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Discussion Paper No. 04-86

Economic Integration and Fiscal Decentralization: Evidence from OECD Countries

Dan Stegarescu

ZEW
Zentrum für Europäische Wirtschaftsforschung GmbH
Centre for European Economic Research

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Nontechnical Summary

Since the 1970s and especially during the last decade a process of decentralization of the public sector has taken place in several countries, while at the same time the globalization and integration of the world economy is rapidly progressing. This parallel is even more striking with regard to European Union countries. In the course of economic and political integration, fiscal and political powers have been transferred from the national governments both to a supranational authority and to lower levels of government. According to the "Sandwich" hypothesis, national governments are expected to be further pushed back in the course of European integration. Given this background, this paper addresses the question whether economic and political integration of countries fosters the decentralization of the public sector.

According to the traditional theory of fiscal federalism, the optimal degree of decentralization of the public sector is determined by the costs and benefits of the decentralized provision of public goods. On the one hand, decentralization allows for the differentiation of public goods according to local preferences and conditions. On the other hand, it implies costs in form of inter-jurisdictional spillovers and foregone economies of scale. However, the theory of fiscal federalism fails to give an adequate explanation of the recent process of decentralization. Inspired by the spread of political separatism throughout the world, recent literature explores the economic determinants of the creation and disintegration of countries. By increasing the market size and reducing political and economic transaction costs, economic integration is shown to raise the benefits of secession or regional autonomy. Furthermore, according to the New Economic Geography literature, integration generates agglomeration and specialization effects at the regional level. Local governments could exploit these benefits by demanding more autonomy in the provision of local public goods and taxes in order to compete for mobile factors. Political integration, too, might contribute to public sector decentralization, since the costs of supplying certain public goods now in the competence of the supranational level are reduced. On the other side, by increasing the economic risk, economic integration is also expected to enhance the demand for inter-regional risk-sharing or policies carried out by the central government, such as income redistribution.

So far, there is only little empirical evidence with regard to the impact of integration on the vertical government structure. Drawing on the theoretical framework provided by the literature on fiscal federalism and secessions, this paper investigates the impact of economic integration in general, and of political integration in the European Union in particular, on the vertical government structure. For this purpose a theoretical model is set up, which relates the degree of public sector decentralization to economic integration, preference heterogeneity, and economies of scale. The hypothesis of a decentralizing effect of integration is then tested empirically for a panel of OECD countries, also controlling for other possible factors.

Considering the sub-central government share of public expenditure and revenue, the investigation reveals a clear decentralization trend only if social security is excluded, and especially with respect to public revenues. The results of the regression analysis mostly support a decentralizing effect of both economic and European integration, particularly in the context of preference heterogeneity as represented by the degree of linguistic fractionalization, whereas participation of sub-national governments in central decision-making is associated with increasing centralization. Some limited evidence is thus provided for the "Sandwich" hypothesis with respect to the European Union. The estimates also indicate that growing inter-regional income disparity significantly reduces the degree of public sector decentralization. In contrast to this, the end of the cold war seems to have contributed to the enforcement of demands for decentralization.

Despite certain limitations related to the correct measurement of fiscal decentralization, the approach taken in this paper reveals a significant relationship between integration on the one side, and public sector decentralization on the other side, particularly among heterogeneous OECD countries.

Economic Integration and Fiscal Decentralization: Evidence from OECD Countries[†]

Dan Stegarescu[‡]

Abstract

Drawing on recent work on the creation and breakup of countries, this paper examines the impact of economic and political integration on the vertical government structure. It argues that by increasing the market size and the benefits from the decentralized provision of public goods, integration might have triggered the recent process of fiscal decentralization in OECD countries. Based on a theoretical framework, the empirical panel analysis relates the degree of public sector decentralization to economic and European integration, controlling for inter-regional heterogeneity, economies of scale, and institutions. The results found mostly support a decentralizing effect of economic and European integration, particularly in the context of preference heterogeneity, whereas participation of sub-national governments in central decision-making is associated with increasing centralization.

Keywords: Fiscal Decentralization, Economic Integration, European Union, "Sandwich" Hypothesis

JEL: F15, H72, H77

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1 Introduction

Since the 1970s and especially during the last decade a process of decentralization of the public sector has taken place in several industrial and developing countries, and, more recently, in the East European transformation countries. At the same time, globalization and integration of the world economy is rapidly progressing. The World Bank recently estimated that these two major forces, localization, that is the sub-national desire for self-determination and devolution of power, and globalization will be shaping the world.[1]

This parallel is even more striking with regard to European Union countries. In the course of economic and political integration, fiscal and political powers have been transferred from the national governments both to a supranational authority and to lower levels of government. This development is particularly associated with a rise of the regional level of government – sometimes referred to as "New Regionalism" – Spain, Belgium, Italy, France, and, more recently, the United Kingdom being the most prominent examples. According to the "Sandwich" hypothesis, national governments are expected to be further pushed back in the course of European integration, this process in the end leading to an "Europe of the Regions".[2]

Given this background, this paper investigates the causal relationship between those two broad trends, addressing the question whether economic and political integration of countries fosters the decentralization of the public sector. According to the traditional theory of fiscal federalism (Oates, 1972, Musgrave, 1959), the optimal degree of decentralization of the public sector is determined by the costs and benefits of the decentralized provision of public goods. On the one hand, decentralization allows for the differentiation of public goods according to local preferences and conditions. On the other hand, it implies costs in form of inter-jurisdictional spillovers and foregone economies of scale.

While explaining cross-country differences in the vertical government structure, the theory of fiscal federalism fails to give an adequate explanation of the recent process of decentralization. Inspired by the spread of political separatism and the emergence of new countries throughout the world, recent literature (Alesina and Spolaore, 1997, Bolton and Roland, 1997) explores the economic determinants of the creation and disintegration of countries.[3] The size of the country is shown to be determined endogenously by the trade-off between the benefits of size and the costs of heterogeneity of preferences. It turns out that by impeding the internalization of externalities associated with secession, majority decisions in democracies result in the emergence of an inefficiently large number of countries. Within this context, by increasing the market size and reducing political and economic transaction costs, economic integration lowers the benefits of size, thus enhancing the incentives to separation.[4] The intensification of the separatist movement in Québec after creation of the NAFTA, and increasing demands for regional autonomy in certain EU countries seem to support these theories.

However, changes of national borders represent an extreme case. The direct implications of integration for the vertical government structure are mostly neglected by the literature on secessions. Bolton and Roland (1997) show that regional autonomy is less costly than secession, since it mainly avoids the efficiency losses involved. By lowering the relative costs of local provision of public goods, integration is thus expected to enhance public sector decentralization. With world-wide liberalization and deregulation of markets,

[1] See World Bank (2000).

[2] See, e.g., Alesina (2002), Lammers (1999), and Zimmermann (1990). The latter, however, questions this development.

[3] A survey of this literature is found in Bolton et al. (1996), and Drazen (2002). See also Alesina and Spolaore (2003) for a more recent contribution.

[4] See Alesina and Spolaore (1997), Alesina et al. (2000), Etro (2003), Casella and Feinstein (2002), Spolaore and Wacziarg (2002), and Wacziarg et al. (2002).

and the reduction of political and physical impediments to trade and factor movements, local and regional factors of location are becoming more significant as compared to national economic conditions. The end of the cold war is expected to further intensify this development. According to the New Economic Geography literature in the tradition of Krugman (1991), integration generates agglomeration and specialization effects at the regional level, thus increasing the scope for economies of scale in the production. Local governments could exploit these benefits by demanding more autonomy in the provision of local public goods and taxes in order to compete for mobile factors. Political integration, too, might contribute to public sector decentralization, since the costs of supplying certain public goods now in the competence of the supranational level are reduced. On the other side, by increasing the economic risk, economic integration is also expected to enhance the demand for inter-regional risk-sharing or policies carried out by the central government, such as income redistribution.

So far, there is only little empirical evidence with regard to the impact of integration on the vertical government structure. Alesina and Wacziarg (1998) provide some evidence for a negative relationship between the size of the country and the degree of economic openness, thus confirming the hypothesis that larger countries benefit less from economic integration. This is also supported by Alesina et al. (2000) who find a positive effect of both openness and country size on economic development, the growth inducing impact of the market size being determined by the degree of openness.[5] With regard to the vertical government structure, the results of a few – particularly politico-scientific – studies seem to support a positive relationship between integration and centralization. Rodrik (1998), for instance, finds a positive significant effect of economic openness on the size of the public sector which he attributes to higher public expenditure for redistribution and macroeconomic stabilization due to increasing exposure to exogenous shocks.[6] Since these functions are in general in the competence of the central government, one would therefore expect a centralizing effect of economic integration. Using a panel of industrial and developing countries, Garrett and Rodden (2003) show that indeed integration is associated with public sector centralization. This is broadly explained by growing demand for inter-regional risk-sharing and central government transfers aimed at preventing the secession of rich regions. In a cross-section analysis for OECD countries Verdier and Breen (2001) provide evidence for a positive relationship between financial openness and fiscal centralization, whereas the interaction with European integration, as captured by the EU structural policy payments, has a negative sign. Finally, van Houten (2003) finds no clear evidence for a stimulating effect of economic integration on the recent regional autonomy movements in EU countries.

Drawing on the theoretical framework provided by the literature on fiscal federalism and secessions, this paper investigates the impact of economic integration in general, and of political integration in the European Union in particular, on the vertical government structure. For this purpose a theoretical model is set up, which relates the degree of public sector decentralization to economic integration, preference heterogeneity, and economies of scale. The hypothesis of a decentralizing effect of integration is then tested empirically for a panel of OECD countries, also controlling for other possible factors. The results found mostly support a decentralizing effect of economic and European integration, particularly in the context of preference heterogeneity, whereas participation of sub-national governments in central decision-making is associated with increasing centralization.

The paper is organized as follows. In the following section a theoretical model relating integration and the vertical government structure is set up and the main hypotheses are

[5] See also Spolaore and Wacziarg (2002), as well as Wacziarg et al. (2002) for a survey of this work.

[6] However, this result does not apply to OECD countries. See also Schulze and Ursprung (1999) for a critical review of the empirical literature on the impact of integration on public expenditure.

derived. In section 3, then, different empirical considerations are discussed and some descriptive statistics and the investigation approach are presented. Finally, section 4 provides the results of the empirical analysis, and section 5 draws the conclusions.

2 Theoretical framework

In the following, a theoretical framework is presented which relates public sector decentralization to economic integration, economies of scale and preference heterogeneity, and the main hypotheses are set up. The aim is not so much to contribute to the theoretical discussion, but to formalize testable empirical implications of the theoretical considerations already made in the literature.

2.1 Basic assumptions

The model presented here extends the theoretical framework provided by Alesina and Spolaore (1997), Alesina et al. (2000), and Etro (2003) in order to illustrate the relationship between economic integration and the degree of public sector decentralization. The welfare-maximizing approach chosen draws on the "Decentralization Theorem" by taking into account costs and benefits of decentralization, since both are assumed to be affected by economic integration. In contrast to the literature on secessions which deals with the optimal size of countries, national borders are assumed to be fixed, and the analysis focuses instead on the effect of integration on the optimal vertical government structure.[7]

To begin with, consider a federation of fixed population size N, which is equally divided among two regions $i = 1, 2$. Assuming that Tiebout stratification has already taken place and there is no more inter-jurisdictional mobility, individual preferences described by the parameter δ_i are identical within each region, but differ between the regions. The individuals consume a national and a local public good, which are non-rival and not close substitutes. Think, e.g., of defense or income redistribution, and, respectively, local infrastructure or school education. The local public good g^L is supplied in equal absolute quantity, yet of different type, in each region according to the local preferences.[8] By assuming that the local public good benefits exclusively the inhabitants of the respective region, we abstract from inter-regional spillovers. The national public good g^C provided by the central government is of uniform type and located in the middle of an ideological spectrum of regional preferences. The preference parameter δ_i then measures the preference distance between the type of national public good preferred by the regional inhabitant and the type of good actually provided.[9] In the symmetric setting considered here, the regional preference distances are assumed to be of different signs but of equal

[7] Marginal changes in national borders generally imply high separation costs, and therefore seldom occur in reality. See also Drazen (2000), p.726f., concerning this. Generally speaking, demands for secession concern only particular regions, and are often solved through specific arrangements, such as home rule. Unlike this, decentralization entails the devolution of fiscal powers to lower levels of government as a whole. Alesina and Spolaore (1997), and Etro (2003) investigate the effect of integration on the size of countries, and refrain from considering different levels of government, therefore assuming that public goods are provided uniformly by the central government according to the preferences of the national median. Panizza (1999) extends the model of Alesina and Spolaore (1997) to analyze the determinants of the degree of public sector centralization, however, without considering the aspect of integration.

[8] In principle, the amount of the local public good supplied in each region could differ. However, for the sake of simplicity we consider only symmetric allocations here. Inter-jurisdictional preference heterogeneity is therefore only related to the type of public goods. Think, e.g., of education or administration in native language, quality of public services, or other aspects related to ethno-linguistic, cultural or social characteristics.

[9] See also Alesina et al. (1999), and Panizza (1999) for similar specifications of preference heterogeneity. In the median voter model this is referred to as the "median distance from the median".

magnitude: $\delta_1 = -\delta_2 = \delta$, with $0 \leq \delta < 1$.[10]

The utility of an individual located in region i is then described by the following additive function

$$U_i = \upsilon^L(g^L, \alpha) + \upsilon^C\left(g^C, \delta, \beta(\omega, \gamma)\right) + y_i - t, \tag{1}$$

with $\upsilon^C_{g^C} > 0$, $\upsilon^L_{g^L} > 0$, and strict concavity. According to the fiscal federalism theory, increasing preference heterogeneity reduces the utility from centrally provided public goods, therefore $\upsilon^C_\delta < 0$. $0 < \alpha, \beta \leq 1$ finally denote general preference parameters. In order to account for the possible centralizing effects of integration mentioned in the literature,[11] preferences for the national public good are assumed to depend themselves on the degree of integration of the federation in the world economy, $\omega \in [0, 1]$[12], and other determinants combined in γ. By increasing economic risk and income disparities, integration is assumed to enhance the demand for insurance policies carried out by the central government, such as income redistribution, or macro-economic stabilization.

Given the public budget constraint, the identical lump-sum tax t is determined by the per capita costs of public goods provision

$$t = \kappa(g^C, g^L, N),$$

with $\kappa_{g^C} > 0$, $\kappa_{g^L} > 0$, and $\kappa_N < 0$. In case of pure public goods, the costs of providing the national public good can be shared with the entire federation, whereas the costs of the local public good are shared only among the region's inhabitants.

Finally, considering household-producers, we assume that regional output per capita y_i is generated by the production function[13]

$$y_i = \psi(A_i, g^L, \omega).$$

Following the literature in the tradition of Barro (1990), output is linked apart from technology A_i to the local public good which – in contrast to the national public good – serves as a production input, with $\psi_{g^L} > 0$ and $\psi_{g^L g^L} < 0$. Therefore, in addition to providing utility directly, the local public good is also assumed to generate income. Several studies[14] have shown that particularly public infrastructure enhances productivity in the private sector.

According to the traditional trade theory, integration and international specialization increase global output and factor productivity. Therefore, we assume that $\psi_\omega > 0$, and, in this particular case, $\psi_{g^L\omega} > 0$. The supposed relationship between integration and the marginal productivity of the local public good is based on the extent-of-the-market hypothesis.[15] In an integrated world national borders no longer delimit the size

[10] In case of more than two regions one could imagine that preferences are located on a circle, the national public good being located at the centre. $\delta = 1$ is excluded, since in case of missing minimum affinity of preferences there is no justification for the existence of the federation.

[11] See, e.g., Rodrik (1998), and Garrett and Rodden (2003).

[12] The degree of economic integration is exogenous, and is determined by the magnitude of political and physical trade barriers.

[13] Note that here inter-regional income differences are only due to different technological endowments. We also abstract from intra-regional aspects of income distribution.

[14] See, e.g., Aschauer (1989), among others.

[15] See, e.g., Alesina et al. (2000), and Wacziarg et al. (2002) for some recent contributions on the relationship between economies of scale and market size. Ades and Glaeser (1999) provide empirical support for a positive relationship between economic growth and the size of the market. However, note that even in an integrated world, high transaction costs can

of the market. Expanded market size facilitates economies of scale in the production, thus increasing the productivity of the local public input and fostering economic growth regardless of the size of the political jurisdiction. With increasing liberalization and deregulation of markets, and the reduction of political and physical impediments to trade and factor movements, local and regional factors of location become more significant as compared to national economic conditions.

These considerations correspond to the findings of the literature on the creation and disintegration of countries, according to which the optimal size of the country decreases with integration. In general, the relative costs of separation or local autonomy depend on the degree of integration in the world economy, whereas the benefits associated with public good provision according to local preferences remain unaffected. Therefore, in the present model, preference heterogeneity costs are assumed to be independent of the degree of economic openness. With high trade barriers and restrained international factor mobility, separation or local autonomy implies higher economic and political transaction costs with the rest of the nation and the world. Apart from higher local taxes, in case of secession even the benefits of trade are lowered, since formerly domestic trade is then reduced. In case of open economies, however, the costs of local autonomy in terms of higher taxes are partly compensated by higher benefits from trade.

2.2 The optimal degree of decentralization

Based on the model assumptions presented above, we next analyze the optimal allocation of the public goods among both levels of government. In order to illustrate the role of the vertical government structure, the utility function is transformed in terms of the sub-central government share in total public output provided in each region (degree of public sector decentralization),[16]

$$\theta = \frac{g^L}{g^C + g^L}.$$

Especially in view of the empirical verification, a continuous measure is used to describe the degree of public sector decentralization. Defining total public output provided in each region as $g = g^C + g^L$, and using $g^L = \theta g$, and, respectively, $g^C = (1-\theta)g$, we can reformulate the individual utility function:

$$\widetilde{U}_i = \widetilde{v}^L\left(g\theta, \alpha\right) + \widetilde{v}^C\left(g(1-\theta), \delta, \beta(\omega,\gamma)\right) + \psi\left(A_i, g\theta, \omega\right) - \widetilde{\kappa}\left(g(1-\theta), g\theta, N\right), \qquad (2)$$

with

$$\widetilde{v}^L_g > 0, \quad \widetilde{v}^L_\theta > 0,$$

and, respectively,

$$\widetilde{v}^C_g > 0, \quad \widetilde{v}^C_\theta < 0, \quad \widetilde{v}^C_{g\delta} < 0, \quad \widetilde{v}^C_{\theta\delta} > 0.$$

still persist due to cultural, linguistic or legal differences.

[16] With θ describing the degree of decentralization from the viewpoint of a region, in this specific setting the degree of decentralization of the federation $\bar{\theta}$ is then given by

$$\bar{\theta} = \frac{2g^L}{g^C + 2g^L} \equiv \frac{2\theta}{1+\theta},$$

which is by definition higher than θ.

Accordingly, the larger the share of public output provided by the central government, and the greater the heterogeneity of preferences, the lower is the utility from the national public good. Therefore, in the present model heterogeneity costs are not related to the size of the country, but instead to the degree of decentralization.[17] On the other side, due to foregone economies of scale decentralized provision of public goods entails higher per capita cost, $\widetilde{\kappa}_\theta > 0$. With increasing population size, however, the cost savings of centralization are expected to decrease ($\widetilde{\kappa}_{\theta N} < 0$). This implies that cost benefits of centralization are lower in larger countries, where economies of scale could be exploited at the sub-national level, too. Note also that due to the productivity-enhancing effect of the local public good, income is increasing both in total public output, $\widetilde{\psi}_g > 0$, and the degree of decentralization, $\widetilde{\psi}_\theta > 0$. Accordingly, the income generating effect of integration is higher in case of decentralization ($\widetilde{\psi}_{\omega\theta} > 0$).

In order to obtain simple closed form solutions, the following log-linear specification is chosen:

$$U_i = ln(g^L)^\alpha + ln(g^C)^{\beta(1-\delta)} + lnA_i(g^L)^\omega - \left(\frac{g^C}{N} + \frac{g^L}{N/2}\right), \tag{3}$$

assuming that the unit costs of both public goods are equal to one. Inserting for g^L and g^C, we finally obtain

$$U_i = \alpha ln\theta g + \beta(1-\delta)ln(1-\theta)g + lnA_i + \omega ln\theta g - \frac{g(1+\theta)}{N}. \tag{4}$$

A welfare-maximizing social planner decides simultaneously both on total public output g and the degree of decentralization θ, that is the allocation of public goods among the two levels of government, as to maximize the sum of individual utilities. In the present symmetric setting this corresponds to maximizing the utility of an individual in region i. Differentiating the utility function with respect to both political instruments, we obtain the following optimal solution:

$$\theta^* = \frac{\alpha+\omega}{\alpha+\omega+2\beta(1-\delta)}, \quad g^* = \frac{N}{2}\left(\alpha+\omega+2\beta(1-\delta)\right). \tag{5}$$

Accordingly, the optimal degree of decentralization is always above zero even in case of homogeneous preferences ($\delta = 0$) and autarchy ($\omega = 0$), since the public goods are not close substitutes, and the local public good always generates direct utility ($\alpha > 0$). Also, as long as certain benefits could be derived from the national public good, that is $\beta > 0$, staying within the federation is always preferable to secession ($\theta < 1$).[18] This corresponds to the conclusions of Bolton and Roland (1997). In case of secession, new institutions and rules have to be set up, and income redistribution and formerly national public goods, such as defense, have to be provided at a lower scale and with higher per-capita costs. As Alesina and Perotti (1998) point out, staying within the nation-state provides the advantage of inter-regional risk-sharing and redistribution in case of

[17] The literature on secessions implicitly assumes that heterogeneity is increasing in country size. However, there is no clear empirical evidence in support of this. The existence of heterogenous small countries like Switzerland, or Belgium, as compared to large homogeneous countries like France, e.g., prove the contrary.

[18] Note, again, that $\delta = 1$ has been excluded right from the beginning.

asymmetric economic shocks.

The comparative statics show that the optimal degree of decentralization is increasing with preference heterogeneity, whereas the total amount of public goods supplied in each region is decreasing ($\theta^*_\delta > 0, g^*_\delta < 0$). As expected, higher preferences for the local public good, and, respectively, the national public good have opposite effects on decentralization ($\theta^*_\alpha > 0$, $\theta^*_\beta < 0$). On the other side, due to economies of scale, total public output is increasing with population size ($g^*_N > 0$). Note that due to the even distribution of population, in this specific case economies of scale aspects have no influence on the degree of decentralization.[19]

Due to the complementarity of local and national public goods, economic integration raises the total supply of public goods ($g^*_\omega > 0$). In contrast to this, the effect on the vertical allocation of the public goods, and thus on the degree of public sector decentralization is ambiguous, depending on the magnitude of the two opposite effects of integration:

$$\theta^*_\omega = \frac{2(1-\delta)\left(\beta - \beta_\omega(\alpha+\omega)\right)}{\left(\alpha+\omega+2\beta(1-\delta)\right)^2} \lesseqgtr 0$$

Strictly speaking, only if the marginal effect on preferences for the national public good is relatively small, that is $\beta_\omega < \frac{\beta}{\alpha+\omega}$, integration exerts a decentralizing impact, otherwise the opposite occurs. Note that due to the growth enhancing effect of the local public good, integration might foster fiscal decentralization even in the context of uniform preferences ($\delta = 0$), thus providing a possible explanation for the process of decentralization taking place in several homogeneous countries. To sum up, the benefits of decentralization hinge on the trade-off between increased local growth prospects and higher economic vulnerability associated with progressing integration. The empirical investigation should therefore reveal which effect ultimately predominates.

2.3 Political integration

An important aspect not considered explicitly in the model, and which is not in the focus of the literature on secessions by now, is the possible effect of political integration on the vertical government structure of the countries involved. This is especially important in order to understand the tendency towards decentralization and separatism in several EU member countries in the course of European integration.

On the one hand, political integration, that is the transfer of certain national competencies to a supranational authority, entails a centralizing effect from the point of view of local jurisdictions. Decisions are made by a more remote body, while at the same time the role of central government at the local level is reduced. On the other hand, demands for the transfer of fiscal powers to sub-national levels of government within the integrating countries are likely to be intensified, too. This corresponds to the "Sandwich" hypothesis which postulates that national governments are expected to be further pushed back in the course of European integration.

As illustrates the case of the European Union, the benefits of secession or local autonomy are further increased, since the costs of providing certain public goods now in the competence of Brussels are shared on a larger scale between the member countries. Also, national policies and legislation are increasingly harmonized, fostering the integration of

[19] In case of different regional sizes, optimal decentralization is shown to depend on both total and regional population size. See the model extension in Appendix 1.

goods and factor markets and thus enhancing the local growth prospects. This comprises all policies related to the Common Market, such as common trade and agriculture policies, regulation and market supervision, the environment policy, and, most recently, the monetary and the foreign policies. Furthermore, the European Union is increasingly involved in regional development and infrastructure projects, and partly takes on certain insurance functions of the national governments.[20]

In case of secession, however, the separating regions would have to join the European Union, in order to benefit from political integration. This case is not yet provided for in the European treaties[21], and seems rather unlikely when taking into account that admission of new member countries has to be decided unanimously. In case of rejection, the costs of staying outside the political union would be considerably higher as compared to the case of economic integration discussed above. Also, with extended majority decision-making in the European Council, small secessionist regions would possibly exert less influence on European policy-making as compared to forming part of a larger member country.[22] Therefore, regional autonomy and decentralization are supposed to be preferred to secession in the context of European integration in order to avoid these efficiency losses and to continue to benefit from certain national public goods. Despite the increasing role of the European level of government, income redistribution and fiscal equalization, among others, are still supposed to be carried out by the national governments.

Apart from this, the role of regional and local governments within the member countries is further strengthened by certain European policies and institutions. Especially the European structural funds, but also activities in fields such as health, education, or environment, increasingly require implementation and planning by sub-national governments, thus augmenting the scope for direct implication of local decision-makers and lobbying groups. Therefore, political integration in the European context might have contributed to increasing decentralization of the public sector by enhancing the demands for local autonomy and decentralized public good provision.

3 Empirical analysis

Based on the theoretical framework presented above, we test the hypothesis according to which economic integration in general, and the political unification in Europe in particular, foster the decentralization of the public sector. The empirical analysis starts with a discussion of general empirical aspects. After that, a comparative-descriptive overview of the processes of fiscal decentralization and integration is provided, and the investigation approach is described.

3.1 Empirical considerations

The theoretical model presented in section 2 suggests that economic integration contributes to government decentralization by lowering the relative costs associated with

[20] One might object that the transfer of competencies for the provision of national public goods to a supranational authority automatically involves an increase in the degree of public sector decentralization of the member countries. However, this is not necessarily true. First of all, this depends on whether legislative or executive powers or both of them are concerned. Also, as the example of the regional policy illustrates, the European Union is increasingly involved in the provision of certain public goods at the local and regional level. And, finally, the scope of government activity is expected to change over time, with central government possibly taking over new functions.

[21] However, note that Art. 59 of the draft of the European Constitution currently provides a mechanism regulating the withdrawal of member countries from the union.

[22] This depends, of course, on the relative political influence of the regions in question in national decision-making.

the decentralized provision of public goods. On the other side, economic integration could also have the opposite effect, since it implies higher exposure to exogenous shocks which could counteract the benefits of decentralization. Increased economic risk is expected to stimulate the demand for inter-personal income redistribution and risk-sharing across regions, thus enhancing central government activity.

The welfare-maximizing approach employed above, however, abstracts from several important aspects in order to keep the model tractable and to derive empirical testable implications concerning the effect of preference heterogeneity, economies of scale, and integration on the degree of public sector decentralization. These additional aspects are generally summarized by the inclusion of the shift parameters α and β. In the following, we discuss a couple of further considerations which might be taken into account in the empirical analysis.

By definition, the degree of public sector decentralization is determined both by the quantity and the number of different public goods provided by each level of government. The model presented here implicitly takes the preceding decision concerning the assignment of functions to different levels of government as given, and focuses instead on the quantity of both public goods supplied by each level of government. However, considering g^L and g^C as bundles of different public goods instead, we can easily interpret a relative increase in the supply of g^L as possibly being the result of devolved competencies.

The model also abstracts from different local taxes. With increased factor mobility, local tax autonomy would imply welfare costs in terms of inefficiently low taxes due to enhanced fiscal competition between local governments.[23] Also, inter-jurisdictional spillovers of public goods or economies of scope are expected to favor centralization or, at least, coordination of local policies. Finally, due to the symmetric setting chosen, the model abstracts from inter-regional differences in income, population, and factor endowments, or even from aspects of intra-regional income and preference distribution. Cross-regional differences in preferences and income are likely to increase as a consequence of economic integration, regional specialization and structural change. Whereas well endowed regions benefit from extended fiscal autonomy and competition which permits them to escape from the implicit inter-regional redistributive effect of national taxes, poor unproductive regions would call for larger central government transfers and income redistribution.[24] Since economic integration strengthens the credibility of threats of secession, higher central government transfers to rich regions could even become necessary to prevent them from leaving. These considerations therefore point at possible centralizing effects of integration.

On the other side, the New Economic Geography literature provides further support for the expected positive relationship between decentralization and economic integration. In case of inter-regional differences in factor endowments the market size effect of economic integration is expected to intensify regional specialization in accordance with comparative advantages and to foster the inter-regional division of labor. This development is further supported by technical progress which reduces transaction and transport costs and increases factor mobility and inter-jurisdictional knowledge spillovers. Krugman (1991), and Krugman and Venables (1996), among others, have shown that economic integration induces agglomeration effects in the industrial sector and leads to inter-regional specialization of the production structure. Within this context, Straubhaar (1999) speaks of "glocalization", arguing that free markets and decreasing transport costs reduce the importance of national economies, at the same time strengthening local and regional agglomerations. Evidence for a causal relationship is found particularly for European

[23] See Bolton and Roland (1997).

[24] This point is also made by Bolton and Roland (1997).

Union regions.[25] Whereas per capita income of member countries increasingly converges, cross-regional disparities within countries tend to increase.

Since local public goods influence the location decisions of mobile factors, they are expected to play an important role in the process of agglomeration and specialization at the regional level. As Baldwin and Krugman (2002) have recently shown, economic integration creates agglomeration rents for production factors located in the core which can be taxed away by local governments. Extending this approach to public spending, Brakman et al. (2002) point out that taxes stimulate the spread of production factors, whereas public goods foster agglomeration by enhancing the attractiveness of the location for mobile firms and workers. Yet, the resulting implications for the vertical government structure are not taken into account by these approaches. With increasing economic integration local governments would benefit from the decentralized provision of public goods and taxes, and, consequently, from extended fiscal autonomy which allows them to implement their own policies and compete internationally for mobile factors of production. In the end, fiscal decentralization could trigger a process of repercussions intensifying industrial specialization and agglomeration. Since investors benefit from fiscal competition and the implementation of market-conforming policies, economic interest groups are expected to support decentralization of the public sector.

Finally, recent work on fiscal federalism[26] shows that apart from cost-benefit considerations political decision-making processes in democracies and the underlying institutional rules are expected to influence the costs and benefits of decentralization. For example, centralization is expected to be more beneficial in federations which provide a guaranteed minimum representation of sub-national jurisdictions in national decision-making. Since, then, the risk for minorities of being dominated by the national majority is reduced. In this case, the demands for fiscal decentralization in the course of economic integration might be prevented by collusive behavior of local policy-makers or the opposition of poor regions to fiscal competition. Instead of this, integration would then enhance inter-regional redistribution.

Therefore, the implementation of demands for decentralization depends on the degree of involvement of sub-national entities in central decision-making and the legal provisions regulating the transfer of powers. Decentralization might be easier to achieve when the delegation of powers is regulated by simple law adopted by parliamentary majority instead of constitutional provisions which are difficult to change. Analogously, without the existence of rules regulating secession on peaceful terms, the costs of separation are considerably higher, at worst taking the form of armed conflicts.[27]

3.2 Descriptive statistics

The implications of the theoretical considerations are tested using a sample of OECD countries which includes apart from EU countries other comparable industrial nations with well functioning democratic institutions. This enables us to control for the possible effect of democracy on public sector decentralization[28] and for other features, like the degree of economic and social development, and the existence of common cultural and political traditions. Within this context, the specific aspect of regional integration in Europe can be separated from the more general aspect of integration in the world economy.

[25] See, among others, Giannetti (2002), Stirböck (2002), and the survey of Krieger-Boden (2000).

[26] See, e.g. Besley and Coate (2003) and Lockwood (2002), among others.

[27] See, e.g., Bordignon and Brusco (2001), and Jehiel and Scotchmer (2001), with regard to credibility aspects of secession rules. In general, such mechanisms are not provided for in most federal constitutions.

[28] Panizza (1999) finds out that the level of democracy is negatively correlated with the degree of centralization.

To begin with, Table 1 compares the degree of public sector decentralization at the beginning of the 1970s and the end of the 1990s. The share of public goods provided by local governments is approximated by the ratio of sub-central government expenditure to consolidated general government expenditure, as reported by the IMF Government Finance Statistical Yearbook. When focusing on the financing of public goods, decentralization is alternatively represented in terms of revenue shares. One major problem associated with aggregate budgetary data consists in the difficulty to distinguish as to which extent the degree of decentralization reflects the assignment of functions and resources to different levels of government, or, merely, the relative size of sub-central government activities. In addition to this, expenditure and revenue shares contain no information on the decision-making power of sub-central government, and only partly reflect regulatory activities and political coordination among layers of government. Therefore, the actual role of the central government generally tends to be underestimated.

Table 1: Degree of fiscal decentralization (incl. social security), OECD countries, 1970-2001

Country	Direct expenditure (1)		Total expenditure (2)		Own revenue (3)	
	1970-75	1996-2001	1970-75	1996-2001	1970-75	1996-2001
AUS	49.3	48.3	27.4	31.6	24.0	32.9
AUT	33.1	32.0	25.2	22.8	27.2	24.9
BEL	14.6	27.8	7.7	25.2	7.5	26.1
CAN	57.7	60.0	48.3	53.2	47.8	52.4
DEN	59.2	55.6	29.4	33.5	29.5	32.4
FIN	36.8	38.3	26.3	29.4	27.0	31.1
FRA	17.5	18.2	10.8	12.1	8.7	13.5
GER	44.1	36.1	39.7	33.4	37.4	32.7
GRE	3.9		3.7		3.5	
ICL	17.7	28.2	17.8	25.1	18.9	23.8
IRL	28.3	24.9	16.5	6.6	14.1	7.0
ITA	17.8	24.9	7.9	11.7	5.5	11.6
JAP	48.4	35.8	22.9	18.4	25.7	23.5
LUX	16.4	15.5	8.8	10.0	8.3	10.0
NED	33.4	28.3	7.4	8.5	3.8	10.3
NEZ	12.5[a]	11.1	10.4[a]	10.0	11.3[a]	10.1
NOR	36.9	34.1	32.7	21.8	32.2	20.9
POR	6.8	10.1	3.4	6.6	4.2	6.4
SPA	9.8	35.8	5.4	17.4	5.1	18.1
SWE	43.5	36.3	32.5	30.1	31.9	29.7
SWI	57.8	49.6	49.9	44.0	47.3	43.5
UK	32.1	21.9	19.6	7.2	15.7	7.8
USA	44.4	47.6	35.7	39.5	39.3	41.6
Median[b]:						
OECD	*33.2*	*33.1*	*21.3*	*22.3*	*21.5*	*23.7*
EU15	*30.2*	*28.1*	*13.7*	*14.8*	*11.4*	*15.8*

Note: Total expenditure and lending minus repayments (total revenue and grants) of sub-central government in % of consolidated general government expenditure (revenue), without EU payments; for JAP only current expenditure (revenue). Six-year-averages, [a] 1978-80, [b] without GRE. (1) expenditure excluding transfers to other levels of government; (2) expenditure including transfers to other levels of government net of received transfers; (3) revenue excluding received transfers from other levels of government. Source: IMF, Government Finance Statistical Yearbook (except for: BEL – Banque Nationale de Belgique, JAP – OECD, National Accounts). Own calculations.

Despite these and several other shortcomings[29], expenditure and revenue shares provide simple quantifiable measures which have been largely used in previous empirical stud-

[29]For a critical discussion of the measurement of fiscal decentralization see, e.g., Oates (1972), Levin (1990), and OECD (1999).

ies. Problems regarding the vertical aggregation across different levels of government in calculating the degree of decentralization are taken into account by attributing intergovernmental transfers either to the level of the recipient, or, alternatively, to the granting level of government. In the first case, intergovernmental transfers from lower levels of government to the central government are attributed to the latter, sub-central government expenditure representing only amounts spent or administered directly by the sub-central government (*direct expenditure*). In the second case, sub-central government spending includes intergovernmental expenditure, too, but excludes intergovernmental revenue from central government (*total expenditure*). Analogous to this, one could consider sub-central government revenue from own sources, exclusive of received grants from central government (*own revenue*). This differentiation permits also a more detailed look on the pattern of decentralization.

The expenditure and revenue figures indicate no clear decentralization trend across OECD countries. Whereas especially in Belgium and Spain the sub-central government share of public spending and revenue increased drastically, the development in the United Kingdom or Germany among others went in the opposite direction. Only with respect to total expenditure and own revenue, increasing decentralization is reported for a narrow majority of OECD countries. At the same time, the degree of revenue decentralization is found to be in general lower as compared to the expenditure side, indicating positive net vertical transfers to sub-national governments. Furthermore, European Union countries are on average more centralized than other OECD countries.

The picture changes, however, when taking a closer look at the composition of central government expenditure and revenue. In order to focus on government functions which could be decentralized according to the theory of fiscal federalism, and to separate the possible insurance function of the central government described above, social security is removed from the central government sector.[30] Now, the figures reveal a significant rise of the degree of fiscal decentralization in a large majority of countries, particularly in European Union countries and with regard to the revenue side. According to this pattern of development, central government grants to lower levels of government seemingly tend to be substituted by – formally – own financial resources. This piece of evidence therefore indicates that the observed tendency to decentralize certain government activities has partly interfered with the significant rise of the welfare state in most OECD countries. However, no clear conclusions can be drawn, since budgetary data provide no information whether indeed fiscal powers have been transferred to lower levels of government. On the other hand, according to the figures, the vertical government structure seems to change only gradually, displaying significant inertia in the course of time.

To contrast the development of the public sector to economic integration both on a worldwide and a regional scale, the analysis makes use of the degree of trade and financial openness, and the share of trade with EU countries, as presented in Table 2. With few exceptions, both the share of exports and imports in GDP, and the Quinn/Inclan-Index which reflects the degree of financial openness according to currency, capital and current account restrictions, have increased considerably in most OECD countries during the period of observation, clearly providing evidence for growing worldwide integration. Probably due to the establishment of the Common Market, EU member countries have on average a higher degree of openness than other OECD countries, the process of global integration, however, having been more pronounced for the latter. In line with this, EU trade figures also indicate slightly increasing regional integration among EU countries, the opposite occurring to the other countries. It is not surprising that especially countries which are economically deeply integrated with each are also forming a political union.

Finally, Table 3 portrays the process of political integration in Europe. The share of EU

[30] See Table 6 in Appendix 2.

Table 2: Degree of economic openness, and trade with EU countries, 1970-2001

Country	Trade openness (1)		Quinn/Inclan index (2)		EU trade (3)	
	1970-75	1996-2001	1970-75	1996-2001	1970-75	1995-2000
AUS	27.8	41.7	0.55	0.82	27.0	17.9
AUT	62.1	92.2	0.71	0.93	63.3	66.5
BEL	90.9	151.6	0.70	0.96	75.0	73.4
CAN	44.8	79.9	0.88	1.00	13.3	7.4
DEN	57.8	73.7	0.65	1.00	66.7	67.8
FIN	52.6	70.3	0.63	1.00	62.0	55.9
FRA	34.8	50.3	0.79	0.93	59.6	63.5
GER	45.4	59.1	0.99	1.00	58.7	55.9
GRE	35.6	50.4	0.32	0.96	56.0	63.1
ICL	81.0	75.4			55.4	60.2
IRL	84.8	161.3	0.60	1.00	76.5	61.9
ITA	34.9	50.7	0.75	1.00	53.6	58.1
JAP	22.2	19.6	0.55	0.79	11.1	15.3
LUX	171.2	241.0	0.70^a	0.96^a	75.0	77.8
NED	93.8	111.3	0.86	1.00	71.3	69.3
NEZ	48.8	63.2	0.44	0.96	22.4^b	17.3
NOR	75.7	74.4	0.54	0.96	71.0	73.2
POR	57.2	69.1	0.32	0.96	53.9	78.0
SPA	29.7	57.0	0.43	0.93	46.9	68.0
SWE	52.8	81.3	0.74	0.93	62.8	61.4
SWI	63.9	75.1	0.88	0.93	70.1	69.2
UK	48.3	56.5	0.59	1.00	41.8	55.0
USA	13.1	24.3	0.90	1.00	26.0	19.6
Median:						
OECD	*52.7*	*70.3*	*0.68*	*0.96*	*58.7*	*61.9*
Non-EU15	*46.8*	*68.8*	*0.55*	*0.96*	*26.5*	*18.7*
EU15	*52.8*	*70.3*	*0.70*	*0.96*	*62.0*	*63.5*

Note: (1) sum of exports and imports in % of GDP; (2) index for the financial openness, re-adjusted on a scale of 0-1, ^{a} BEL/LUX; (3) sum of exports and imports to/from EU15 countries in % of total foreign trade. Six-year-averages, ^{b} 1987. Source: (1) IMF; (2) Quinn and Inclan (1997), Armingeon et al. (2000); (3) OECD. Own calculations.

Table 3: The budget of the European Union, 1960-2001

	EU expenditure	
	in % of total public exp. of EU countries	in % of EU- GDP
1960-1965	0.20	0.07
1970-1975	1.38	0.54
1996-2001	2.33	1.10

Note: Period averages. Source: Europäische Kommission (2000); own calculations.

expenditure as % of total GDP or as % of total expenditure of the member countries has nearly doubled since the beginning of the 1970s. Since the European Commission is mainly vested with legislative, regulatory and coordinating powers, the actual level of political integration is estimated to be higher than reflected by these figures.

All things considered, the simultaneity of fiscal decentralization and increasing economic integration in most OECD countries indicates a possible relationship between those two

trends. At the same time, the "Sandwich" hypothesis seems to be partly endorsed. At least in terms of expenditure and revenue shares, in certain EU countries the role of national governments is considerably declining in the course of political integration.

3.3 Investigation approach

In the following, an empirical investigation is carried out which includes, apart from integration, preference heterogeneity, and economies of scale, other possible determinants of the vertical government structure as derived from the positive theory of fiscal federalism. By this, both differences in the costs and benefits of (de-)centralization, and possible interactions with integration are taken into account. The hypothesis of a decentralizing effect of integration is tested using a panel of 23 OECD countries covering the period 1970-2001.

The regression analysis relates the degree of public sector decentralization to economic and European integration, while controlling for further variables which explain the vertical division of government functions and the relative demand for certain public services provided by the central government. In this way, we take into account the fact that changes in the degree of fiscal decentralization as measured by the share of sub-central government expenditure (revenue) in consolidated general government expenditure (revenue) are either due to changes in the assignment of functions and financial resources, or to changes in the budget share of certain expenditure and revenue categories.[31] Only the first aspect, the transfer of authority for functions and resources to sub-central governments represents real fiscal decentralization.

In order to focus on the impact of increasing integration, the model is estimated with country fixed effects, which depict all time-invariant country-specific factors, such as geographic area, institutions, traditions, or inter-regional diversities. In doing so, we concentrate on the factors which are assumed to determine the costs and benefits of decentralization over time. Contrary to pooled estimations, by conditioning on the cross-section the fixed effects approach focuses on the time variation in the data. Moreover, it controls for characteristics which are unobserved or cannot be quantified[32], thus solving simultaneity problems in the form of omitted-variable bias.

Formally, the basic estimation equation is

$$Decentr_{it} = \beta_{0i} + \beta_1 \cdot Scale_{it} + \beta_2 \cdot Heter_{it} + \beta_3 \cdot Diverse_{it} + \beta_4 \cdot Open_{it} + \beta_5 \cdot EUIntegr_{it} + \beta_6 \cdot (Fix_i \cdot Open_{it}) + u_{it}.$$

$Decentr_{it}$ denotes the share of sub-central government expenditure (revenue) in consolidated general government expenditure (revenue) in country i in period t. $Open_{it}$ denotes the degree of integration of each country in the world economy in period t. In order to capture the market size effect described in the theoretical framework, the degree of *trade openness* as measured by the share of exports and imports in GDP, is used as an indicator of economic integration. Alternatively, we employ the Quinn/Inclan index of *financial openness* which reflects the degree of liberalization of goods and capital markets according to legal provisions in order to account for other facets of economic integration.

To separate the effects, integration in the world economy and political integration are

[31] See also the discussion in the previous section.

[32] Just to give an example, the role of the public sector or of the central government in economy and society is often deeply rooted in the country's history. In France, e.g., the still prevailing strong role of the central government stems from the Jacobin centralist tradition of the French revolution.

included in the regressions.[33] Both economic and political aspects of integration within the European Union ($EUIntegr_{it}$) are taken into account on an annual basis by the inclusion of different indicators: First, in order to capture both the impact of the joining of the European Union and advancing political integration, a dummy variable for EU membership (EU) is interacted with the share of total EU expenditure in consolidated public expenditure of the member countries ($EU\ exp.$). Alternatively, we use a country-specific index of *political integration* which assigns higher values to increasing degrees of integration with the EU: from free-trade agreements, the establishment of the customs union, the European Economic Area, until the creation of the Economic and Monetary Union. By this, different degrees of participation in EU policy of both member countries, such as Denmark or the UK, and Non-EU countries, such as the EFTA, are taken into account. And, finally, the share of trade with EU countries in total foreign trade ($EU\ trade$) is used as a an indicator of the regional concentration of each country's trade flows.[34]

The effect of integration is separated from other potential determinants of the degree of public sector decentralization as described by the theoretical framework in section 2 and the positive theory of fiscal federalism through the inclusion of control variables. Among them, economies of scale and spillovers of public goods ($Scale_{it}$), inter-regional heterogeneity ($Heter_{it}$), and further explanatory variables ($Diverse_{it}$) are taken into account. Certain time-invariant country-specific characteristics (Fix_i) are interacted with the degree of economic, and, alternatively, European integration. Finally, β_{0i} denotes country-specific averages.

Corresponding to the empirical literature, economies of scale and spillovers of public goods are captured by the size of the country in terms of *population*, and the spatial allocation of the population, as measured by the degree of *urbanization*. The higher the size and the geographic concentration of population, the more likely economies of scale could be exploited at lower levels of government, thus increasing the benefits of decentralization. In addition to this, the costs of centralized information, administration, and decision-making are likely to increase with the size of the country. On the other side, population growth and increasing concentration of the population might also intensify the demand for certain public goods provided by the central government. However, since in general these factors change only gradually over time, the dynamic effects are expected to be rather moderate and have to be interpreted with caution. Further time-invariant factors, such as geographic area, or the number of constituent jurisdictions, which are assumed to affect economies of scale and spillovers, are captured by the country fixed effects.

We follow previous studies[35] and approximate inter-jurisdictional diversity of preferences by means of the degree of linguistic fractionalization ($Fractional$). Since the geographical grouping of people with similar preferences constitutes the crucial precondition for the validity of the "Decentralization Theorem", we therefore implicitly assume that the linguistic structure is perfectly correlated with the spatial allocation of the population. However, common fractionalization measures are highly imperfect proxies of preference heterogeneity, since they do not reflect accurately the geographical distribution and the intensity of differences between ethnic or cultural groups.[36] Despite these shortcomings,

[33] We cannot rule out that economic integration has fostered both decentralization in the member countries and the transfer of political and fiscal powers to the EU level.

[34] See Appendix 2 for more details on the variables.

[35] See, e.g., Panizza (1999), and Garrett and Rodden (2003).

[36] For instance, some studies report high degrees of fractionalization for certain countries like Australia, Netherlands or the USA in terms of the number and relative size of ethnic or linguistic groups. However, the different groups considered often represent recently immigrated people without deeply rooted local traditions, which are dispersed throughout the country, and not geographically concentrated. The aspect of inter-cultural differences might also be better reflected by surveys on the regional degrees of identification with the nation. See, e.g., Alesina et al. (2003), and Greenberg (1956),

omitted aspects of preference heterogeneity are expected to be captured by the country fixed effects. Given its time-invariance, fractionalization is interacted with the degree of economic openness, and, alternatively, with indicators of European integration in the regression. In addition to this, the time-variant degree of *regional disparity* of per capita income is taken into account in order to control for changes in the degree of heterogeneity in the course of integration which are not captured by the fixed country effects.[37] On the one hand, the degree of decentralization is expected to increase with inter-regional heterogeneity. On the other hand, by controlling for regional economic disparity a possible centralizing effect of increasing demand for inter-regional redistribution in the context of greater exposure to economic shocks is separated from other possible effects of economic integration.

The next set of factors consists of standard control variables capturing the demand for certain public goods. According to the "laws" of Wagner (1876) and Popitz (1927), economic development and growing prosperity are associated with the expansion and centralization of the public sector. For example, demand for income redistribution and the establishment of generous welfare systems are expected to be positively related to higher income per capita. This also corresponds to the Meltzer-Richard hypothesis according to which an increase in the mean income relative to the income of the decisive median voter increases the size of government.[38] Yet, empirical evidence shows that high-income countries are likely to be more decentralized. This is explained by higher real costs of decentralized structures due to the necessity of additional qualified administrative staff, political coordination and creation of local institutions.[39] In order to control for these effects, we include the natural log of real *income* (GDP) *per capita*. The regression analysis also takes temporary expenditure and revenue effects of business cycles into account by using the *growth rate* of real per capita income, and the rate of *unemployment*. Furthermore, a dummy variable for national *election* years captures possible electoral cycles. According to this, one would expect central government expenditure to rise in the run-up, and, respectively, tax revenue to rise in the aftermath of national elections.

Since the decentralization trend seems to have accelerated in the 1990s, we also test for the role of international conflicts postulated by Spolaore and Alesina (2001). The authors show that the decline in international conflicts and the enforcement of international law raise the benefits of secession. Accordingly, the end of the cold war reduced the importance of extensive defense and security systems. Within this context, regional autonomy movements are also more likely to be tolerated since they are no longer perceived as a threat to national security and integrity. For this purpose, the share of military expenditure of the Warsaw Treaty states in GNP is set in relation to the respective share of NATO countries (*Coldwar*), and is used as a proxy of the potential military threat exerted by the communist block to western countries. Central government expenditure for defense are expected to have declined with disarmament and the end of the cold war, other things being equal consequently increasing the degree of fiscal decentralization in the 1990s.

for a discussion of different measures of fractionalization and linguistic diversity. In the present study we rely on data provided by the Ethnologue project on Greenberg's index of linguistic diversity. Though not removing all difficulties, these data have the definite advantage of considering only indigenous languages and dialects in each country, thus, e.g., excluding languages of recent immigrants.

[37] Note that, in general, regional indicators involve certain difficulties. First, in several countries regional boundaries often change for political or administrative reasons, thus questioning the exogenity and integrity of administrative divisions, and, at the same time, affecting the degree of disparity. For example, certain EU countries, such as Ireland, Greece or Finland, created development regions without vesting them with real fiscal powers, in order to allocate EU structural funds payments. This aspect is directly related to another problem, that of comparing countries with autonomous regional governments, with countries where regions merely represent administrative units of central government or statistical areas.

[38] See Meltzer and Richard (1981).

[39] See, e.g., Oates (1972). However, as Kee (1977) found out, this aspect is more likely to reflect fundamental differences between industrial and developing countries.

The role of institutions is finally taken into account by interacting integration with certain decision-making rules. First, a dummy variable for the existence of a second chamber of parliament with directly elected or appointed representatives of the regions (*Regional parliam.*) takes into account the participation of sub-national governments in national legislation. According to Brennan and Buchanan (1980), the common pool problem induced by the involvement of lower levels of government in national decision-making leads to extensive centralization of the public sector, especially with regard to the revenue side.[40] In order to moderate competitive pressures, sub-central governments tend to establish tax cartels which are enforced by the central government. Therefore, direct participation in national decision-making might enable especially poor regions to oppose pressures for the devolution of fiscal competencies, and thus, inter-jurisdictional fiscal competition in the course of integration. Second, a dummy variable for legal provisions concerning national constitutional and legislative *referendums* is included. Direct democracy leads to more decentralization, since referendums are supposed to prevent elected representatives from exercising vote trading and centralizing government activities.[41]

In light of the theoretical discussion in section 2, we expect a positive effect of integration on the degree of fiscal decentralization, particularly in the context of the European Union. However, with increasing demand for inter-personal and inter-regional redistribution associated with higher exposure to economic shocks and growing regional disparities, as well as central government transfers directed towards separatist regions, the opposite effect might prevail, too. Whether decentralization ultimately occurs should also depend on the specific institutional framework.

4 Results

4.1 Basic estimations

The results of the estimations for the degree of decentralization of direct public expenditure are reported below, in Table 4.[42] The F tests indicate significant country effects in the data, Hausman specification tests mainly reject specifications using random effects. Changes in territorial structures which exerted considerable effects on the indicator of regional disparity are taken into account by the inclusion of dummy variables for the countries and periods in question. Since Wooldridge's (2002) test indicates strong serial correlation in the panel data, the variance matrix estimates are corrected for both heteroscedasticity and autocorrelation according to Newey and West (1987).[43]

In contrast with theoretical expectations and the typical results of cross-sectional empirical studies, the estimates report a negative significant coefficient of urbanization and, to a lesser extent, of population size on the degree of public sector decentralization. This possibly indicates that in case of focusing on the time dimension, growing demand for public goods provided by the central government dominates vis-à-vis economies of scale aspects at sub-national levels of government which barely change in the course of time. One possible explanation for the centralizing effect of increasing urbanization might be that urban agglomeration is typically associated with higher inter-jurisdictional

[40] See, e.g., Blankart (1999) for an application to Germany.

[41] See, e.g., Redoano and Scharf (2001). Schaltegger and Feld (2001) provide evidence for a negative impact of referenda on the degree of centralization of Swiss cantons.

[42] Due to the lack of fiscal and especially regional data for certain periods and countries, the sample is unbalanced.

[43] The alternative computation of White standard errors for within-groups estimators proposed by Arellano (1987), which accounts for the clustering of observations, yields more conservative estimates in the present case. The reliability of the White variance matrix estimator is also questionable in the case of small samples or cross-sections according to Davidson and MacKinnon (1993).

spillovers and increasing demand for social assistance, both enhancing central government activity. The estimates also report a strong and highly significant negative effect of regional disparity of per capita income on the degree of decentralization. The inclusion of this variable turns out to improve considerably the goodness of fit of the regression. Provided that economic integration enhances cross-regional disparities, this might be indirect evidence of a stimulating effect of integration on the demand for inter-regional redistribution through central government expenditure.

With respect to economic development, the results are in line with previous studies reporting a decentralizing effect of higher per capita income. Also, electoral and business cycles seem to play a certain role, the share of sub-central government expenditure being lower in years of national elections and higher unemployment. On the other hand, though having the expected signs, economic growth and the extent of military threat have no significant coefficients.

Regarding integration, the estimates only partly support the hypothesis of a positive impact of integration on the degree of public sector decentralization in OECD countries. A marginal rise in the degree of trade openness is associated with a larger share of central government expenditure, the effect, however, being only partly statistically significant. Apparently, this is in line with the findings in section 3.2 which show no clear decentralization trend in OECD countries when considering direct public expenditure exclusive of social security. A significant decentralizing effect of integration is found instead when using alternatively the Quinn/Inclan index of financial openness.

In the European context, particularly economic, and, to a lesser extent, political integration prove to have contributed to fiscal decentralization. At first glance, the results confirm the "Sandwich" hypothesis in some respects. Central governments in EU member countries apparently have been pushed back both by the process of supranational political unification, and by increasing regional and global economic integration. However, the simultaneous inclusion of both EU trade and political integration variables shows that the decentralizing effect of regional trade integration ultimately dominates.[44]

The theoretical predictions concerning the decentralizing impact of integration are more clearly supported when looking at the interaction terms. According to the estimates reported in the columns (5) to (7), the positive effect of both economic and European integration on the sub-central government share of public spending turns out to be particularly valid for linguistically heterogeneous countries.[45] Note that when the interaction terms are included, the direct positive effects of economic or European integration are reversed. The results found also emphasize that institutional rules matter to some extent. Contrary to the expectations, direct democracy is associated with centralization of public spending particularly in the context of economic integration. This might not be surprising when considering that national referenda are mostly concerned with objects of general national interest, such as the ratification of international treaties or the validation of significant constitutional reforms, and to a lesser extent with the concrete assignment of responsibilities among levels of government or the central government budget.[46] Also, the large international variety of legal provisions for the organization of referenda is not appropriately represented by the inclusion of one-dimensional dummy variables. On the other side, the centralizing tendency of sub-national participation in central decision-making suggested by Brennan and Buchanan (1980) is clearly supported

[44]These specifications are not reported here, but are available upon request. Note that the correlation coefficient between trade with EU countries and the share of EU expenditures amounts only to 0.497. The share of trade with EU countries in GDP has been used alternatively as a measure of economic integration in the EU. However, the results coincide with those of trade openness, and both variables are highly correlated.

[45]The results are robust to the use of different fractionalization indices, and we do not report them.

[46]With the exception of Switzerland, most constitutions explicitly forbid budget referendums at the national level. Note that previous studies considered the impact of referenda only at the sub-national level.

Table 4: Fixed effects (within) estimates for fiscal decentralization, direct expenditure (incl. social security), OECD countries, 1970-2001

	Dep. Var.: Degree of expenditure decentralization						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population	-.089	-.131	-.047	-.090	-.109	.039	.044
	(.084)	(.085)	(.086)	(.086)	(.081)	(.080)	(.093)
Urbanization	-.236**	-.239***	-.207**	-.245***	-.252***	-.278**	-.183*
	(.096)	(.093)	(.093)	(.094)	(.092)	(.116)	(.101)
Regional disparity	-.227***	-.239***	-.252***	-.235***	-.206***	-.116**	-.180***
	(.066)	(.066)	(.068)	(.068)	(.064)	(.050)	(.059)
Per capita income	.062**	.032	.018	.063**	.066**	.020	.017
	(.028)	(.033)	(.031)	(.029)	(.028)	(.024)	(.029)
Growth rate	-.056	-.024	-.059	-.057	-.037	-.043	-.093
	(.075)	(.078)	(.069)	(.074)	(.073)	(.065)	(.063)
Unemployment	-.254	-.297*	-.331**	-.267	-.267	-.377***	-.369***
	(.192)	(.177)	(.157)	(.186)	(.182)	(.143)	(.132)
Election	-.004*	-.003	-.003*	-.004*	-.003*	-.003	-.004*
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Coldwar	-.007	-.004	-.010*	-.006	-.008	-.008	-.006
	(.006)	(.006)	(.006)	(.006)	(.005)	(.005)	(.006)
Trade openness	.026		.091***	.028	-.056	-.006	.089***
	(.031)		(.035)	(.031)	(.062)	(.028)	(.032)
Finan. openness		.088*					
		(.048)					
EU · EU exp.	.012	.009			.017**	-.023*	
	(.008)	(.006)			(.007)	(.014)	
EU trade			.314***				-.032
			(.111)				(.127)
EU polit. integr.				.008*			
				(.005)			
Fractional					.235*		
· Trade openness					(.134)		
Fractional						.177***	
· (EU · EU exp.)						(.039)	
Fractional							1.248***
· EU trade							(.367)
Referendum					-.042*		
· Trade openness					(.025)		
Referendum						.001	
· (EU · EU exp.)						(.011)	
Referendum							-.003
· EU trade							(.031)
Regional parliam.					-.219**		
· Trade openness					(.093)		
Regional parliam.						-.009	
· (EU · EU exp.)						(.008)	
Regional parliam.							-.219
· EU trade							(.154)
No. obs. (countries)	484 (23)	457 (22)	482 (23)	484 (23)	484 (23)	484 (23)	482 (23)
Adj. R^2	0.959	0.962	0.962	0.960	0.962	0.969	0.967
Within R^2	0.187	0.220	0.263	0.201	0.253	0.396	0.361

Note: All regressions include country fixed effects and dummies for the periods after territorial changes in Canada, Germany, Netherlands, and Portugal, whose coefficients are not reported. Newey-West heteroscedasticity and autocorrelation consistent standard errors (L=3) are in brackets. ***, **, and * indicate significance at 1%, 5% and 10% levels, respectively.

by the estimates. Countries having a chamber of parliament with indirectly elected regional representatives tend to centralize government activity in the course of integration in the world economy, and, to a lesser extent, in the European Union.[47] According to this, political bargaining at the national level enables especially poor regions to prevent competitive pressures related to fiscal decentralization and economic integration, and to enhance redistributive central government expenditure instead.

4.2 Sensitivity analysis and robustness checks

In order to check for the robustness of the results with regard to different measures of centralization and possible outliers, several sensitivity analyses have been carried out. As a first approach, the two additional concepts of centralization mentioned in section 3.2 are employed, allocating intergovernmental transfers to the grantor: *total expenditure* inclusive of intergovernmental expenditure, but exclusive of intergovernmental revenue, and *own revenue* exclusive of intergovernmental revenue. In doing so, we focus on the level of government actually financing public spending. The amount of – formally – own financial resources is furthermore expected to reflect the degree of fiscal autonomy more accurately.

According to the comparative overview in section 3.2 the increase in public sector decentralization is more evident with respect to public revenue and in case of excluding social security from the central government. Indeed, the decentralizing effect of increasing trade openness is clearly supported for total expenditure and own revenue.[48] Integration is thus shown to increase sub-national government reliance on – formally – own revenues. With respect to European integration, however, the results are less conclusive. Particularly the effect of political integration as depicted by the share of EU expenditure or by the composite index becomes less accurate and is even reversed for public revenue. Regarding the indirect effects of integration and the other control variables, the previous results are mostly confirmed. Note that the positive, but insignificant effect of unemployment on revenue decentralization corresponds to declining revenue of the central government from taxes and social contributions in times of rising unemployment. However, with regard to the revenue side of the public sector, other determining factors are possibly omitted, such as the mobility of different tax bases or economies of scale in tax collection, which are assumed to determine the assignment of taxing powers to different levels of government.

In order to separate the possible insurance effect of central government activity, additional regressions excluding social security expenditure and revenue have been run.[49] The results found are with few exceptions consistent with the previous estimates. Again, increasing economic integration is associated with a higher sub-central government share of consolidated public expenditure and revenue, particularly when excluding grants received from central government. The effect of European integration is again reversed with respect to the revenue side. Interestingly, the relationship between the decline in large global conflicts associated with the end of the cold war and the decentralization of the public sector becomes more evident when excluding social security. More precisely, the reduction in the potential military threat of the Warsaw Treaty Organization exerted a positive effect on the share of sub-central government expenditure and revenue

[47] We distinguish between members of the upper chamber of parliament directly elected by the citizens of the regions, as opposed to representatives appointed by the regional governments or legislatures, such as in Germany and Austria. Since particularly the direct involvement of representatives subject to instructions of the regional authorities is expected to enhance log-rolling and political cartelization, the latter situation is investigated here. Alternative regressions considering more general definitions of regional chambers of parliament in fact yielded opposite results. These results are not reported here.

[48] See Tables 7 and 8 in Appendix 2.

[49] See Tables 9 - 11 in Appendix 2.

in OECD countries.

Generally speaking, the use of different measures of decentralization mostly seem to corroborate the evidence of a positive effect of economic integration on the degree of fiscal decentralization. In contrast to this, the hypothesis of a decentralizing impact of European integration is only clearly confirmed with respect to direct public spending and linguistic heterogeneity. Table 1 however reveals two possible exceptional cases of considerable decentralization which deserve closer examination: Belgium and Spain. The share of sub-central government expenditure and revenue increased drastically in Belgium from 1989 on as a consequence of the transfer of competencies to the recently created regions and linguistic communities. At the same time, Belgium represents a small open economy whose degree of openness rose considerably in the last decades (see Table 2). With regard to Spain, the transfer of fiscal powers to the autonomous regions, and, simultaneously, economic opening and integration in the EU made considerable progress after the end of the Franco regime. Apart from this, both countries are characterized by strong linguistic diversity.

In fact, after carrying out a sensitivity analysis it turns out that particularly the coefficients of economic and EU integration vary with the use of different samples.[50] Note first that due to the limited size of the cross-section[51], and to the fixed effects approach, it is not surprising that even though we have checked for outliers, individual cases have a considerable influence on the results. When dropping Belgium from the sample, the coefficient of economic openness becomes less precisely estimated, and the sign is even partly reversed. On the other hand, in case of excluding Spain, the positive impact of European integration on the sub-central government share of public spending is reversed. Yet, in both cases, the signs of the interaction terms remain unchanged.

As a test for robustness, "robust" estimators, like the least absolute deviations (LAD) estimator, are proposed by Koenker and Bassett (1978).[52] This special case of generalized quantile regressions estimates the median of the dependent variable, conditional on the values of the independent variables. It generally turns out that this estimator is very robust with respect to outliers in both the dependent and the independent variables. Table 5 shows the corresponding results of median regressions for direct public expenditure using country specific dummy variables. Since the usual standard errors are often reported to be understated in the presence of heteroscedasticity, bootstrap standard errors are reported according to Efron and Tibshirani (1993). The robust estimations show that indeed integration in the world economy as described by the degree of trade openness has no clear effect on the degree of public sector centralization. Note, however, that the index of financial openness used alternatively maintains a positive significant coefficient.[53] Similarly, the results with respect to European integration and the interaction terms remain unchanged, though less accurately estimated.

To sum up, the quantitative analysis provides some evidence for a decentralizing effect of integration. The results are, however, particularly consistent with a significant positive effect of economic and European integration on the sub-central government share of public expenditure and revenue in the context of linguistic heterogeneity, whereas participation of sub-national governments in national decision-making induces centralizing tendencies in the course of integration. Also, circumstantial evidence is reported for a causal relationship between the end of the cold war and the decentralization of the public sector.

[50] The results of these sensitivity analyses are available upon request.

[51] Belgium and Spain make up about 6%, and, respectively, 4% of the observations in the sample.

[52] See, e.g., Judge et al. (1988) for an overview of quantile regressions.

[53] This is probably due to the fact that, unlike the degree of trade openness, this indicator is not correlated with the size of the economy and exhibits no distinct pattern for Belgium. The estimates for the other measures of decentralization are available upon request.

Table 5: Quantile (median) estimates for fiscal decentralization, direct expenditure (incl. social security), OECD countries, 1970-2001

	Dep. Var.: Degree of expenditure decentralization						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population	-.039	-.052	-.045	-.048	-.078	.127	-.008
	(.050)	(.067)	(.070)	(.076)	(.074)	(.094)	(.093)
Urbanization	-.168***	-.141*	-.183***	-.148***	-.216***	-.341***	-.150*
	(.051)	(.072)	(.054)	(.057)	(.067)	(.079)	(.090)
Regional disparity	-.132***	-.123***	-.148***	-.142**	-.119***	-.124***	-.114
	(.045)	(.038)	(.040)	(.061)	(.037)	(.039)	(.071)
Per capita income	.057***	.023	.056***	.058***	.075***	-.001	.039*
	(.021)	(.025)	(.019)	(.016)	(.028)	(.015)	(.022)
Growth rate	-.071	-.039	-.066	-.086*	-.080	-.043	-.055
	(.058)	(.050)	(.049)	(.052)	(.067)	(.048)	(.047)
Unemployment	-.301***	-.332***	-.292**	-.305***	-.357***	-.435***	-.356***
	(.078)	(.095)	(.115)	(.092)	(.079)	(.092)	(.114)
Election	-.000	.000	-.001	-.000	-.001	-.001	-.001
	(.002)	(.001)	(.002)	(.002)	(.002)	(.002)	(.001)
Coldwar	-.002	.000	-.003	-.002	-.004	-.004	-.001
	(.004)	(.004)	(.004)	(.003)	(.003)	(.003)	(.004)
Trade openness	-.011		.014	-.011	-.030	-.014	.021
	(.020)		(.034)	(.019)	(.043)	(.019)	(.041)
Finan. openness		.068*					
		(.035)					
EU · EU exp.	.006	.004			.009*	-.018	
	(.006)	(.004)			(.005)	(.016)	
EU trade			.097*				.070
			(.052)				(.148)
EU polit. integr.				.003			
				(.003)			
Fractional					.126		
· Trade openness					(.104)		
Fractional						.156***	
· (EU · EU exp.)						(.043)	
Fractional							.383
· EU trade							(.546)
Referendum					-.043		
· Trade openness					(.031)		
Referendum						-.000	
· (EU · EU exp.)						(.013)	
Referendum							-.008
· EU trade							(.030)
Regional parliam.					-.142**		
· Trade openness					(.060)		
Regional parliam.						-.005	
· (EU · EU exp.)						(.012)	
Regional parliam.							-.227***
· EU trade							(.086)
No. obs. (countries)	484 (23)	457 (22)	482 (23)	484 (23)	484 (23)	484 (23)	482 (23)
Pseudo R^2	0.850	0.857	0.850	0.850	0.856	0.861	0.852

Note: All regressions include country dummies, as well as period dummies for territorial changes in Canada, Germany, Netherlands, and Portugal, whose coefficients are not reported. Bootstrap standard errors are reported in brackets. ***, **, and * indicate significance at 1%, 5% and 10% levels, respectively.

5 Summary and conclusions

The aim of this paper is to investigate empirically the relationship between economic integration in general, and political integration in the European Union in particular, and the recent process of public sector decentralization. The analysis draws on recent work on the secession and integration of countries which shows that economic integration increases the benefits of secession or local autonomy. However, the resulting implications of integration for the vertical government structure have mostly been neglected by this literature.

For this purpose, a theoretical framework is set up, which relates the degree of public sector decentralization to economic integration and the costs and benefits of decentralization in terms of economies of scale and preference heterogeneity. By increasing the market size and enhancing economies of scale in the private sector, integration is shown to increase the benefits from the decentralized provision of public goods. Within this context, political unification in Europe is supposed to support decentralization, since market integration is intensified and formerly central government functions are taken over by a supranational authority. On the other side, with increasing exposure to economic shocks the demand for central government redistribution and macroeconomic stabilization might prevail, too. Therefore, the ultimate result of integration hinges on the trade-off between increased local growth prospects and higher economic risk.

Using a panel of OECD countries, we tested the hypothesis of a positive impact of economic and European integration on the degree of decentralization of the public sector. Considering different measures, a clear decentralization trend is detected only if social security is excluded, and especially with respect to public revenue. Since integration is assumed to affect the costs and benefits of the decentralized provision of public goods over time, the empirical analysis uses a panel data approach, taking country-specific technologies, preferences, and institutional rules into account.

The estimates mostly indicate a significant positive relationship between economic integration as measured by the share of foreign trade in GDP and the degree of public sector decentralization. Some limited evidence is also provided for the "Sandwich" hypothesis postulating a diminishing role of national governments in the course of European integration. European integration as measured either by the share of trade with EU countries or the volume of EU expenditure exerts a positive effect on the sub-central government share of expenditure. In line with the common pool argument, direct involvement of sub-national governments in central decision-making through a regional chamber of parliament is found to be associated with stronger centralization. Contrary to the expectations, integration also seems to lead to higher centralization in countries providing for direct democracy at the national level. The estimates also indicate that growing inter-regional income disparity significantly decreases the sub-central government share of expenditure and revenue, thus supporting the hypothesis of growing demand for inter-regional redistribution by the central government with increasing exposure to economic shocks. Finally, a negative relationship is reported between the extent of military threat and the relative size of sub-central government activity.

However, the results prove to be sensitive to the measurement of decentralization and the inclusion of individual countries. It turns out that the decentralizing impact of economic, as well as European integration is induced particularly by the exceptional cases of Belgium and Spain. At least, economic and political integration seem to have played a significant role in the remarkable process of fiscal decentralization observed in these two countries. Indeed, robust estimates confirm that, strictly speaking, economic and European integration contributed to the relative increase of sub-central government expenditure and revenue particularly in linguistically heterogeneous countries.

Despite some inconclusive results and certain limitations due to the correct measurement of fiscal decentralization, the empirical analysis provides us with some new results. The approach taken in this paper focuses on the particular interaction between integration on the one side, and public sector decentralization on the other side, revealing a significant relationship between those two broad trends among OECD countries, especially in the context of preference heterogeneity. Despite circumstantial evidence for this tendency, nation-states formed during long historical processes are not expected to disappear in the near future with advancing European integration, national governments continuing to exert considerable power through the European Council. In line with this, up to now the European Union has been vested particularly with regulative and legislative competencies, and to a lesser extent with direct expenditure and revenue powers. The analysis also indicates that institutional rules play an important role in determining the impact of integration on the vertical government structure and that the end of the cold war has considerably contributed to the enforcement of demands for local autonomy.

Appendix 1

Theoretical framework: different regional population sizes

A possible extension of the theoretical model presented in section 2 consists in considering different regional population sizes N_i. In this case, the utility function (4) becomes

$$U_i = \alpha ln\theta g + \beta(1-\delta)ln(1-\theta)g + lnA_i + \omega ln\theta g - \frac{g\left(\theta N + (1-\theta)N_i\right)}{NN_i}. \tag{6}$$

Accordingly, the optimal degree of decentralization from the viewpoint of a region now depends on the population size of the federation N, as well as on the region's population size N_i:

$$\theta^* = \frac{N_i(\alpha+\omega}{N_i\left(\alpha+\omega\right) + N\beta(1-\delta)}. \tag{7}$$

Other things being equal, the optimal degree of decentralization decreases in the size of the federation, $\theta^*_N < 0$, but increases in the region's population size, $\theta^*_{N_i} > 0$. In the latter case economies of scale are exploited at the sub-national level of government. However, since in reality changes in both regional and total population size are likely to be concomitant, both effects on centralization might balance out on aggregate.

Appendix 2

Table 6: Degree of fiscal decentralization (excl. social security), OECD countries, 1970-2001

Country	Direct expenditure (1)		Total expenditure (2)		Own revenue (3)	
	1970-75	1996-2001	1970-75	1996-2001	1970-75	1996-2001
AUS	49.3	48.3	27.4	31.6	24.0	32.9
AUT	45.8	47.5	34.9	33.8	35.1	33.4
BEL	21.0	39.5	10.0	33.8	10.2	35.4
CAN	58.5	63.7	49.6	56.5	49.3	55.8
DEN	61.8	59.9	30.7	36.1	30.3	33.8
FIN	42.6	45.2	30.3	34.7	30.3	34.7
FRA	29.0	32.2	18.0	21.5	13.5	22.3
GER	65.9	64.6	59.3	60.2	54.5	54.9
GRE	5.0		4.8		4.9	
ICL	21.8	33.7	21.9	30.1	19.7	25.6
IRL	34.5	28.4	18.1	7.4	15.4	7.8
ITA	26.2	36.3	11.7	17.2	9.1	16.1
JAP	65.5	62.8	28.4	27.6	34.6	38.3
LUX	26.7	27.6	14.3	17.5	11.7	13.3
NED	53.2	45.9	11.6	13.7	5.9	16.2
NEZ	12.5[a]	11.1	10.4[a]	10.0	11.3[a]	10.1
NOR	48.1	46.1[b]	42.2	32.7[b]	40.9	27.2[b]
POR	9.3	13.7	4.7	9.0	6.0	8.7
SPA	15.6	63.4	8.7	30.8	8.2	26.6
SWE	48.0	42.0	35.8	34.8	35.9	34.4
SWI	74.4	78.2	63.3	62.2	62.3	63.0
UK	36.9	31.6[b]	22.4	19.3[b]	17.9	18.6[b]
USA	53.1	60.2	42.8	49.9	46.8	51.5
Median[c]:						
OECD	*44.2*	*45.6*	*24.9*	*31.2*	*21.9*	*30.0*
EU15	*35.7*	*40.8*	*18.1*	*26.2*	*14.5*	*24.4*

Note: Total expenditure and lending minus repayments (total revenue and grants) of sub-central government in % of consolidated general government expenditure (revenue), without social security and EU payments. Six-year-averages, [a] 1978-80, [b] 1988-90, [c] without GRE. See Table 1 for further details.

Table 7: Fixed effects (within) estimates, total expenditure (incl. social security)

	Dep. Var.: Degree of expenditure decentralization						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population	.040	.062	.051	.030	.030	.134*	.105
	(.089)	(.089)	(.090)	(.090)	(.088)	(.077)	(.094)
Urbanization	-.137	-.161*	-.127	-.134	-.156*	-.165*	-.110
	(.093)	(.095)	(.091)	(.092)	(.090)	(.099)	(.099)
Regional disparity	-.203***	-.197***	-.213***	-.203***	-.185***	-.139***	-.173***
	(.058)	(.059)	(.060)	(.059)	(.057)	(.047)	(.055)
Per capita income	.006	-.009	-.007	.011	.006	-.028	-.008
	(.034)	(.039)	(.036)	(.035)	(.036)	(.032)	(.036)
Growth rate	-.029	.007	-.026	-.021	-.000	-.022	-.046
	(.063)	(.065)	(.063)	(.064)	(.058)	(.054)	(.062)
Unemployment	-.352***	-.305**	-.372***	-.334***	-.369***	-.444***	-.397***
	(.131)	(.139)	(.121)	(.129)	(.121)	(.119)	(.114)
Election	-.004**	-.004**	-.004**	-.004**	-.004**	-.004*	-.004**
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Coldwar	-.006	-.006	-.007	-.007	-.007	-.007	-.004
	(.006)	(.006)	(.006)	(.006)	(.006)	(.006)	(.006)
Trade openness	.103**		.124***	.105**	-.010	.079**	.122***
	(.042)		(.044)	(.042)	(.058)	(.036)	(.044)
Finan. openness		.051					
		(.045)					
EU · EU exp.	.004	.005			.009**	-.009	
	(.005)	(.006)			(.004)	(.013)	
EU trade			.099				-.135
			(.061)				(.130)
EU polit. integr.				.001			
				(.003)			
Fractional					.287*		
· Trade openness					(.153)		
Fractional						.123***	
· (EU · EU exp.)						(.038)	
Fractional							.769**
· EU trade							(.313)
Referendum					-.029		
· Trade openness					(.019)		
Referendum						-.012	
· (EU · EU exp.)						(.014)	
Referendum							.014
· EU trade							(.026)
Regional parliam.					-.149*		
· Trade openness					(.082)		
Regional parliam.						-.009	
· (EU · EU exp.)						(.008)	
Regional parliam.							-.032
· EU trade							(.153)
No. obs. (countries)	485 (23)	458 (22)	483 (23)	485 (23)	485 (23)	485 (23)	483 (23)
Adj. R^2	0.960	0.959	0.960	0.960	0.962	0.965	0.961
Within R^2	0.218	0.167	0.224	0.215	0.276	0.319	0.261

Note: See Table 4 for further details.

Table 8: Fixed effects (within) estimates, own revenue (incl. social security)

	Dep. Var.: Degree of revenue decentralization						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population	.001	.049	.016	-.010	-.013	.088	.060
	(.097)	(.097)	(.096)	(.096)	(.096)	(.086)	(.098)
Urbanization	-.196**	-.223**	-.195**	.189**	-.232***	-.219**	-.185**
	(.087)	(.090)	(.086)	(.087)	(.083)	(.090)	(.091)
Regional disparity	-.176***	-.164***	-.180***	-.172***	-.163***	-.130***	-.147***
	(.057)	(.057)	(.058)	(.057)	(.056)	(.048)	(.055)
Per capita income	.019	-.000	.008	.024	.023	-.015	.008
	(.036)	(.038)	(.037)	(.036)	(.038)	(.034)	(.037)
Growth rate	-.001	.045	-.008	.010	.013	.005	-.023
	(.065)	(.066)	(.066)	(.066)	(.060)	(.057)	(.066)
Unemployment	.026	.086	-.002	.053	.013	-.060	-.025
	(.113)	(.122)	(.110)	(.110)	(.107)	(.114)	(.107)
Election	-.003*	-.004**	-.003*	-.003*	-.003*	-.003	-.003**
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Coldwar	-.007	-.007	-.007	-.008	-.007	-.008	-.004
	(.006)	(.006)	(.006)	(.006)	(.006)	(.006)	(.006)
Trade openness	.107**		-.115**	.108**	.015	.083**	.114**
	(.043)		(.048)	(.043)	(.054)	(.037)	(.047)
Finan. openness		.055					
		(.046)					
EU · EU exp.	-.001	-.001			.003	-.003	
	(.005)	(.006)			(.004)	(.011)	
EU trade			.049				-.161
			(.060)				(.117)
EU polit. integr.				-.003			
				(.002)			
Fractional					.231		
· Trade openness					(.155)		
Fractional						.107***	
· (EU · EU exp.)						(.038)	
Fractional							.639**
· EU trade							(.294)
Referendum					-.009		
· Trade openness					(.016)		
Referendum						-.022*	
· (EU · EU exp.)						(.013)	
Referendum							.026
· EU trade							(.021)
Regional parliam.					-.184**		
· Trade openness					(.073)		
Regional parliam.						-.009	
· (EU · EU exp.)						(.008)	
Regional parliam.							-.013
· EU trade							(.153)
No. obs. (countries)	485 (23)	458 (22)	483 (23)	485 (23)	485 (23)	485 (23)	483 (23)
Adj. R^2	0.961	0.960	0.961	0.961	0.963	0.965	0.962
Within R^2	0.192	0.145	0.195	0.198	0.240	0.277	0.222

Note: See Table 4 for further details.

Table 9: Fixed effects (within) estimates, direct expenditure (excl. social security)

	Dep. Var.: Degree of expenditure decentralization						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population	-.213**	-.221**	-.117	-.214**	-.236**	-.032	.004
	(.098)	(.103)	(.099)	(.096)	(.098)	(.099)	(.109)
Urbanization	-.150	-.148	-.105	-.160	-.148	-.171	-.061
	(.125)	(.128)	(.106)	(.132)	(.120)	(.159)	(.099)
Regional disparity	-.239***	-.241***	-.295***	-.246***	-.204***	-.131**	-.196***
	(.075)	(.071)	(.080)	(.077)	(.067)	(.053)	(.060)
Per capita income	.120***	.071	.030	.122***	.123***	.050	.030
	(.038)	(.047)	(.045)	(.038)	(.037)	(.038)	(.041)
Growth rate	-.076	-.034	-.104	-.083	-.058	-.069	-.146*
	(.100)	(.111)	(.088)	(.097)	(.097)	(.090)	(.076)
Unemployment	-.203	-.263	-.335	-.232	-.201	-.341	-.384**
	(.288)	(.265)	(.229)	(.277)	(.273)	(.218)	(.187)
Election	-.004	-.003	-.003	-.004	-.004	-.003	-.003
	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)
Coldwar	-.028***	-.025***	-.031***	-.027***	-.030***	-.027***	-.025***
	(.008)	(.008)	(.007)	(.008)	(.007)	(.007)	(.007)
Trade openness	.016		.127***	.013	-.069	-.022	.126***
	(.039)		(.046)	(.040)	(.079)	(.039)	(.041)
Finan. openness		.146**					
		(.071)					
EU · EU exp.	.016	.008			.023**	-.018	
	(.012)	(.009)			(.012)	(.014)	
EU trade			.531***				.118
			(.177)				(.122)
EU polit. integr.				.011			
				(.007)			
Fractional					.247		
· Trade openness					(.162)		
Fractional						.218***	
· (EU · EU exp.)						(.062)	
Fractional							1.602***
· EU trade							(.488)
Referendum					-.079**		
· Trade openness					(.034)		
Referendum						-.008	
· (EU · EU exp.)						(.013)	
Referendum							-.042
· EU trade							(.037)
Regional parliam.					-.228*		
· Trade openness					(.120)		
Regional parliam.						-.011	
· (EU · EU exp.)						(.011)	
Regional parliam.							-.546***
· EU trade							(.166)
No. obs. (countries)	459 (22)	432 (21)	457 (22)	459 (22)	459 (22)	459 (22)	457 (22)
Adj. R^2	0.952	0.953	0.959	0.953	0.955	0.962	0.965
Within R^2	0.306	0.333	0.413	0.324	0.355	0.456	0.509

Note: See Table 4 for further details.

Table 10: Fixed effects (within) estimates, total expenditure (excl. social security)

	Dep. Var.: Degree of expenditure decentralization						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population	-.117	-.069	-.099	-.125	-.136	-.021	-.062
	(.100)	(.100)	(.101)	(.101)	(.098)	(.085)	(.107)
Urbanization	-.171**	-.198**	-.164**	-.168**	-.182**	-.207***	-.164**
	(.082)	(.079)	(.078)	(.082)	(.071)	(.079)	(.082)
Regional disparity	-.204***	-.182***	-.216***	-.203***	-.174***	-.166***	-.174***
	(.060)	(.055)	(.062)	(.059)	(.056)	(.052)	(.055)
Per capita income	.084**	.059***	.068	.088**	.088**	.045	.072*
	(.039)	(.044)	(.042)	(.039)	(.040)	(.036)	(.042)
Growth rate	-.041	.001	-.043	-.034	-.009	-.043	-.061
	(.074)	(.076)	(.074)	(.073)	(.068)	(.067)	(.071)
Unemployment	-.340**	-.308*	-.368**	-.324**	-.356**	-.446***	-.386***
	(.159)	(.165)	(.145)	(.156)	(.144)	(.142)	(.135)
Election	-.005**	-.005**	-.004**	-.005**	-.004**	-.004*	-004**
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Coldwar	-.024***	-.022***	-.024***	-.024***	-.026***	-.026***	-.022***
	(.007)	(.007)	(.007)	(.008)	(.007)	(.007)	(.008)
Trade openness	.098**		.119**	.099**	-.006	.075*	.119**
	(.047)		(.050)	(.047)	(.058)	(.041)	(.049)
Finan. openness		.100**					
		(.051)					
EU · EU exp.	.002	-.002			.008*	.011	
	(.006)	(.006)			(.005)	(.011)	
EU trade			.094				-.023
			(.070)				(.111)
EU polit. integr.				-.000			
				(.003)			
Fractional					.282*		
· Trade openness					(.167)		
Fractional						.108***	
· (EU · EU exp.)						(.040)	
Fractional							.516
· EU trade							(.326)
Referendum					-.057***		
· Trade openness					(.020)		
Referendum						-.032**	
· (EU · EU exp.)						(.015)	
Referendum							-.020
· EU trade							(.024)
Regional parliam.					-.185**		
· Trade openness					(.090)		
Regional parliam.						-.016**	
· (EU · EU exp.)						(.007)	
Regional parliam.							-.418**
· EU trade							(.187)
No. obs. (countries)	467 (23)	440 (22)	465 (23)	467 (23)	467 (23)	467 (23)	465 (23)
Adj. R^2	0.967	0.968	0.967	0.967	0.969	0.971	0.968
Within R^2	0.330	0.318	0.333	0.329	0.387	0.409	0.356

Note: See Table 4 for further details.

Table 11: Fixed effects (within) estimates, own revenue (excl. social security)

	Dep. Var.: Degree of revenue decentralization						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population	-.097	-.039	-.077	-.104	-.119	-.019	-.058
	(.113)	(.110)	(.110)	(.112)	(.112)	(.096)	(.115)
Urbanization	-.227**	-.262***	-.236***	-.219**	-.252***	-.263***	-.240***
	(.091)	(.086)	(.090)	(.090)	(.082)	(.082)	(.092)
Regional disparity	-.167***	-.142**	-.170***	-.162***	-.143**	-.156***	-.145**
	(.061)	(.056)	(.062)	(.059)	(.059)	(.052)	(.059)
Per capita income	.074*	.058	.065	.076*	.081*	.039	.068
	(.044)	(.047)	(.045)	(.043)	(.046)	(.041)	(.046)
Growth rate	-.039	.009	-.056	-.029	-.020	-.042	-.066
	(.077)	(.077)	(.081)	(.077)	(.072)	(.069)	(.082)
Unemployment	.110	.167	.075	.140	.097	.013	.062
	(.135)	(.147)	(.137)	(.131)	(.131)	(.137)	(.137)
Election	-.004*	-.005**	-.004*	-.004*	-.004*	-.003	-.004*
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Coldwar	-.021***	-.021***	-.020***	-.022***	-.023***	-.025***	-.019**
	(.008)	(.008)	(.008)	(.008)	(.008)	(.007)	(.008)
Trade openness	.114**		.109*	.116**	.026	.090*	.110*
	(.054)		(.059)	(.054)	(.060)	(.046)	(.059)
Finan. openness		.084					
		(.058)					
EU · EU exp.	-.007	-.011			-.002	.021**	
	(.007)	(.007)			(.006)	(.010)	
EU trade			-.009				-.078
			(.080)				(.125)
EU polit. integr.				-.006**			
				(.003)			
Fractional					.237		
· Trade openness					(.186)		
Fractional						.082*	
· (EU · EU exp.)						(.042)	
Fractional							.280
· EU trade							(.354)
Referendum					-.036*		
· Trade openness					(.020)		
Referendum						-.050***	
· (EU · EU exp.)						(.017)	
Referendum							-.004
· EU trade							(.024)
Regional parliam.					-.208**		
· Trade openness					(.092)		
Regional parliam.						-.015	
· (EU · EU exp.)						(.009)	
Regional parliam.							-.261
· EU trade							(.196)
No. obs. (countries)	467 (23)	440 (22)	465 (23)	467 (23)	467 (23)	467 (23)	465 (23)
Adj. R^2	0.963	0.962	0.962	0.963	0.965	0.967	0.962
Within R^2	0.284	0.264	0.280	0.295	0.324	0.364	0.286

Note: See Table 4 for further details.

Table 12: Data sources and definitions

Variable	Description	Source
Decentral	Sub-central governm. expenditure (revenue) as a share of consolid. general governm. expend. (revenue); different measurement concepts	IMF, Government Finance Stat. Yearbook; own calculations
Population	Natural log of population in 1000	IMF; World Bank
Urbanization	Share of urban population	Eurostat; OECD; World Bank
Fractional	Index of linguistic fractionalization (0-1)	www.ethnologue.com
Regional disparity	Coeff. of variation of regional GDP, GVA or income per capita	Eurostat, REGIO Database, Regional Accounts; national statistics; own calculations
Regional parliam.	Dummy=1 for second chamber of parliament with representatives delegated by the regions	CIA, World Fact Book; Ismayr (1999); constitutions
Referendum	Dummy=1 for legal provisions concerning national constitutional and legislative referendums	Research and Documentation Centre on Direct Democracy (http://c2d.unige.ch); constitutions
Per capita income	Log of real GDP per capita, in prices of 1995, in ECU/EUR	IMF, International Financial Statistics; own calculations
Growth rate	Rate of growth of real GDP p.c.	
Unemployment	Rate of unemployment	OECD, Labour Force Statistics
Election	Dummy=1 national election	Ismayr (1999); Mackie and Rose (1991); www.polisci.com
Coldwar	Military expenditure in % of GNP of WTO countries relative to NATO countries	U.S. Arms Control and Disarmament Agency; own calculations
Trade openness	Exports plus imports as a share of GDP	IMF, International Financial Statistics; own calculations
Finan. openness	Index of financial openness (re-scaled 0-1)	Quinn and Inclan (1997); Armingeon et al. (2000)
EU	Dummy=1 for EU membership	own compilation
EU expend.	EU expenditure in % of total public expenditure of EU countries	Europ. Kommission (2000)
EU trade	Exports plus imports to/from EU15 as a share of foreign trade	OECD, Statistical Compendium Database; own calculations
EU polit. integr.	Index of integration in the EU (0-6): 0 (none), 1 (free-trade agreement), 2 (EEA), 3 (customs union), 4 (EC/EU), 5 (EMS), 6 (EMU)	own calculations

Table 13: Descriptive statistics

Variable	Mean	Std.Dev.	Min.	Max.
Decentral				
Dir. exp. (excl. soc. sec.)	0.420	0.184	0.041	0.789
Dir. exp. (incl. soc. sec.)	0.321	0.154	0.031	0.626
Total exp. (excl. soc. sec.)	0.280	0.167	0.013	0.649
Total exp. (incl. soc. sec.)	0.219	0.135	0.009	0.543
Own rev. (excl. soc. sec.)	0.283	0.173	0.037	0.666
Own rev. (incl. soc. sec.)	0.225	0.140	0.027	0.545
Population	9.366	1.624	5.323	12.560
Urbanization	0.746	0.135	0.259	0.972
Fractional	0.246	0.201	0.000	0.650
Regional disparity	0.197	0.087	0.000	0.452
Regional parliam.	0.089	0.285	0.000	1.000
Referendum	0.646	0.479	0.000	1.000
Per capita income	9.647	0.438	8.244	10.698
Growth rate	0.024	0.028	-0.105	0.272
Unemployment	0.059	0.041	0.000	0.241
Election	0.295	0.456	0.000	1.000
Coldwar	2.117	0.594	1.150	2.680
Trade openness	0.665	0.380	0.108	2.907
Finan. openness	0.806	0.181	0.286	1.000
EU	0.477	0.500	0.000	1.000
EU expend.	1.891	0.385	1.200	2.400
EU trade	0.544	0.205	0.072	0.865
EU polit. integr.	2.400	2.329	0.000	6.000

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