(k\) activities leads to a loss of economies of scope at the local level. Some new economies of scope, however, are created at the central level. Since economies of scope are largest when all functions are concentrated at one level or the other, the economies of scope gained at the central level will be growing with \(k\). As will be shown later in Section 5, the trade-off between economies of scope at the local and central levels plays an important role in the creation of lock-in effects.

In Section 4.2, we will further show that the equilibrium in the case of partial centralization depends on which version of the subsidiarity test is adopted. We will provide a full characterization of these partial centralization equilibria in Section 5. Under the subsidiarity test, each member state evaluates whether it is more convenient to allocate \(k\) activities at the central level or to keep those activities at the local level. In what follows we are going to explain the functioning of subsidiarity test, with reference to the optimization problems introduced above.

### 4.2. HOW THE SUBSIDIARITY TEST WORKS

Having introduced all the elements of our simple model, we shall now provide a formalization of the subsidiarity test, on the basis of which states decide whether to reallocate some of their governmental functions from the local to
the central level. The subsidiarity test evaluates the benefits and the costs of reallocating a given activity from local to central governments. In our simplified environment, the test consists in the application of a cost-benefit analysis to assess the optimal level of allocation of a given activity.\(^{27}\)

The subsidiarity test can be carried out directly by the central government at the federal or union level (“centralized subsidiarity test”) or individually by member states under a unanimity rule (“decentralized subsidiarity test”) or majority rule (“democratic subsidiarity test”). These three alternative decision rules will be discussed in Sections 4.2.1 through 4.2.3. When states have heterogeneous preferences, outcomes are likely to be different in the three cases. As we will show in Section 5.2, a decentralized subsidiarity test is generally more restrictive than the other two forms of subsidiarity. The effects of centralized and democratic subsidiarity may vary according to the placement of the median state’s preferences relative to the average preferences of all states.

### 4.2.1. Case 1: Centralized Subsidiarity Test

We begin considering the case of centralized subsidiarity, where the test is performed at the central level. This is equivalent to the case of centralized federalism as defined by Inman and Rubinfeld (1998).

Assuming that the central government is planning to centralize \(k\) activities, the subsidiarity test can be written analytically as follows:

\[
W^U(g^{*C}) \geq \sum_{i=1}^{N} W_i(g^{*L})
\]

where \(g^{*C} = (g_1^{*C}, \ldots, g_i^{*C}, \ldots, g_N^{*C})\) represents the \(N\) vectors of each state’s governmental activities. Under this form of subsidiarity, centralization will take place if it improves the aggregate well being of all member states.

### 4.2.2. Case 2: Decentralized Subsidiarity Test

The situation would be inherently different under a test of decentralized subsidiarity, where the test is performed at the local level by member states.\(^{28}\)

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\(^{27}\) See Pelkmans (2006). In the specific EU context, the test comprises a number of steps, including an analysis of whether a given activity falls within the area of shared competences (if exclusive to the EU the test does not apply). If cooperation between different layers of government were allowed, the test should also comprise a verification of the possibility of cooperation between those levels of government. Whenever cooperation is feasible, the optimal level of centralization would be established.

\(^{28}\) Using Inman and Rubinfeld’s (1998) terminology, this would be equivalent to the case of decentralized federalism, where all governmental activities are initially allocated at the local level and where states then decide whether to transfer some (or even all) of these competences to a
In this case, given the states’ diversity of preferences, outcomes would differ from those reached under centralized subsidiarity.

When the decision to centralize is made at the local level and the unanimous consent of all member states is required for centralization to occur, the subsidiarity test would have to be satisfied for each member state. The test for state \( i \) would take the following form:

\[
W_i(g^c_i) \geq W_i(g^l_i)
\]

Equation (12) shows that whenever the total welfare of state \( i \) is reduced by centralization, the subsidiarity test will fail for state \( i \). Under a unanimity rule, the subsidiarity test in equation (12) has to be passed for all member states, i.e. for all \( i = 1, \ldots, N \), otherwise the competences will be kept at the local level.

We can show that when the decentralized subsidiarity test in equation (12) is satisfied for all member states, the centralized subsidiarity test in equation (11) is also satisfied. This result is rather intuitive: if all member states benefit from centralization, then the aggregate benefits must outweigh the aggregate costs of centralization. It is interesting to notice that the opposite is not necessarily true. Satisfaction of the centralized subsidiarity test in equation (11) does not necessarily imply satisfaction of the inequalities in expression (12) for all member states.

### 4.2.3. Case 3: Democratic Subsidiarity Test

Things change when the unanimity rule considered in the case of decentralized subsidiarity is replaced with a majority rule under democratic subsidiarity. In order to obtain a majority vote in favor of centralization, equation (12) has to be satisfied for the majority of member states. Again applying the terminology in Inman and Rubinfeld (1998), this case is germane to the case of “democratic federalism” in which the allocation of power among the various levels of government is decided on the basis of a majority rule.

Under the median voter theorem (Downs, 1957), centralization will occur if the subsidiarity test is satisfied for the median member state. The test for the median state (indicated as \( MED \)) takes the following form:

\[
W_{MED}(g^c_{MED}) \geq W_{MED}(g^l_{MED})
\]

The “Early Warning Mechanism” proposed by the European Commission on May 10th, 2006 and “welcomed” by the European Council, looks like a move towards a mechanism based on the unanimity rule, if not towards a form of decentralized federalism. The “early warning mechanism” would render national parliaments “subsidiarity watchdogs.” According to the mechanism, national parliaments would have the power to raise objections to EU legislative proposals that they believe violate the principle of subsidiarity (see Cooper, 2006).

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In the case of democratic subsidiarity, we can find situations in which the satisfaction of the centralized subsidiarity test does not imply satisfaction of the democratic subsidiarity test. Given that centralization will occur if the subsidiarity test is satisfied for the median member state, manipulation of the cost and benefit of centralization for the median state can have important effects.29

5. LOCK-IN EFFECTS AND THE BOUNDARIES OF SUBSIDIARITY

In this section we consider how the process of centralization is affected by the subsidiarity principle. Specifically, in Section 5.1., we consider the lock-in effects that may be created when applying the subsidiarity test to implement gradual centralization. In Section 5.2 we consider the extent to which these problems are mitigated or exacerbated by the adoption of one form of subsidiarity or another. In Section 5.3, we bring these results together. We consider the conditions that must be satisfied to justify centralization under centralized, decentralized and democratic subsidiarity. We also provide a graphical representation of the boundaries of centralization under subsidiarity.

5.1. TRANSFERING MULTIPLE COMPETENCES: LOCK-IN EFFECTS UNDER SUBSIDIARITY

When transferring competences, states and unions can choose the number of activities that they wish to transfer from local to central levels of government and bundle them accordingly. In this section, we will show that the subsidiarity test can yield different results according to the way in which the competences are bundled together.30 In order to illustrate the relevance of bundling, we model the subsidiarity decision as a function of \( k \), the number of competences to be allocated at the central level. The case \( k = 0 \) corresponds to the case in which all functions are left to be performed at the local level. In the general case \( 1 \leq k \leq M \), the states and the union consider whether to transfer a bundle of \( k \) competences from the local to the central level. A limiting case in which \( k = M \) corresponds to a situation in which all functions are transferred to the

29 As we will discuss in Section 5.2, given the distribution of costs and benefits of carrying out the governmental activities among member states, it is possible to identify many instances where sharing rules can be manipulated strategically at the central level (for instance by the member states with stronger bargaining power) in order to favor the centralization of a given function.

30 For the purpose of this section, proofs will be developed with reference to the case of centralized subsidiarity discussed in Section 4.2.1. Qualitatively similar results would hold for the other subsidiarity tests.
central government at once. The case $k = 1$ corresponds instead to a stepwise centralization process, wherein the member states and the union decide to transfer a single competence from the local to the central level. In all such cases, the subsidiarity test is applied by considering the costs and benefits of transferring $k$ competences to the central level.

In the following we use the subsidiarity model developed in the previous sections to analyze the allocation of competences using different values of $k$, for the general case $1 \leq k \leq M$. The application of the subsidiarity test to the transfer of the $k$ activities under consideration entails a weighing of the countervailing effects of centralization. First, the transfer of $k$ activities to the central level has some potential benefits. One such benefit is given by the exploitation of economies of scale at the central level when the central government has a cost advantage as expressed in Definition 1. Another potential benefit is given by the opportunity to obtain economies of scope at the central level. Starting from a situation of full decentralization, economies of scope will obviously be small and will only be created if more than one function is transferred to the central government, i.e., $k > 1$. These benefits from centralization will have to be weighed against the increased cost that arises due to the foregone economies of scope at the local level and to the switching costs due to preference heterogeneity. The comparison of these two countervailing effects of centralization will determine the outcome of the subsidiarity test.

**Proposition 1:** In the absence of economies of scope at both central and local levels, the subsidiarity test will favor centralization, if the Union has a sufficiently large cost advantage with respect to member States.

*Proof:* see Appendix

**Corollary 1:** In the absence of economies of scope, if the Union has a sufficiently large cost advantage with respect to member States, the subsidiarity test for centralization will be satisfied for any values of $k$, with no lock-in effects.

*Proof:* see Appendix

In the absence of economies of scope, centralization is desirable and will be chosen under all forms of subsidiarity considered in Section 4.2 if the allocation of competences to the central level yields sufficiently lower per-unit costs to compensate for losses that arise due to the heterogeneity of states’ preferences. In these cases, centralization is preferable and will be undertaken under all values of $k$. No lock-in effects will be observed. In this case, the same optimal level of centralization will be reached by proceeding with
Proposition 2: If economies of scope are present at both central and local levels, and in the absence of cost advantage, the subsidiarity test may favor centralization if the economies of scope at the central level prevail over those at the local level. Prevailing economies of scope at the central level are a necessary but not a sufficient condition for satisfaction of the subsidiarity test.

Proof: see Appendix

Corollary 2: In the absence of economies of scale, the presence of economies of scope at both central and local levels can create lock-in effects for values of $M < k < M$.

Proof: see Appendix

Here, unlike what was seen with Proposition 1, we observe the possibility of lock-in effects. This because, unlike economies of scale, economies of scope at the central (local) level grow larger as additional functions are centralized (decentralized). In practical terms, economies of scope are largest when all functions are concentrated at one level or the other. The first functions that are moved from the local to the central level are those that suffer the highest loss in terms of forgone economies of scope. This is self-evident, since at the beginning of a centralization process, there are more functions that are still at the local level and with which the centralized functions lose synergies at the local level. This may lead to situations in which a proposed centralization of functions at an early stage of centralization fails the subsidiarity test, with a resulting lock-in effect for subsequent centralization decisions. Lock-in effects can be observed for values of $k < M$, but not for the case of wholesale centralization, $k = M$.

Proposition 3: In the presence of a cost advantage, the subsidiarity test could favor centralization even if the economies of scope at the local level prevail over those at the central level. Larger economies of scope at the central level are a necessary but not sufficient condition for centralization.

Proof: see Appendix

Proposition 4: The lock-in effect is decreasing in the size of $k$.

Proof: See Appendix.

As discussed above, economies of scope are largest when all functions are concentrated at one level or the other. All else being equal, the subsidiarity test is most likely to fail centralization when functions are transferred in a stepwise fashion, i.e., $k = 1$. If a sufficient number of functions are bundled together at
the time they are transferred to the central level, the economies of scope at the central level could become strong enough to satisfy the subsidiarity test.

In Figure 1 we illustrate the case of a lock-in effect caused by the application of the subsidiarity test. In this example the optimal level of centralization would be reached at $k^*$. For any current level of centralization $k \leq k_L$, however, the subsidiarity principle could prevent the achievement of the optimal level. Centralization could proceed until $k_L$, but not any further. This may happen because an incremental transfer of competences to the central government beyond $k_L$ and short of $k_G$ would cause a transitional welfare loss. The transitional welfare loss could only be avoided if a number of competences $k > k_G - k_L$ are bundled together and transferred, allowing for a sudden transition from $k_L$ to a point beyond $k_G$ with a higher welfare level. By allowing bundling of a larger number of competences, $k$, the probability of a lock-in effect decreases. At the limit ($k = M$) lock-in effects are avoided because competences could be lumped together at the time of centralization, allowing any possible move from local to global maxima.

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5.2. THE DOMAIN OF CENTRALIZATION: COMPARING THE THREE FORMS OF SUBSIDIARITY

We shall now briefly compare the effectiveness of the three forms of subsidiarity in promoting an optimal level of centralization. We should preface this discussion by pointing out that the differences in the results of the three tests of subsidiarity disappear when member states have homogeneous preferences. As the membership becomes more heterogeneous, the choice of the form of subsidiarity acquires increasing relevance.

We begin by noting that any reallocation of competences carried out under a centralized subsidiarity test as defined in (11) will take place only if the aggregate benefits of centralization outweigh the aggregate costs for all member states. This is equivalent to a Kaldor-Hicks test of potential compensation. Unlike centralized subsidiarity, the decentralized subsidiarity test defined in (12) compares, instead, the individual payoffs for each member state. The decentralized subsidiarity test also allows reallocation of competences only when no member state suffers a reduction in welfare from centralization. Any member state could in fact oppose a centralization proposal that worsens its own welfare. This is equivalent to saying that centralization will be carried out only if the ensuing equilibrium is Pareto superior for all member states. Centralization proposals are therefore generally subjected to a more restrictive test under decentralized subsidiarity. The satisfaction of the decentralized subsidiarity test becomes harder as the degree of heterogeneity of member states increases.

The outcomes of decentralized and centralized subsidiarity tend to converge as appropriate sharing rules are adopted to compensate the effects of centralization on the welfare of member states.

Lemma 2: Any centralization proposal that satisfies the centralized subsidiarity test under the condition stated in Proposition 1, 2 or 3 could also satisfy the decentralized subsidiarity test if an appropriate sharing rule, 

\[ \{s_1, \ldots, s_N\}, \sum_{i=1}^{N} s_i = 1, \] is adopted.

The result in Lemma 2 is rather intuitive and states that when centralization is Kaldor-Hicks efficient, there must exist a way of redistributing the costs of centralization among countries that compensates all countries from potential losses and switching costs.

In cases that satisfy the centralized subsidiarity test in (11), the gainers gain more than the losers lose. Countries could, therefore, agree on a sharing rule that compensates the losing states, yet leaves some states better off. This would be sufficient to satisfy the decentralized subsidiarity test. The choice of appropriate sharing rules could reduce the share of centralized costs imputed to the losing
states. If Kaldor-Hicks efficiency is verified for the results given by the centralized subsidiarity test in (11), there will exist a vector of sharing rules that guarantees that all member states would favor centralization. If sharing rules can be freely chosen, reallocation of competences under both centralized and decentralized subsidiarity will take place when efficient. The opposite also holds such that if the centralized subsidiarity test cannot be satisfied, there will be no vector of sharing costs capable of satisfying the decentralized subsidiarity test.31

Lemma 3: Any member state with an intensity of preferences below the average of the union will benefit from centralization. Any member state above the average will benefit from centralization only in the presence of a sufficiently large cost advantage.

Proof: Immediate from proof of Proposition 1.

Proposition 5: Under the democratic subsidiarity test, centralization will take place when the median member state has a preference intensity $\alpha_{MED}$ below the union’s average $\bar{\alpha}$. When the median member state has a preference intensity $\alpha_{MED}$ above the union average $\bar{\alpha}$, centralization could only satisfy subsidiarity in the presence of a sufficiently large cost advantage. Under democratic subsidiarity, an inefficient centralization decision may be made.

Proof: See the Appendix.

According to Lemma 3, all member countries with lower preferences for governmental goods $\alpha_i \leq \alpha_{MED}$ gain from centralization, whereas (some) countries with higher evaluations $\alpha_i > \alpha_{MED}$ may not. Centralization does not necessarily satisfy the democratic subsidiarity test when the median $\alpha_{MED}$ is above the average $\bar{\alpha}$. In this case centralization will pass only if there exists a sufficiently large cost advantage to render centralization attractive for the median state. An interesting case occurs when $\alpha_{MED}$ is above $\bar{\alpha}$, but the subsidiarity test condition in (13) is violated for the median voter. In that case, centralization is rejected because all countries to the right of the median would oppose it. Under both scenarios, the decision made under the democratic

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31 As a practical matter, allowing cost sharing to be adjusted on the basis of preferences opens the floodgates of preference falsification. Member states would indeed have incentives to engage in strategic manipulation regarding the knowledge of $\alpha_i$ in order to shift a larger share of the cost of central government to other member states. Therefore, the ideal vector of sharing rules $\{s_1, \ldots, s_N\}$, $\sum_{i=1}^{N} s_i = 1$ may not be achievable in practice because of the strategic behavior of states. Note however that in the framework considered here, the assumption of observable $\alpha_i$ rules out the case of strategic manipulation.

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subsidiarity test is not necessarily efficient: centralization could be rejected when efficient or approved when inefficient.

5.3. THE BOUNDARIES OF SUBSIDIARITY

In the following, we list the conditions that will have to be satisfied under the three forms of subsidiarity for centralization to take place.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Centralized Subsidiarity Test</th>
<th>Decentralized Subsidiarity Test</th>
<th>Democratic Subsidiarity Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost advantage</td>
<td>$\frac{\alpha_i}{\alpha} &lt; \frac{C_{j}^{C}(g_{i}^{L})}{C_{j}^{C}(N g^{C})}$</td>
<td>$\frac{\alpha_i}{\alpha} &lt; \frac{C_{j}^{C}(g_{i}^{L})}{C_{j}^{C}(N g^{C})}$</td>
<td>$\frac{\alpha_{MED}}{\alpha} &lt; \frac{C_{j}^{C}(g_{i}^{L})}{C_{j}^{C}(N g^{C})}$</td>
</tr>
<tr>
<td>Economies of scope</td>
<td>$\frac{\alpha_i}{\alpha} &lt; \frac{\sum_{i \neq j} C_{j}^{C}}{\sum_{i \neq j} C_{j}^{C}}$</td>
<td>$\frac{\alpha_i}{\alpha} &lt; \frac{\sum_{i \neq j} C_{j}^{C}}{\sum_{i \neq j} C_{j}^{C}}$</td>
<td>$\frac{\alpha_{MED}}{\alpha} &lt; \frac{\sum_{i \neq j} C_{j}^{C}}{\sum_{i \neq j} C_{j}^{C}}$</td>
</tr>
<tr>
<td>Cost advantage + Economies of scope</td>
<td>$\frac{\alpha_i}{\alpha} &lt; \frac{C_{j}^{C}(g_{i}^{L})}{C_{j}^{C}(N g^{C})}$</td>
<td>$\frac{\alpha_i}{\alpha} &lt; \frac{C_{j}^{C}(g_{i}^{L})}{C_{j}^{C}(N g^{C})}$</td>
<td>$\frac{\alpha_{MED}}{\alpha} &lt; \frac{C_{j}^{C}(g_{i}^{L})}{C_{j}^{C}(N g^{C})}$</td>
</tr>
</tbody>
</table>

Table 1: Conditions for Centralization under Subsidiarity

The conditions in Table 1 identify the trade-offs among the key factors at play in the centralization decisions: cost advantage, economies of scope and heterogeneity of preferences.

Figure 2 provides a graphical representation of these trade-offs. Points above the three-dimensional function represent a combination of values of heterogeneity of preferences, cost advantage and scope economies such as to warrant

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32 The threshold values for centralization in Table 1 have been derived for the case of equal sharing of the costs of central government for all member states, $s_i = \frac{1}{N}$.  
33 Figure 3 is drawn rewriting the conditions in Table 1 in terms of the variance of preferences. This follows the concept of heterogeneity used by Alesina and Wacziarg (1999), who define a country as being composed of a group of individuals who must agree on a set of policies and who are aligned along a spatial or ideological line. Heterogeneity of preferences is measured as the average distance of individuals from the center.
centralization. On the contrary, points below the function are characterized by a combination of values for which decentralization is desirable.

Figure 2: The Boundaries of Subsidiarity

Consistent with the values identified in Table 1, Figure 2 shows that when the heterogeneity of states’ preferences increases, higher values of cost advantage and/or economies of scope become necessary in order to justify centralization. Likewise, the vertical section of our three-dimensional function shrinks as we move closer to the origin, inasmuch as even a small cost advantage and/or small economies of scope at the central level are sufficient to make centralization attractive when membership to the union is highly homogeneous.

6. EXCESSIVE CENTRALIZATION UNDER SUBSIDIARITY?

The subsidiarity principle was formally adopted as a constitutional principle of the European Union to limit excessive centralization and to ensure that the reallocation of functions to the central level would occur only when centralization added value over and above what member states or individuals could achieve by acting at the local level.

In the previous analysis we have shown that, when starting from a situation of complete decentralization, the subsidiarity principle may create some lock-in

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effects that prevent desirable centralization. In the following, we will show that
the effects of subsidiarity change, however, and are possibly reversed if we start
from a situation similar to that faced by the European Union in 1992, in which
several functions were previously centralized and in which the proposed
centralization of additional functions became subject to the subsidiarity test.

6.1. APPLYING THE SUBSIDIARITY TEST AFTER THE CENTRALIZATION OF
AN INITIAL BUNDLE OF COMPETENCES

The subsidiarity principle was adopted by the European Union in 1992, after a
fairly large number of competences had already been transferred on the basis
of political decisions and in the absence of a blueprint for the expansion.34 As
discussed in Section 2.1, the competences that had been centralized prior to
1992 ranged vastly in their nature. Examples include the functions that were
transferred in 1958 by Articles 2 and 3 of the EC Treaty, such as the
establishment of a common external tariff and commercial policy, the removal
of barriers to the free movement of goods, persons, services and capital, the
creation of common Community policy in key areas of the economy, such as
agriculture and transport, the coordination of economic and monetary policy,
the “harmonization” of the laws of the Member States to help the common
market, the creation of a European Social Fund and a European Investment
Bank, the improvement of employment opportunities and facilitation of the
expansion of the Community, and the association with overseas countries and
territories to increase trade.35 In 1986, the Single European Act expanded
competences to entirely new fields of activity, including research, finance,
economic convergence, social policy and environment.

In the following, we analyze the effects of subsidiarity when applied after an
initial set of competences has been transferred to the central government on
the basis of political decision-making. We will show that the subsidiarity test is
affected by pre-existing centralization decisions in quite substantial ways.

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34 Although previously invoked as a general principle of good governance, the formal adoption
of the subsidiarity principle by the European Union came at a point where several important
functions had already been allocated at the central level as part of the exclusive competence of
the Union. Since the founding of the European Community, centralization of competences has
progressed in a piecemeal fashion in the absence of a blueprint for the ultimate objective of the
Union and of any formal analysis of the costs and benefits of centralization (Land, 1991).

35 For an account of the growth of these competences from 1958 to 1992, see Flaherty and
Proposition 6: An over-centralization problem may arise when the subsidiarity test is adopted after an initial bundle of competences is already centralized.

Proof: See Appendix.

Whether we start from a situation of complete decentralization, or we apply the subsidiarity test at a later stage when a bundle of competences has been previously assigned to the central government, the application of a subsidiarity test may fail to generate an optimal allocation of policy responsibilities across different levels of government. The initial bundle of centralized competences could in fact create economies of scope and attract additional competences. This may create an over-centralization problem if some of those functions could have been carried out more effectively at the local level. These functions may have been brought to the central level as an effect of the economies of scope generated by the initial bundle of competences at the central level. In Section 5 we saw that a lock-in effect may occur when an initial transfer of competences is evaluated under subsidiarity. A symmetrical problem can be found when the subsidiarity test is adopted after an initial wave of centralization. The symmetrical problem would be one of over-centralization. Unlike the lock-in effects considered in the previous sections, we observe in this symmetrical problem a trend towards progressive centralization, with a potential equilibrium characterized by excessive levels of centralization.

Figure 3 illustrates the process of excessive centralization that may be triggered when an initial set of competences, \( k_o \), is centralized on the basis of political decision-making and where the centralization of additional competences is subjected to the subsidiarity test.
The proposed centralization of any number of competences beyond the point $k_o$ would increase welfare and would therefore satisfy the subsidiarity test. In the scenario considered in Figure 3, this would bring us further away from the global maximum, $k^*$, leading to progressive centralization well beyond the optimal level of centralization. The preexisting centralization of competences in this example has important effects on the subsequent application of the subsidiarity test, leading to a path-dependent evolution of governance.

The above analysis may provide an explanation for the paradox of progressive centralization observed by Alesina, Angeloni and Schuknecht (2005). Contrary to its stated goal of preventing excessive centralization, in the specific context in which it was introduced in the EU, the subsidiarity principle triggered a mechanism favoring further centralization. This mechanism is strongly path dependent and, once started, may lead to levels of centralization that yield lower aggregate benefits than the preexisting decentralized regime. Although the subsidiarity principle is still too young to allow for a significant empirical verification of our hypothesis, our conjecture is that once some functions become centralized, further centralization becomes easier. Further centralization may, in fact, become unavoidable. This hypothesis is consistent with the preliminary evidence presented by Alesina, Angeloni and Schuknecht, who date the period of most intense centralization to the 1990s – ironically at a time when subsidiarity was adopted and raised to the rank of a constitutional...
principle of the European Union. The range of competences reallocated to the central level spanned along the new boundaries of a political, economic and monetary union, which have grown larger and stronger on the foundations laid by the Maastricht Treaty, subsidiarity principle notwithstanding.

6.2. DE V O L U T I O N U N D E R S U B S I D I A R Y

Although the objective of the subsidiarity principle was to constrain the future expansion of the Union through excessive centralization of competences, the European Commission, soon after its adoption, staged a demonstration of the constraining effects of subsidiarity by undertaking a review of existing Community legislation for conformity with the subsidiarity principle. The review was completed and a list of initiatives to be withdrawn or modified in light of the subsidiarity test was presented to the European Council (Marquardt, 1994). The list and the actions that followed were not impressive, and only three proposed directives were withdrawn and six more revised on subsidiarity grounds (Bermann, 1994). However, in drawing up this list, the Commission validly asserted the principle that the subsidiarity test could be applied retrospectively, allowing devolution of previously centralized functions. The possibility of a retrospective application of the subsidiarity principle was subsequently reaffirmed by a protocol added by the Treaty of Amsterdam, which under Article 3 stated: “Subsidiarity is a dynamic concept and should be applied in the light of the objectives set out in the Treaty. It allows Community action within the limits of its powers to be expanded where circumstances so require, and conversely, to be restricted or discontinued where it is no longer justified.” Although the use of the subsidiarity principle for devolution purposes has rarely been observed in recent years, the possibility of devolution through subsidiarity acquires particular symbolic value, given the lack of a

6 Bermann (1994) notes that the Commission evidently proceeded in the daunting task of legislative review believing that in matters of politics, actions speak louder than words. Much of the action, however, affected pending legislative proposals, rather than existing legislation and allocation of competences that had taken place prior to 1992. The European Commission subsequently withdrew additional legislative proposals. This possibly discouraged yet other initiatives and unborn proposals on subsidiarity grounds.

57 The use of subsidiarity principle for devolution purposes is limited by the fact that subsidiarity only applies to situations of shared competence and does not apply to areas in which the EU has exclusive jurisdiction. In practical terms, subsidiarity could not return authority to the member states where the union has taken over a given competence entirely.

secession opportunity for member states within the Union (Weiler, 1985).39 The possibility that there might be devolution of competences from the central government back to the states acquires particular relevance in enhancing the understanding of the effects of subsidiarity in our model.

In the following, we consider the application of subsidiarity for the devolution of competences from the central government back to the states. Proposition 6 showed that progressive centralization is the likely outcome of an ongoing process of centralization under subsidiarity. This conclusion should be revisited in light of the possibility of devolution.

**Proposition 7:** The over-centralization problem identified in Proposition 6 is mitigated if the subsidiarity test could be applied to the devolution of previously centralized competences.

**Proof:** See Appendix.

Propositions 1 and 2 apply to the case of devolution of previously centralized competences through subsidiarity. In the absence of economies of scope at both central and local levels, the subsidiarity test will favor devolution of previously centralized functions if the states have a comparative advantage. In this case the subsidiarity test for devolution will be satisfied for any value of $k$, with no lock-in effects. Also in this case, the subsidiarity test will be able to lead to contraction of the central government and to bring the allocation of competences back to an optimal level of centralization, either by proceeding with stepwise devolution ($k = 1$), wholesale devolution of competences ($k = k_0$) or any intermediate form of devolution ($1 < k < k_0$).

**Proposition 8:** The lock-in effect identified in Corollary 2 will also affect devolution through subsidiarity for values ($k < k_0$).

**Proof:** See Appendix.

When economies of scope are present at both central and local levels, lock-in effects may be observed for cases of partial devolution ($k < k_0$). The possibility of lock-in effects is due to the fact that economies of scope at the local level grow larger as additional functions are decentralized. When applying the subsidiarity test for devolution, the first functions that are reallocated back to the local level would create larger losses in terms of foregone economies of scope at the central level. Similar to what was observed under Proposition 2,

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39 Weiler (1985) points out that the EC treaty provisions suggest rather strongly that contraction of the EU can be negotiated, but not claimed as the right of any member state.
this may lead to situations where a proposed devolution of functions will not satisfy the subsidiarity test, with a resulting lock-in effect which may lead to the persistence of an excessive level of centralization. This lock-in effect could be overcome if multiple competences are simultaneously reallocated to the state level, tilting the balance of economies of scope in favor of states.

7. CONCLUSIONS

In this paper, we have shown that the principle of subsidiarity can lead to a path-dependent reallocation of policy responsibilities and have mixed effects for the achievement of an efficient level of centralization. After modeling the decision process under three alternative forms of subsidiarity, we observed in Section 5 that lock-in effects may prevent a gradual transition towards efficient levels of centralization. Stepwise reallocation of competences is most sensitive to these lock-in effects. The application of the subsidiarity test in the initial steps of the process may turn subsidiarity into a myopic policy instrument, especially when stepwise centralization is undertaken. Subsidiarity can also create the opposite problem of over-centralization. In Section 6, we showed that the adoption of subsidiarity by an already-centralized union may have perverse effects, favoring further centralization rather than putting a limit to it. This may have path-dependent effects on later centralization decisions.

These two results reveal that the timing of the subsidiarity test is crucial to determine the final level of centralization and whether lock-in effects or over-centralization problems are likely to emerge. When lock-in or over-centralization problems arise, subsidiarity may lead to a local, rather than a global, maximum. These findings are consistent with the particular patterns of centralization of distinct areas, such as social protection or agricultural policy, with strong heterogeneity of preferences but dominant scope economies. These findings are also consistent with the observed lack of centralization of other areas, such as defense and environmental protection, which have remained in the local domain notwithstanding the strong economies of scale achievable at the central level. As the now-young principle of subsidiarity comes of age, future scholars will have an opportunity to investigate empirically the extent to which lock-in or over-centralization problems have affected the process of unification of governmental functions in the European context.

Our analysis left out the constitutional economy aspect of the issue and the analysis of political agency costs. Centralization may have a substantial impact on the individuals and groups that hold diverse minoritarian preferences, or in regimes with imperfect democratic decision-making. With ongoing centralization, citizens are confronted with rising agency problems. Democratic

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control and political accountability are being weakened. This factor creates an additional trade-off between the benefits and costs of centralization. This trade-off may weigh more heavily toward centralization or decentralization, depending on the area of competence under consideration. These varying costs and benefits of centralization play a major role in the European Union, because of its so-called democratic deficit. These costs and benefits should be considered and explicitly modeled in further extensions of our analysis.

Further theoretical extensions should give greater emphasis to the strategic dimension of subsidiarity. This will give a clearer understanding of who may be the potential gainers and losers from decisions on reallocation under different subsidiarity rules, and of how these distributive effects might influence the outcome of allocation decisions made under different voting rules. Further analyses should also evaluate the robustness of subsidiarity to changes in membership and size of the union, as well as changes in the level of heterogeneity of member states. The enlargement of the union may affect the optimality of previous centralization decisions in two main ways. First, diseconomies of scale may result from an expansion of the union. Second, and more importantly, the union may grow more heterogeneous as membership expands. The opportunity to apply subsidiarity for devolution purposes may become a critical instrument to allow the thinning of some centralized competences in response to an expansion in membership and diversity within the union. Additionally, the optimal size and membership in the union may be endogenous to the rules that govern the process of allocation of competences and the choice of a proper form of subsidiarity may be vital to fostering a healthy expansion of the union.

The model could also be extended to consider the strategic manipulation of the functions that are proposed for centralization. Several related issues may be relevant in this setting. First, as discussed in this paper, cost sharing rules can be used to manipulate the costs and benefits of centralization for the relevant states, affecting the outcomes of subsidiarity. Cost sharing rules, however, can have important redistributive effects, and different forms of subsidiarity may be more or less conducive to such redistributive manipulations. Second, the number of governmental functions is often endogenously determined. Under different voting rules, we may observe an expansion or a restriction of the activities that fall under the shared competences of states and union. Finally, agenda setting may have important effects in the process of progressive centralization considered in this paper. Agenda setters may facilitate centralization by bundling a subset of functions that enhance the opportunities of absorption of additional functions at a later stage. On the other hand, agenda setters may also block desirable centralization, centralizing an initial bundle of competences that will produce lock-in effects in the future. In either
case, agenda manipulation can lead to a less than optimal allocation of governmental functions. Future extensions should further consider the possible role of imperfect information and the effect of strategic bargaining on the outcomes of centralization under our three rules. These considerations and extensions will hopefully shed some light on the practical effectiveness of subsidiarity and offer a valuable basis for evaluating its desirability and exploring alternative formulations of this concept.

Appendix

**Proof of Proposition 1**

The optimization problem for the central government and of each member state $i$ in case of partial centralization of $k$ competences requires the satisfaction of the first order conditions (9) and (10) without the term referring to the economies of scope

\[(9') \sum_{j=1}^{N} \alpha_i H_j(g^c_j) = NC_j^c(Ng^c); j = 1, ..., k \]

\[(10') \alpha_i H_j(g^D_{ij}) = C^D_j(g^D_{ij}); j = k + 1, ..., M; i = 1, ..., N \]

We can immediately see that, in the absence of economies of scope, the first order conditions in (4) and (10) coincide. Hence $g^D_{ij} = g^L_j; j = k + 1, ..., M$

Expression (9') can be rewritten as

\[(9'') H_j(g^c_j) = \frac{C^L_j(Ng^c)}{\bar{\alpha}} \]

where $\bar{\alpha} = \frac{\sum_{i=1}^{N} \alpha_i}{N}$ is the average $\alpha$ in the population of member states.

Comparing expressions (9'') and (10') it can be seen that $g^c_j > g^L_{ij}$ iff

\[(14) \frac{\alpha_i}{\bar{\alpha}} < \frac{C^L_j(g^L_j)}{C^L_j(Ng^c)} \]

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Under the condition of cost advantage defined in (6), the r.h.s. of condition (14) is always bigger than one. Hence, \( g_j^c > g_j^L \) whenever \( \frac{\alpha_i}{\bar{\alpha}} < 1 \), i.e. whenever \( \alpha_i < \bar{\alpha} \). When \( \alpha_i > \bar{\alpha} \), condition (14) is not automatically satisfied. Satisfaction requires that the degree of heterogeneity (measured by the percent distance of \( \alpha_i \) from the mean) is lower than the percentage cost savings, i.e.

\[
\frac{\alpha_i - \bar{\alpha}}{\bar{\alpha}} < \frac{C_{j}^{L}(g_{i}^{*,L}) - C_{j}^{C}(Ng_{i}^{*,C})}{C_{j}^{C}(Ng_{i}^{*,C})}.
\]

The total welfare of a single state and of the union can be derived by integrating the FOC over the range \((0,g_{i}^{*,L})\) in the case of full decentralization and \((0,g_{i}^{*,C})\) in the case of partial centralization. The marginal benefits for states and union coincide, while the marginal costs of supplying the governmental goods differ. Under the assumption of a comparative cost advantage for the union, the net marginal benefit is higher for the union for any unit produced up to \( g_{i}^{*,L} \). Over the range \((g_{i}^{*,L},g_{j}^{*,C})\) the welfare of member states will not increase (since those units are not produced under decentralization), whereas the welfare of the union will increase by positive but decreasing amounts up to the optimal level of zero. This is true for any \( j \). Therefore \( g_{j}^{*,C} > g_{j}^{*,L} \) implies that:

\[
W_{i}^{C}(g_{i}^{*,C}) \geq \sum_{i=1}^{N} W_{i}(g_{i}^{*,L})
\]

If condition (14) is not satisfied, some countries with \( \alpha_i > \bar{\alpha} \) will then have \( g_{j}^{*,C} < g_{j}^{*,L} \). Nonetheless, centralization may still be efficient if the gains from centralization (represented by cost savings and increase in welfare due to \( g_{j}^{*,C} > g_{j}^{*,L} \) for \( \alpha_i \leq \bar{\alpha} \)) outweigh the loss due to centralization (represented by forgone welfare due to \( g_{j}^{*,C} < g_{j}^{*,L} \) for \( \alpha_i > \bar{\alpha} \)). In analytical terms:
PROOF OF PROPOSITION 2

In the absence of a cost advantage, the union and the member states have the same marginal cost. If the following condition is satisfied:

\[
\frac{\alpha_i}{\overline{\alpha}} < \frac{\sum_{v \neq j, v=1}^{M} C_{j}^{vl}(g^{*l}_{MED})}{\sum_{v \neq j, v=1}^{M} C_{j}^{vc}(Ng^{*c})}
\]

Then \( g^{*c}_j = g^{*l}_j \), \( j = 1, \ldots, k \). In the presence of prevailing economies of scope at the central level \( \sum_{v \neq j, v=1}^{M} C_{j}^{vl}(g^{*l}_{MED}) \geq \sum_{v \neq j, v=1}^{M} C_{j}^{vc}(Ng^{*c}) \).

As with condition (14), condition (17) is automatically satisfied whenever \( \alpha_i < \overline{\alpha} \) or whenever there is a lower degree of heterogeneity with respect to cost savings for \( \alpha_i > \overline{\alpha} \). However condition (17) is necessary but not sufficient for centralization. In the absence of cost advantage, the member states will choose

\( g^{*D}_{ij} < g^{*L}_{ij} \), \( j = k+1, \ldots, M \)

since under full decentralization the member states rely on economies of scope on all \( M \) functions for any level of \( g_i \). Centralization may still be efficient if the gains from centralization (represented by cost savings and increase in welfare due to \( g^{*c}_j > g^{*l}_j \) for \( j = 1, \ldots, k \)) outweigh the loss due to centralization (represented by forgone welfare due to \( g^{*D}_{j} > g^{*L}_{j} \) for \( j = k+1, \ldots, M \)). In analytical terms:

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\[ \sum_{i=1}^{k} \sum_{j=1}^{k} \int (\alpha H_j - \delta \left( C^i_j + \sum_{v \in j, j \neq i} C^v_j \right) ) + \sum_{i=1}^{k} \sum_{j=1}^{k} \int (C^i_j + \sum_{v \in j, j \neq i} C^v_j - \delta \left( C^i_j + \sum_{v \in j, j \neq i} C^v_j \right) ) + \sum_{i=1}^{k} \sum_{j=1}^{k} \int (\alpha H_j - \delta \left( C^i_j + \sum_{v \in j, j \neq i} C^v_j \right) ) + \sum_{i=1}^{k} \sum_{j=1}^{k} \int (C^i_j + \sum_{v \in j, j \neq i} C^v_j - \delta \left( C^i_j + \sum_{v \in j, j \neq i} C^v_j \right) ) \geq 0 \]

Notwithstanding the presence of economies of scope, a lock-in effect may be observed, that may preclude efficient centralization for values of \( k < M \), with:

\[ W^c (g^c) < \sum_{i=1}^{N} W_i (g^*_{iL}) \]

**Proof of Proposition 3**

Under centralized subsidiarity, in the presence of a cost advantage and prevailing economies of scope at the central level, centralization will be carried out if the condition (19)

\[ \frac{\alpha_i}{\alpha} < \frac{C^i_j (g^*_{iL})}{C^j_i (Ng^{cL})} + \sum_{v \in j, j \neq i} \frac{C^v_j (g^*_{iL})}{C^j_i (Ng^{cL})} \]

and condition (18) are satisfied. As in the previous Proposition, condition (19) is necessary but not sufficient for centralization to satisfy subsidiarity.

**Proof of Proposition 4**

The lock-in effect is caused by the fact that by transferring competences from the local to the central level, economies of scope at the local level are weakened. This implies that when competences stay at the local level, the marginal cost of production rises, and therefore the public good arising from those functions provided by the local government will diminish (as shown in proof of Proposition 3). We can therefore measure the lock-in effect as the proportional increase in marginal cost at the local level following the centralization process (with respect to the case of full decentralization, i.e. \( k = 0 \)).
\[
\frac{\sum_{v(x, j)=k+1}^{M} C_j^{vl}(g_i)}{\sum_{v(x, j)=1}^{M} C_j^{vl}(g_i)}
\]

It is plain that the ratio is decreasing in \( k \), and becomes zero (no lock-in effect) when the centralization process is realized in one step, setting \( k = M \).

**Proof of Proposition 5**

Under democratic subsidiarity, according to the median voter theorem, centralization will be carried out if the following condition (analogous to (19)) is satisfied for the median member state:

\[
(20) \quad \frac{\alpha_{MED}}{\bar{\alpha}} < \frac{\sum_{v(x, j)=1}^{M} C_j^{vl}(g_{MED})}{s_{MED} C_j^{lc}(Ng^c)} + \frac{\sum_{v(x, j)=1}^{k} C_j^{lc}(Ng^c)}{s_{MED} C_j^{lc}(Ng^c)}
\]

Applying Lemma 3 to the democratic subsidiarity test, centralization will always be carried out when the median \( \alpha_{MED} \) is below the average \( \bar{\alpha} \). In that case, all member countries with lower preferences for governmental goods \( \alpha_i \leq \alpha_{MED} \) gain from centralization, whereas (some) countries with higher evaluations \( \alpha_i > \alpha_{MED} \) may not. Centralization does not necessarily satisfy the democratic subsidiarity test when the median \( \alpha_{MED} \) is above the average \( \bar{\alpha} \). In this case centralization requires condition (20) to be satisfied for the median state and condition below (analogous to (16)) to hold:

\[
(21) \quad \int_{s_{MED,j}}^{s_{MED,j}^*} \left( C_j^{vl}(g_j) - s_{MED} C_j^{lc}(Ng^c) \right) \geq \int_{s_{j}}^{s_{MED,j}} \left( \alpha_{MED} H_j(g_j) - C_j^{lc}(g_j) \right)
\]

**Proof of Proposition 6**

The proof follows directly from Propositions 2 and 4. Consider the case in which the union has centralized \( k_1 \) competences and each member state is asked to vote in favor of the centralization of a second bundle of \( k_2 \) governmental activities. The optimization problem for the central government and for each member state \( i \) in the case of an additional partial centralization of \( k_2 \) competences requires the satisfaction of the following first order conditions:
\( (11') \quad \sum_{i=1}^{N} \alpha_i H_j(g_i^C) = N C_{j}^{C}(Ng^C) + N \sum_{v(x,j)=1}^{k_1} C_{j}^{C}(Ng^C) j = 1,...,k \)

\( (12') \quad \alpha_i H_j(g_i^P) = C_{j}^{L}(g_i^P) + \sum_{v(x,j)=k_1+1}^{M} C_{j}^{L}(g_i^P) j = 1,...,k; i = 1,...,N \)

The optimization problem for the central government and of each member state \( i \) in case of partial centralization of the first bundle of \( k_1 \) competences requires the satisfaction of the following first order conditions:

\( (11'') \quad \sum_{i=1}^{N} \alpha_i H_j(g_i^C) = N C_{j}^{C}(Ng^C) + N \sum_{v(x,j)=1}^{k_1} C_{j}^{C}(Ng^C) j = 1,...,k \)

\( (12'') \quad \alpha_i H_j(g_i^P) = C_{j}^{L}(g_i^P) + \sum_{v(x,j)=k_1+1}^{M} C_{j}^{L}(g_i^P) j = 1,...,k; i = 1,...,N \)

It appears immediately from Proposition 4 that the lock-in effect is reduced at the second round of centralization, i.e.

\[
\frac{\sum_{v(x,j)=k_1+1}^{M} C_{j}^{L}(g_i)}{\sum_{v(x,j)=1}^{M} C_{j}^{L}(g_i)} < \frac{\sum_{v(x,j)=k_1+1}^{M} C_{j}^{L}(g_i)}{\sum_{v(x,j)=1}^{M} C_{j}^{L}(g_i)}
\]

Economies of scope at the central level are bigger, since a higher number of governmental activities equal to \( k_1 + k_2 \) is now carried out centrally. This follows from the fact that the reduction in marginal cost at the central level is higher after an initial block of competences is transferred at the central level, fostering progressive centralization. Namely:

\[
\left| \sum_{v(x,j)=1}^{k_1} C_{j}^{C}(Ng) \right| < \left| \sum_{v(x)=1}^{k_2} C_{j}^{C}(Ng) \right|
\]

Note that the proof is derived under the assumption of monotonicity in the economies of scope, i.e. we assume away the case where, after some competences are centralized, the central government begins experiencing diseconomies of scale.
PROOF OF PROPOSITION 7
Same as in Proposition 1, 2 and 3 when you reduce $k$.

PROOF OF PROPOSITION 8
Same as in Proposition 2 and Corollary when you reduce $k$.

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