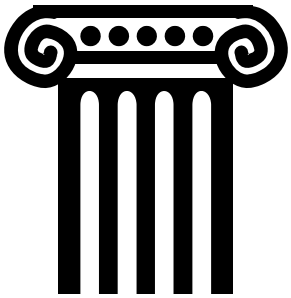

Self-Defeating Subsidiarity: An Economic Analysis

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Self-Defeating Subsidiarity

Abstract

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 at the lowest possible level of government, unless there is evidence that the central government 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 studying the effects and the limitations of the subsidiarity test in promoting an optimal level of centralization.

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KEYWORDS: *Subsidiarity, Popitz's Law, Centralization, Devolution, Comparative Advantage, Economies of Scope.*

1. Introduction

According to a fundamental principle of constitutional design, powers should be allocated to the level of government that can best exercise them. This canon of constitutional design provides the underlying rationale for the subsidiarity principle – a principle aimed at guiding the allocation of competences between the central (federal) government and the local (state) governments. The subsidiarity principle tackles a fundamental question of federalism. The principle is applied to verify whether competences between federal governments and states are optimally allocated,

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taking into account the comparative advantage of different levels of government in fulfilling specific functions. In a nutshell, the subsidiarity principle states that the reallocation of functions to the central level should be permitted only if it brings added value over and above what member states or individuals could achieve by acting at the local level (the so-called "subsidiarity test").[1]

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) studies the effects of subsidiarity comparing it to the alternative of fixed competence catalogues and comes to criticize the notion of subsidiarity for its static nature. A relevant contribution to this field is Alesina, Angeloni and Etro (2005). Their paper characterizes the benefit of centralization as the possibility of exploiting economies of scale in the central allocation of policy responsibilities. It 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 where economies of scale are predominant should be carried out at the central level, whereas all activities with high heterogeneity of preferences should be 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 find 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.[2] Moreover, they find that in the European Union something seems to have drawn the process of allocation of policy responsibilities away from the optimal balance of economies of scale and the heterogeneity of preferences set down by the literature above.

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

[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."

[2] Alesina, Angeloni and Schuknecht (2005, p. 276).

Unlike previous literature on the optimal level of centralization, we adopt a dynamic framework. The frameworks of the previous literature have been static with the structure of costs not changing over time. In our model, 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 when competences can be lumped together when centralization is proposed. We observe the possibility of lock-in effects when subsidiarity is applied in the early stage of centralization. This is due to the fact that, 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 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 are previously centralized. This was the situation 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.

2. The Subsidiarity Principle

The concept of subsidiarity has ancient roots.[3] The concept of subsidiarity 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, with a resulting deference to states over a federal government.[4] In the nineteenth century the concept of subsidiarity reemerged in political thought as a principle standing in alternative to the opposing claims of decentralized capitalism and centralized Marxian socialism.[5] 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.[6] In the 1930s the concept of subsidiarity gradually evolved into a principle advocating a cooperative balance between the state and the civil society, setting limits on centralized authority and protecting various social groups from failures of the state.[7]

[3] 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.

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

[5] 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*."

[6] According to Johannes Popitz, "in a realistic consideration of politics, the power of attraction of the central government becomes inevitable. There is no effective panacea against it." (Popitz, 1927, pp. 348-49). This hypothesis was pronounced so emphatically by Popitz as to become known as "Popitz's law."

[7] 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 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, p. 42).

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.

2.1 Centralization of Competences Prior to the Subsidiarity Principle

One of the most contentious points throughout the history of the European Union is the distribution of powers between the central government of the Union and member states. Since the early years of the European Economic Community (created through the Treaty of Rome in 1958), member states resisted the expansion of activities and the progressive centralization of competences at the Community level.[8] Despite the original idea 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*"), in practice the reallocation of competences took place on a merely political basis supported by 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 is the creation of twenty-some organizations entrusted with a variety of powerful intervention instruments like production quotas, aids or levies, and even 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 EC Treaty governing agricultural policy. Another example concerns the implementation of Articles 94 and 95 of the EC Treaty which de facto led to the 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 hardly found any 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, practically making possible the self-authorization of 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, opening new fields of activity, including 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 some constraints to new proposals of centralization.

[8] 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.

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 matured by several member states.[9]

2.2 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 included in Article 5 of the consolidated version of the Treaty Establishing the European Community[10] and is also included in the proposed European Constitution, under Article 9.[11]

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 of 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 as 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 in the opinion of both scholars and policymakers an obscure concept, lacking formal guidelines for its implementation.

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

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[9] Bermann (1994, p. 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.

[10] 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 within its exclusive competence, the Community shall take action, in accordance with the principle of subsidiarity, only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community. Any action by the Community shall not go beyond what is necessary to achieve the objectives of this Treaty." On the justiciable nature of Article 5, see Edwards (1994).

[11] Art. 9 of the proposed European Constitution states: "Under the principle of subsidiarity, in areas which do not fall within its exclusive competence the Union shall act only if and insofar as the objectives of the intended action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level."

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, addressing the question of how the subsidiarity principle should be constructed and applied in practice, to ensure an effective safeguard for the sovereignty of individual states, and to promote cooperation and intervention of superior hierarchical layers when efficient.[12] Our simple model of subsidiarity wishes to unpack the loaded concept of "comparative advantage of the central government" providing an economic framework for the subsidiarity test. 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.[13]

3. 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 their quantity or quality taking into account their heterogeneous preferences. The solution to the local government's problem allows us 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.

We assume the presence of both economies of scale and scope in the provision and/or enforcement of two or more governmental activities, as well as the heterogeneity of preferences of the member states over governmental goods. When considering centralization decisions in Section 4, we allow for the unequal apportionment of the central government's costs for member states. 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. In Section 4, we will further 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

[12] 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.

[13] 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.

volume of output (i.e., the scale of production) increases. In our model economies of scale can be observed at both local and central 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 "cost advantage" of the central government. There is evidence that such cost advantage for the central government may be present in areas like common market policies, monetary policy, and environmental protection (Alesina, Angeloni and Etro, 2005).

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 where 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 to 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). It seems a plausible assumption that, in a given policy area, governmental activities (like administration, enforcement, regulation, etc.) may be characterized by economies of scope.

Heterogeneity of states' preferences plays an important role in our model of subsidiarity.[14] States may differ in their preferences over the quantity or quality of governmental goods because of the different income level, ethnic background, race, or religion of their population.[15] In the presence of heterogeneity of preferences states may experience greater 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 about 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.

[14] 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 ethnically more fragmented nations.

[15] 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.

These three elements identified in the literature play a critical role in the process of centralization through subsidiarity.[16] We consider the tradeoff between economies of scale, economies of scope and heterogeneity of preferences, studying how the subsidiarity test selects different equilibria with respect to centralization levels.

3.1 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 $i = 1, \dots, N$. Member states 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, $j = 1, \dots, M$. Let $g_i = (g_{i1}, \dots, g_{ij}, \dots, g_{iM})$ 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 $j = 1, \dots, M$, i.e.:

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

Each member state is characterized by the following welfare function:[17]

$$W_i = \alpha_i H(g_i) - C^L(g_i) \tag{2}$$

where $H(g_i) = \sum_{j=1}^{M} H(g_{ij})$ is the state i's total benefit from the provision of its M governmental activities, where $H_{g_j} > 0$ and $H_{g_j g_j} < 0$. The parameter α_i captures the heterogeneity of preferences across states, indicating how much the population in state i values the provision of governmental activities. With no loss of generality we assume that the parameters α_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 centralization (decentralization) decision, starting from a situation where all

[16] Empirical analysis investigates the role of the three factors. Among others, Mazzaferro and Zanardi (2008) show on 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.

[17] 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 intuition and to allow an easier comparison of states' benefits and costs in the fulfillment of their governmental activities.

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.[18]

3.2 The Equilibrium in the Fully Decentralized Case

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

$$max_{(g_{i1},\dots,g_{ij},\dots,g_{iM})} W_i = \alpha_i \sum_{j=1}^{M} H(g_{ij}) - \sum_{j=1}^{M} C_j^L(g_{i1},\dots,g_{ij},\dots,g_{iM}) \quad (3)$$

The first order conditions are:[19]

$$\alpha_i H_j = C_j^{jL} + \sum_{v \neq j} C_j^{vL};\ j = 1,..M \quad (4)$$

where $H_j = \dfrac{\partial H(g_{ij})}{\partial g_{ij}}$ and $C_j^{kL} = \dfrac{\partial c_k^L(g_{i1},\dots,g_{ij},\dots,g_{iM})}{\partial g_{ij}}$.

Define $g_i^* = (g_{i1}^*, \dots, g_{ij}^*, \dots, g_{iM}^*)$ the vector $1xM$ of optimal quantities of governmental activity j for 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^{jL} represents the direct marginal cost of carrying out activity j, while the term $\sum_{v \neq j}^{M} C_j^{kL}$ 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 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_j^{jL}.[20]

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

Lemma 1: (*a) The optimal vector of public goods* $g_i^{*L} = (g_{i1}^{*L}, \dots, g_{ij}^{*L}, \dots, g_{iM}^{*L})$ *is increasing in* α_i*; (b) Under the full decentralization regime, with* $\alpha_1 \leq \dots \leq \alpha_i \leq \dots \leq \alpha_N$, $W_1^{*L} \leq \dots \leq W_i^{*L} \leq \dots \leq W_N^{*L}$.

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[18] 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).

[19] The second order condition of the maximization problem is satisfied under the assumption that $|\alpha_i H_{jj}| > |\sum_{k=1}^{M} C_{jj}^{kL}|$. Note that $H_{jj} < 0$.

[20] Decreasing marginal costs guarantee that average costs are always decreasing.

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

It is immediate to see that Property (*a*) of the equilibrium has a fairly straightforward interpretation which plays an important role in the analysis that follows. Countries with higher intensity of preference towards the governmental activities (high values of α_i) are willing to provide more public goods when choosing at the local level.

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.[21]

In order to study the decision process for the allocation of competences between local and central levels, in Section 4.1 we begin 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,[22] where $1 \leq k \leq M$. The union chooses the level of each governmental activity j that it carries out at the central level, g_j^C, $j = 1, \dots, k$ 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 Ng_j^C, where N is the number of member states in the union. Let $g^C = (g_1^C, \dots, g_k^C)$ be the vector $1xk$ of governmental activity levels chosen by the union for each single State (e.g.,

[21] 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.

[22] 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.

education, defense or environmental regulation) and let $Ng^C = (Ng_1^C, \dots, Ng_k^C)$ be the vector $1xk$ of aggregate levels provided by the union.

The total cost sustained by the central government is $C^C(Ng^C)$, 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 $j = 1, \dots, k$:

$$C^C(Ng^C) = \sum_{j=1}^{K} C_j^C(Ng_1^C, ..., Ng_i^C, ..., Ng_k^C) \tag{5}$$

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 to the central level.[23] This implies that, for any activity $j = 1, \dots, k$, the marginal cost C_j^{jC} will be decreasing, i.e. $C_{jj}^{jC} < 0$.

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

$$\frac{C_j^{jL}(g)}{C_j^{jC}(g)} > 1 \tag{6}$$

In our setting, cost advantage implies that for all member states 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 may be due to institutional settings that affect production costs.[24]

It is possible that some of the activities for which the central government has a cost advantage are best done conjunctly with other activities at the same level of government (economies of scope). Similarly to 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_j^{vC}.

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 $g_i = (g_1^C, \dots g_k^C, g_{ik+1}^D, \dots, g_{iM}^D)$, where the subvector $(g_1^C, \dots g_k^C)$ of

[23] 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".

[24] 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, p. 276).

dimension $1xk$ represents the centrally-supplied governmental activities which is equal for all states, and the subvector $(g_{ik+1}^D, \dots, g_{iM}^D)$ of dimension $1x(M-k)$ represents the locally-supplied governmental activities which is individually chosen by each member state.

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, $C^C(Ng^C)$[25], where such shares can be freely assessed in our model (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.).

State i's welfare function can therefore be expressed as:

$$W_i = \alpha_i H(g_i) - C^L(g_i^D) - s_i \sum_{j=1}^{k} C_j^C(Ng_1^C, ..., Ng_i^C, ..., Ng_k^C) \quad (7)$$

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

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:

$$W^C = \sum_{i=1}^{N} [\alpha_i H(g_i) - C^L(g_i^D)] - C^C(Ng^C) \quad (8)$$

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

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

$$\max_{(g_1^C, \dots, g_k^C)} W^C(g)$$

and the subvector $(g_{ik+1}^{*D}, \dots, g_{iM}^{*D})$ of dimension $1x(M-k)$ for the competences remaining at decentralized level is chosen by each country in a separate maximization problem:

$$max_{(g_{ik+1}^D, \dots, g_{iM}^D)} W_i(g_i)$$

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 in case of partial centralization of k competences requires the satisfaction of the following first order conditions:

$$\sum_{i=1}^{N} \alpha_i H_j(g_{ij}^C) = NC_j^{jL}(Ng_1^{*C}, ..., Ng_N^{*C}) + N \sum_{v=1, v \neq j}^{k} C_j^{vL}(Ng_1^{*C}, ..., Ng_k^{*C}); \; j = 1, ..., k \quad (9)$$

[25] Shares must be chosen such that $\sum_{i=1}^{N} s_i = 1$, i.e. the full provision cost of the union should be divided among the member states.

$$\alpha_i H_j(g_{ij}^{*D}) = C_j^{jL}(g_i^{*D}) + \sum_{v \neq j} C_j^{vL}(g_i^{*D});\ j = k+1,...,M;\ i = 1,...,N \qquad (10)$$

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 are however 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 in k. As it will be shown later in Section 5, the tradeoff 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 elements of our simple model we shall now provide a formalization of the subsidiarity test, on the basis of which central governments and 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 consist in applying a cost-benefit analysis to assess the optimal level of allocation of a given activity.[26]

The subsidiarity test can be carried out directly by the central government ("centralized subsidiarity test") or individually by member states under a unanimity rule ("decentralized subsidiarity test") or majority rule ("democratic subsidiarity test"). When states have heterogeneous preferences, outcomes are likely to be different in the three cases. As it will be shown in Section 5.2, generally a decentralized subsidiarity test is 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.

[26] 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.

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:

$$W^U(g^{*C}) \geq \sum_{i=1}^{N} W_i(g_i^{*L}) \tag{11}$$

where $g^{*C} = \left(g_1^{*C}, \ldots, g_i^{*C}, \ldots, g_N^{*C}\right)'$ 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.[27] In this case, given the states' diversity of preferences, outcomes would differ from those reached under centralized subsidiarity.

When the decision to centralize is taken 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:

$$W_i(g_i^{*C}) \geq W_i(g_i^{*L}) \tag{12}$$

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.

It is possible to show that when the decentralized subsidiarity test in equation (12) is satisfied for all member states, also the centralized subsidiarity test in equation (11) is 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.

[27] 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 central government. 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).

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. Applying again the terminology in Inman and Rubinfeld (1998), this case is germane to the case of "democratic federalism" where 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:

$$W_{MED}(g^{*C}_{MED}) \geq W_{MED}(g^{*L}_{MED}) \tag{13}$$

Also for the case of democratic subsidiarity, we can find situations where 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.[28]

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, considering the conditions that will need to be satisfied to justify centralization under centralized, decentralized and democratic subsidiarity, providing a graphical representation of the boundaries of centralization under subsidiarity.

5.1 Transferring 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

[28] As it will be discussed 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.

together.[29] 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 where all functions are left to 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 where $k = M$ corresponds to a situation where all functions are transferred to the central government at once. The case $k = 1$ corresponds instead to a stepwise centralization process, where the member states and the union decide the transfer of a single competence from local to 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 under 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 some 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, $k > 1$. These benefits from centralization will have to be weighed against the increased cost 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

[29] 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.

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 the loss 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 stepwise centralization ($k = 1$), wholesale centralization of all competences ($k = M$) or any intermediate bundling of centralized competences ($1 < k < M$).

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* $k < M$.

Proof: see Appendix

Unlike what was seen in Proposition 1, in the case considered here we observe the possibility of lock-in effects. This is due to the fact that, 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 may lead to situations where a proposed centralization of functions will fail the subsidiarity test, with a resulting lock-in effect. 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 things equal, the subsidiarity test is most likely to fail centralization when functions are transferred in a stepwise fashion, $k = 1$. If a sufficient number of functions are bundled together when being transferred to the central level, the economies of scope at the central level could become strong enough to satisfy the subsidiarity test.

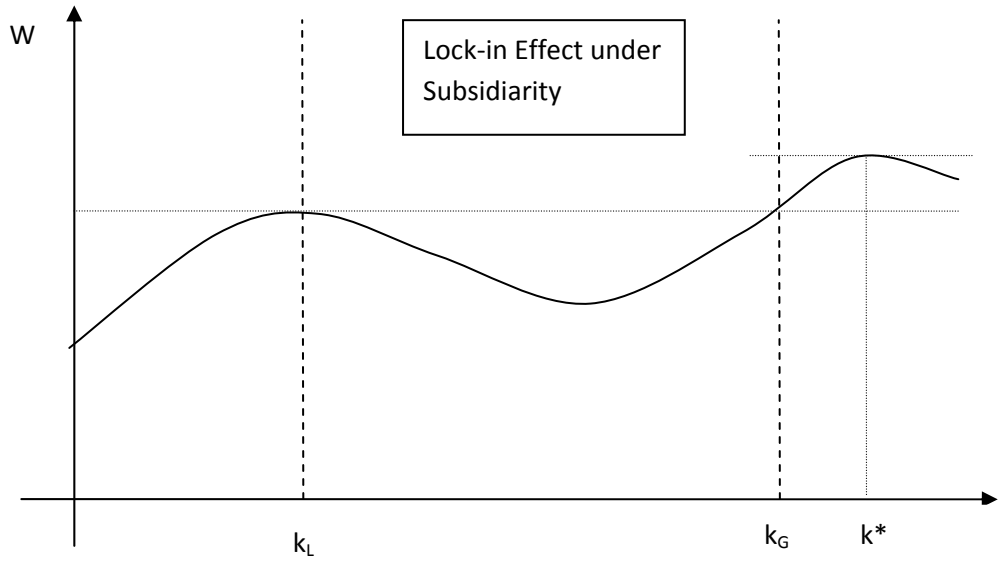

Figure 1: *Lock-in Effect under Subsidiarity*

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 $k > k_G - k_L$ is 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, for values of $k = M$ lock-in effects are avoided, since competences could be lumped together at the time of centralization, allowing any possible move from local to global maxima.

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. The choice of the form of subsidiarity instead acquires increasing relevance as the membership becomes more heterogeneous.

We shall begin 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 and 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 come to converge if 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, is adopted* $\{s_1,...,s_N\}$, $\sum_{i=1}^{N} s_i = 1$, *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 leaving 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 them. If Kaldor-Hicks efficiency is verified for the centralized subsidiarity test in (11), there will be a

vector of sharing rules such as to guarantee 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.[30]

Lemma 3: *Any member state with 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* α_{MED} *below the union's average* $\bar{\alpha}$. *When the median member state has a preference intensity* α_{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 taken.*

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 α_{MED} is above the average $\bar{\alpha}$. In this case centralization will pass only if there exists a sufficient large cost advantage to render centralization attractive for the median state. An interesting case occurs when α_{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 taken under the democratic subsidiarity test is not necessarily efficient: centralization could be rejected when efficient or approved when inefficient.

[30] 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 α_i in order to shift a larger share of the cost of central government to other members states. Therefore, the ideal vector of sharing rules $\{s_1,...,s_N\}$, $\sum_{i=1}^{N} s_i = 1$ 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 α_i rules out the case of strategic manipulation.

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.

	Centralized Subsidiarity Test	**Decentralized Subsidiarity Test**	**Democratic Subsidiarity Test**
Cost advantage	$\frac{\alpha_i}{\bar{\alpha}} < \frac{C_j^{jL}(g_i^{*L})}{C_j^{jC}(Ng^{*C})}$	$\frac{\alpha_i}{\bar{\alpha}} < \frac{C_j^{jL}(g_i^{*L})}{C_j^{jC}(Ng^{*C})/N} \forall i$	$\frac{\alpha_{MED}}{\bar{\alpha}} < \frac{C_j^{jL}(g_i^{*L})}{C_j^{jC}(Ng^{*C})/N}$
Economies of scope	$\frac{\alpha_i}{\bar{\alpha}} < \frac{\sum_{v\neq j,v=1}^{M} C_j^{vL}}{\sum_{v\neq j,v=1}^{k} C_j^{vC}}$	$\frac{\alpha_i}{\bar{\alpha}} < \frac{\sum_{v\neq j,v=1}^{M} C_j^{vL}}{\left(\sum_{v\neq j,v=1}^{k} C_j^{vC}\right)/N} \forall i$	$\frac{\alpha_{MED}}{\bar{\alpha}} < \frac{\sum_{v\neq j,v=1}^{M} C_j^{vL}}{\left(\sum_{v\neq j,v=1}^{k} C_j^{vC}\right)/N}$
Cost advantage + Economies of scope	$\frac{\alpha_i}{\bar{\alpha}} < \frac{C_j^{jL}(g_i^{*L})}{C_j^{jC}(Ng^{*C})} + \frac{\sum_{v\neq j,v=1}^{M} C_j^{vL}}{\sum_{v\neq j,v=1}^{k} C_j^{vC}}$	$\frac{\alpha_i}{\bar{\alpha}} < \frac{C_j^{jL}(g_i^{*L})}{C_j^{jC}(Ng^{*C})/N} + \frac{\sum_{v\neq j,v=1}^{M} C_j^{vL}}{\left(\sum_{v\neq j,v=1}^{k} C_j^{vC}\right)/N} \forall i$	$\frac{\alpha_{MED}}{\bar{\alpha}} < \frac{C_j^{jL}(g_{MED}^{*L})}{C_j^{jC}(Ng^{*C})/N} + \frac{\sum_{v\neq j,v=1}^{M} C_j^{vL}}{\left(\sum_{v\neq j,v=1}^{k} C_j^{vC}\right)/N}$

Table 1: *Conditions for Centralization under Subsidiarity*[31]

The conditions in Table 1 identify the tradeoffs 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 tradeoffs.[32] Points above the three-dimensional function represent a combination of values of heterogeneity of preferences, cost advantage and scope economies such as to warrant centralization. On the contrary, points below the function are characterized by a combination of values where decentralization is instead desirable.

[31] 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, $s_i = 1/N$.

[32] 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 consider a country composed of a group of individuals who must agree on a set of policies and are aligned along a spatial or ideological line. Heterogeneity of preferences is measured as the average distance of individuals from the center.

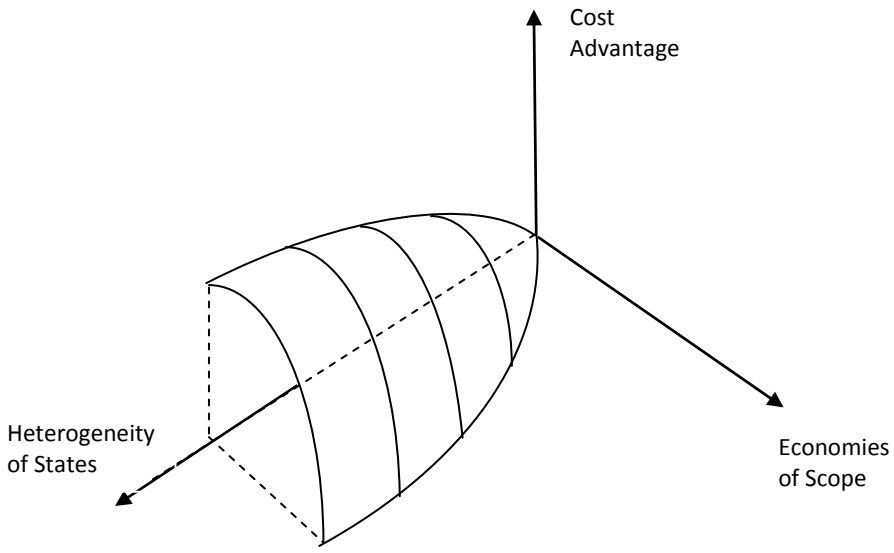

Figure 2: *The Boundaries of Subsidiarity*

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 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 be carried out only when bringing 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 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, where several functions were previously centralized and where 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.[33] As discussed in Section 2.1, the competences that had been centralized prior to 1992 ranged vastly. 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.[34] 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.

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 was 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-

[33] 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 progressed on 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).

[34] For an account of the growth of these competences from 1958 to 1992, see Flaherty and Lally-Green (1996) and Streit and Mussler (1994).

centralization problem if some of those functions could have been carried out more effectively at the local level and were 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 have seen 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 take the form of over-centralization. Opposite to the lock-in effects considered in the previous sections, here we can observe 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.

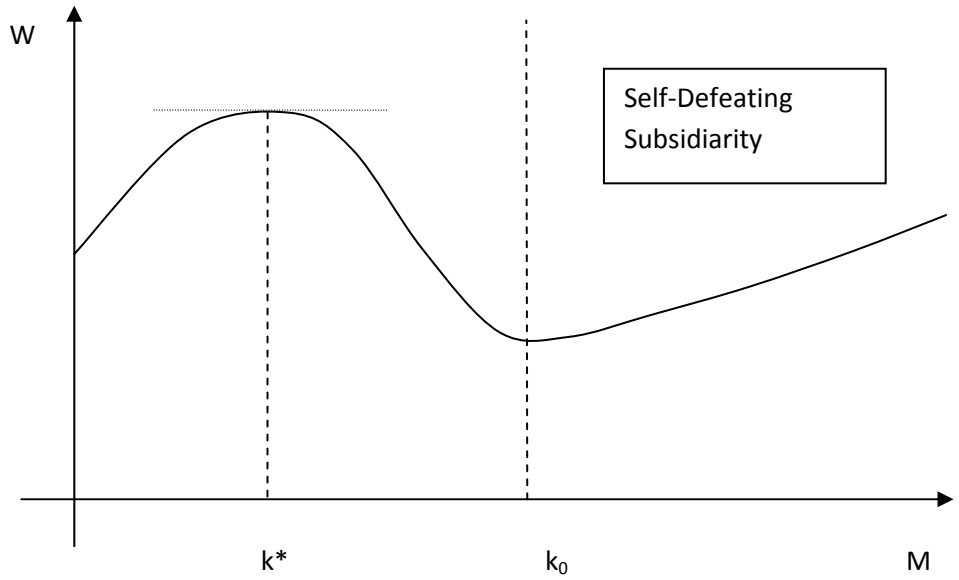

Figure 3: *Self-Defeating Subsidiarity*

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.

This may provide an explaination 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 yields 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 that once some functions become centralized further centralization becomes easier and often unavoidable 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 constitutional principle of the European Union. The 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 Devolution under Subsidiarity

Although the objective of the subsidiarity principle was that of constraining the *future* expansion of the Union through excessive centralization of competences, soon after its adoption, the European Commission 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).[35] But in doing so, the Commission validly asserted the principle that the subsidiarity test could be applied retrospectively, allowing devolution of previously centralized functions.[36] 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

[35] 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 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 and this possibly discouraged yet other initiatives and unborn proposals on subsidiarity grounds.

[36] 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.

powers to be expanded where circumstances so require, and conversely, to be restricted or discontinued where it is no longer justified."[37] Although the use of the subsidiarity principle for devolution purposes has been hardly observed in recent years, the possibility of devolution through subsidiarity acquires particular symbolic value, given the lack of a secession opportunity for member states within the Union (Weiler, 1985).[38] The possibility of devolution of competences from the central government back to the states acquires particular relevance for understanding 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.

Proposition 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. In this case the subsidiarity test will be able to lead to contraction of 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

[37] The Treaty of Amsterdam signed on October 2, 1997, and entered into force on May 1, 1999, amended the 1992 Treaty of the European Union (Maastricht).

[38] 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.

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 observed under Proposition 2, 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 when multiple competences can be 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, in Section 5 we have observed 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 an opposite problem of over-centralization. In Section 6, we have shown 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 peculiar patterns of centralization of areas, such as social protection or agricultural policy, with strong heterogeneity of preferences but dominant scope economies, as well as the lack of centralization of areas, such as defense and environmental protection, that 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.

Further theoretical extensions should 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 possibility 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 to 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 important to foster 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 to consider 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, bundling a subset of functions that enhance the opportunities of absorption of additional functions at a later stage. On the contrary, agenda setters may 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. 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.

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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

$$\sum_{i=1}^{N} \alpha_i H_j(g_j^C) = NC_j^{jC}(Ng^{*C}); \; j = 1,...,k \qquad (9')$$

$$\alpha_i H_j(g_{ij}^{*D}) = C_j^{jL}(g_i^{*D}); \; j = k+1,...,M; \; i = 1,...,N \quad (10')$$

It is immediate to see that, in the absence of economies of scope, the first order conditions in (4) and (10) coincide. Hence $g_j^{*D} = g_j^{*L}; \; j = k+1,...,M$ Expression (9') can be rewritten as

$$H_j(g_j^{*C}) = \frac{C_j^{jL}(Ng^{*C})}{\bar{\alpha}} \qquad (9'')$$

where $\bar{\alpha} = \frac{\sum_{i=1}^{N} \alpha_i}{N}$ is the average α in the population of member states. Comparing expressions (9'') and (10') it can be seen that $g_j^{*C} > g_{ij}^{*L}$ iff

$$\frac{\alpha_i}{\bar{\alpha}} < \frac{C_j^{jL}(g_i^{*L})}{C_j^{jC}(Ng^{*C})} \qquad (14)$$

Under the condition of cost advantage defined in (6), the r.h.s. of condition (14) is always bigger than one. Hence, $g_j^{*C} > g_{ij}^{*L}$ 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 percentual distance of α_i from the mean) is lower than the percentage cost savings, i.e.

$$\frac{\alpha_i - \bar{\alpha}}{\bar{\alpha}} < \frac{C_j^{jL}(g_i^{*L}) - C_j^{jC}(Ng^{*C})}{C_j^{jC}(Ng^{*C})} \tag{14}$$

The total welfare of a single state and of the union can be derived by integrating the FOC over the range $(0, g^{*L})$ in case of full decentralization and $(0, g^{*C})$ in 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_j^{*L}. Over the range (g_j^{*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 decreasing amounts up to zero in the optimal point. This is true for any j. Therefore $g_j^{*C} > g_j^{*L}$ implies that:

$$W^C(g^{*C}) \geq \sum_{i=1}^{N} W_i(g_i^{*L})$$

If condition (14) is not satisfied, for some countries with $\alpha_i > \bar{\alpha}$ then $g_j^{*C} < g_{ij}^{*L}$. 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:

$$\begin{aligned} &\sum_{\alpha_i \leq \bar{\alpha}} \int_0^{g_j^{*L}} (C_j^{jL}(g_j) - C_j^{jC}(g_j)) + \sum_{\alpha_i > \bar{\alpha}} \int_0^{g_j^{*C}} (C_j^{jL}(g_j) - C_j^{jC}(g_j)) + \\ &+ \sum_{\alpha_i \leq \bar{\alpha}} \int_{g_j^{*L}}^{g_j^{*C}} (\alpha_i H_j(g_j) - C_j^{jC}(g_j)) \geq \sum_{\alpha_i > \bar{\alpha}} \int_{g_j^{*C}}^{g_j^{*L}} (C_j^{jL}(g_j) - C_j^{jC}(g_j)) \end{aligned} \tag{15}$$

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:

$$\frac{\alpha_i}{\bar{\alpha}} < \frac{\sum_{v \neq j, v=1}^{M} C_j^{vL}(g_{MED}^{*L})}{\sum_{v \neq j, v=1}^{k} C_j^{vC}(Ng^{*C})} \tag{16}$$

Then $g_j^{*C} = g_j^{*L}$; $j = 1, ..., k$. In the presence of prevailing economies of scope of scope at central level $\dfrac{\sum_{v \neq j, v=1}^{M} C_j^{vL}(g_{MED}^{*L})}{\sum_{v \neq j, v=1}^{k} C_j^{vC}(Ng^{*C})} > 1$.

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

$$g_{ij}^{*D} < g_{ij}^{*L} \quad j = k+1, \dots, M$$

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 $g_j^{*C} > g_j^{*L}$ for $j = 1, \dots, k$) outweigh the loss due to centralization (represented by forgone welfare due to $g_j^{*D} < g_j^{*L}$ for $j = k+1, \dots, M$). In analytical terms:

$$\sum_{\alpha_i \le \bar{\alpha}} \sum_{j=1}^{k} \int_{g_j^{*L}}^{g_j^{*C}} (\alpha_i H_j - s_i \left(C_j^{jC} + \sum_{v \ne j, v=1}^{k} C_j^{vC} \right)) + \sum_{\alpha_i \le \bar{\alpha}} \sum_{j=1}^{k} \int_{0}^{g_j^{*L}} (C_j^{jL} + \sum_{v \ne j, v=1}^{M} C_j^{vL} - s_i \left(C_j^{jC} + \sum_{v \ne j, v=1}^{k} C_j^{vC} \right)) +$$

$$+ \sum_{\alpha_i > \bar{\alpha}} \sum_{j=1}^{k} \int_{g_j^{*C}}^{g_j^{*L}} (\alpha_i H_j - s_i \left(C_j^{jL} + \sum_{v \ne j, v=1}^{M} C_j^{vL} \right)) + \sum_{\alpha_i > \bar{\alpha}} \sum_{j=1}^{k} \int_{0}^{g_j^{*C}} (C_j^{jL} + \sum_{v \ne j, v=1}^{M} C_j^{vL} - s_i \left(C_j^{jC} + \sum_{v \ne j, v=1}^{k} C_j^{vC} \right)) \ge$$

$$\sum_{i=1}^{N} \sum_{j=k+1}^{M} \int_{g_j^{*D}}^{g_j^{*L}} (\alpha_i H_j - s_i \left(C_j^{jL} + \sum_{v \ne j, v=k+1}^{M} C_j^{vL} \right)) - \sum_{i=1}^{N} \sum_{j=k+1}^{M} \int_{0}^{g_j^{*D}} \left(\sum_{v \ne j, v=1}^{M} C_j^{vL} - \sum_{v \ne j, v=k+1}^{M} C_j^{vL} \right) \tag{17}$$

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:

$$W^C(g^{*C}) < \sum_{i=1}^{N} W_i(g_i^{*L})$$

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)

$$\frac{\alpha_i}{\bar{\alpha}} < \frac{C_j^{jL}(g_{ij}^{*L})}{C_j^{jC}(Ng^{*C})} + \frac{\sum_{v \ne j, v=1}^{M} C_j^{vL}(g_{ij}^{*L})}{\sum_{v \ne j, v=1}^{k} C_j^{vC}(Ng^{*C})} \tag{18}$$

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, the economies of scope at local level are weakened and this implies that for the competences to stay at local level, the marginal cost of production

is rising, and therefore the public good on 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 local level following the centralization process (with respect to the case of full decentralization, i.e. $k = 0$)

$$\frac{\sum_{v(\neq j)=k+1}^{M} C_j^{vL}(g_i)}{\sum_{v(\neq j)=1}^{M} C_j^{vL}(g_i)}$$

It appears clearly 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:

$$\frac{\alpha_{MED}}{\bar{\alpha}} < \frac{C_j^{jL}(g_{MED}^{*L})}{s_{MED} C_j^{jC}(Ng^{*C})} + \frac{\sum_{v\neq j, v=1}^{M} C_j^{vL}(g_{MED}^{*L})}{\sum_{v\neq j, v=1}^{k} C_j^{vC}(Ng^{*C})} \tag{18}$$

Applying Lemma 3 to the democratic subsidiarity test, centralization will always be carried out when the median α_{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 α_{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:

$$\int_0^{g_{MED,j}^{*L}} (C_j^{jL}(g_j) - s_{MED} C_j^{jC}(g_j)) \geq \int_{g_j^{*C}}^{g_{MED,j}^{*L}} (\alpha_{MED} H_j(g_j) - C_j^{jC}(g_j)) \tag{19}$$

Proof of Proposition 6

The proof follows directly from Propositions 2 and 4. Consider the case where 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 case of an additional partial centralization of k_2 competences requires the satisfaction of the following first order conditions:

$$\sum_{i=1}^{N} \alpha_i H_j(g_i^C) = N C_j^{jC}(Ng^C) + N \sum_{v(\neq j)=1}^{k_2} C_j^{vC}(Ng^C) \quad j = 1, \dots, k \tag{11'}$$

$$\alpha_i H_j(g_i^D) = C_j^{jL}(g_i^D) + \sum_{v(\neq j)=k_2+1}^{M} C_j^{vL}(g_i^D) \quad j = 1, \dots, k; i = 1, \dots, N \tag{12'}$$

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:

$$\sum_{i=1}^{N} \alpha_i H_j\left(g_i^C\right) = NC_j^{jC}(Ng^C) + N\sum_{v(\neq j)=1}^{k_1} C_j^{vC}(Ng^C) \;\; j = 1, \dots, k \quad (11'')$$

$$\alpha_i H_j(g_i^D) = C_j^{jL}(g_i^D) + \sum_{v(\neq j)=k_1+1}^{M} C_j^{vL}(g_i^D) \;\; j = 1, \dots, k; i = 1, \dots, N \; (12'')$$

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

$$\frac{\sum_{v(\neq j)=k_2+1}^{M} C_j^{vL}(g_i)}{\sum_{v(\neq j)=1}^{M} C_j^{vL}(g_i)} < \frac{\sum_{v(\neq j)=k_1+1}^{M} C_j^{vL}(g_i)}{\sum_{v(\neq j)=1}^{M} C_j^{vL}(g_i)}$$

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:

$$\left| \sum_{v(\neq j)=1}^{k_1} C_j^{vC}(Ng) \right| < \left| \sum_{v(\neq j)=1}^{k_2} C_j^{vC}(Ng) \right|$$

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*.