DECENTRALISING THE PUBLIC SECTOR

FISCAL DECENTRALISATION AND ECONOMIC GROWTH: IS THERE REALLY A LINK?

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The relationship between fiscal decentralisation (FD) and economic growth has been analysed by a number of economists during the last three decades. Linking economic growth and FD together has mainly three reasons: firstly, growth is seen as an objective of FD and efficiency in the allocation of resources in the public sector; secondly, it is an explicit intention of governments to adopt policies that lead to a sustained increase in per capita income and thirdly, per capita growth is easier to measure and to interpret than other economic performance indicators. While theoretical examinations started with the pioneer publications of Tiebout (1956), Musgrave (1959) and Oates (1972), empirical analysis regarding the role of economic growth on FD started at the end of the 1970s and estimations concerning the direct impact of FD on economic growth have only been conducted since the end of the 1990s. Both theoretical and empirical analyses tend to be inconclusive and come up with ambiguous and differing results. One can conclude that this is the outcome of the theoretical trade-off construction, which reflects the various pros and cons of a decentralised government structure. But we shall also consider that direct empirical estimations are still scarce and do not sufficiently involve new results of economic growth theory and empiricism. In addition, different methodological approaches and diverse designs for decentralisation have been applied. Furthermore, theoretical foundations for the direct impact of FD

on economic growth have remained largely undeveloped and have therefore weakened the validity of the empirical work on this topic (see Martinez-Vazquez and McNab 2001). Nevertheless, the empirical studies on the direct impact of FD on economic growth during the last decade have not only provided the first corresponding empirical examinations, but have also elaborated meaningful insights into various aspects of this relationship. Therefore, it is time for an evaluation (again)[1]. This article reviews these studies, summarises their major findings, examines the covered time horizon and region, compares the applied theoretical framework and the chosen empirical methodology, evaluates the chosen indicators for fiscal decentralisation and the specification of the dependent growth variable. In this way we would like to acknowledge this scientific focus of the last decade and contribute to a better understanding of the "real" linkage between the two variables of interest.

Survey of the status quo of empirical evidence

Data coverage

Since 1995 there have been few empirical studies, which have directly examined the impact of fiscal decentralisation on economic growth (in total 14 studies). This survey concentrates on cross-country studies and on studies on particular (federal) states, while studies on developing or transitional countries or studies, which concentrate on the effects of centralisation instead of decentralisation, are tackled only secondarily. Currently there are only six cross-country studies[2] and several ones on particular countries.[3] Within the cross-country
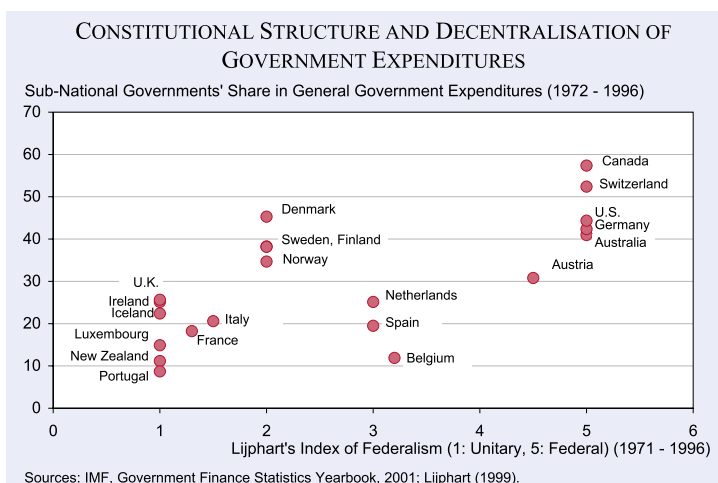
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[1] In January 2001, Martinez-Vazquez and McNab composed a first survey regarding this issue. Nevertheless, they did not take into account several studies published before this date: Oates (1995), Thießen (2000), or Yilmaz (2000). Until today, a number of new studies have been conducted.
[2] Oates 1995; Davoodi and Zou 1998 (mixed set of developing countries and OECD countries); Woller and Phillips 1998 (set of least developed countries [LDCs]); Yilmaz 1999; Thießen 2000 and Thießen 2003 (high income OECD countries).
[3] Three on China (Zhang and Zou 1998; Lin and Liu 2000; Zhang and Zou 2001), two on the United States (Xie, Zou and Davoodi 1999; Akai, Nishimura and Sakata 2002 and 2004), one on Germany (Behnisch, Buettner and Stegarescu 2001), one on India (Zhang and Zou 2001), and one on Russia (Desai, Freinkman and Goldberg 2003).

Figure 1

CONSTITUTIONAL STRUCTURE AND DECENTRALISATION OF
GOVERNMENT EXPENDITURES

Sub-National Governments' Share in General Government Expenditures (1972 - 1996)

Lijphart's Index of Federalism (1: Unitary, 5: Federal) (1971 - 1996)

Sources: IMF, Government Finance Statistics Yearbook, 2001; Lijphart (1999).

studies, the countries are grouped into high and low income ones (see Thießen 2000 and 2003), into unitary and federal ones (in order to consider the diverse constitutional structures, see Yilmaz 1999; see also Figure 1), or into different geographical areas (see Akai and Sakata 2002). They also consider the size of the jurisdictions in order to make the ratios more comparable across states and launch size variables (see Zhang and Zou 2001: area of Indian states; Desai et al. 2003: size of regional Russian population) or include per capita explanatory variables.

Following Yilmaz (1999), we have depicted Figure 1, where the relationship between the decentralisation of government expenditures and the constitutional structure of selected countries is shown. We use the "index of federalism" of Lijphart (1999), which is rated on a five-point scale: unitary and centralised (1), unitary but decentralised (2), semi-federal (3), federal but centralised (4), federal and decentralised (5). It is highly plausible that the different degrees of decentralisation can be partly explained by the constitutional structure of competence allocation. But, as the definition of the federalism index demonstrates, federalism and decentralisation need not necessarily be the same. For example, the unitary Scandinavian countries show quite high degrees of expenditure decentralisation, while Belgium as a semi-federal country exhibits a relatively low decentralisation ratio. Thus, the right to decide (constitutional determination of the allocation of competences to different levels of government) and the right to act (effective decentralisation of expenditures) might differ.

Most authors choose the *budget data approach* and approximate the degree of FD using the share of sub-national government expenditures (or revenues) in general government expenditures (or revenues), net of intergovernmental transfers. The Government Finance Statistics (GFS) of the International Monetary Fund (IMF) operate as the corresponding database. As the GFS have been delivering data since the early 1970s, the resulting time series have a length of circa 30 years. While the revenue share is chosen only in three studies (see Woller and Phillips 1998, Thießen 2003 and Akai et al. 2004), the expenditure share is built into eight examinations. Zhang and Zou (1998 and 2001) examine the cross-provincial impact of FD in China and in India and use the ratio of consolidated provincial budgetary spending (revenue) to central budgetary spending (revenue). Lin and Liu (2000) and Desai et al. (2003) use the marginal revenue retention rate or tax revenue retention rate, respectively, as a measure for FD in order to consider regional fiscal incentives and regional fiscal autonomy. A similar measure for the independence of sub-national levels is the self-reliance ratio (share of own revenues of lower levels in their total revenues), which is used by Oates (1995) and Thießen (2000 and 2003).

These indicators for FD are *disaggregated by function* at different levels of government. Davoodi and Zou (1998) discuss the opposing expected effects of capital and infrastructure expenditures (positive growth effects) versus current and welfare expenditures (negative growth effects). In order to consider the accurate responsibility of either level of government, Woller and Phillips (1998) construct an expenditure share subtracting defence and social security spending and a revenue share subtracting grants-in-aid. Behnisch et al. (2001) analyse different spending categories (education and science, transport and communication) at the central level. Zhang and Zou (1998 and 2001) show the most sophisticated approach respecting functional diversification and differentiate between budgetary and extra-budgetary spending and different spending categories at the central and provincial level.

With respect to the *dependent variable*, the majority of the studies use the growth rate of real GDP per capita (in cross-country studies) or the growth rate of real provincial (state) income (in studies on particular countries). Exceptions are Behnisch et al. (2001), who analyse the impact of public sector centralisation on total factor productivity growth (TFPG), Desai et al. (2003), who use a recovery index focused on regional industrial output, or Akai et al. (2004), who test the impact of FD on economic volatility. Thießen (2000) decomposes economic growth into its components TFPG and the growth rate of real gross fixed capital formation and estimates own regressions using these rates as dependent variables.

Conceptual framework

Most authors use the *endogenous growth model of Barro (1990)*, where the production function has multiple inputs including private capital and public spending. They split public spending into three levels of government (for the first time in Davoodi and Zou 1998) and analyse different decentralisation shares regarding their consistency with growth maximisation (see in particular Xie et al. 1999). Highest complexity is reached in Zhang and Zou (2001), who augment the aforementioned approach and develop a model that links multiple sectors of public spending by multiple levels of government to economic growth. Akai et al. (2004) refer additionally to Nishimura (2001), who developed a model that considers differences in the quality as well as complementarities of public services. Lin and Liu (2000) and Thießen (2003) choose a different approach. They follow *Mankiw, Romer and Weil (1992)* and adapt their augmented Solow model of economic growth introducing FD as explanatory variable.

Empirical methodology

Two kinds of conventional growth regressions are employed: *pure cross-country regressions* and *panel data regressions* based on several period averages. In panels usually annual frequency data are used, but it is also possible to construct perennial average panels in order to capture the likelihood of long-run effects (see Davoodi and Zou 1998; Woller and Phillips 1998). Pros and cons of these two regression types are discussed in particular by Thießen (2000 and 2003), who finally gives priority to pure cross-sectional growth regressions based on averages of annual data. The differences between the two approaches are pronounced in his first study, where the estimated pure cross-section regression shows that FD affects GDP growth positively (the coefficient for Western European countries is not significant). Adding the time series dimension and estimating the panel regressions, the significance of the FD indicator disappears completely and the coefficient for European countries becomes even negative. However, most authors choose the panel data method and include *country fixed* and *time fixed effects* in order to control for individual-specific, time invariant characteristics of the analysed countries. Besides panel and pure cross-section regressions the *growth accounting procedure* is employed (see Thießen 2000; Behnisch et al. 2001). *Ordinary least squares* (OLS) *estimation* predominates the studies, while general least squares (GLS) (see Zhang and Zou 1998; Thießen 2000), least squares dummy variable (LSDV; see Zhang and Zou 1998), or maximum likelihood (ML) estimation (see Akai and Sakata 2002) are applied only in particular cases. In addition, Desai et al. (2003) estimate simultaneous growth regressions and use three stage least squares (3SLS) estimators in order to correct for simultaneity and the potential endogeneity of certain explanatory variables (i.e., budgetary transfers from the central level as percentage of regional governmental revenue).

Within empirical estimation most authors conduct *sensitivity analyses* following Levine and Renelt (1992). Accordingly they distinguish between three groups of explanatory variables: base regressors, which are always included in the regressions; the variables of interest (i.e., fiscal decentralisation); and a subset of regressors chosen from a pool of variables identified by past studies as potentially important explanatory variables for growth. In addition, they classify a variable as "robust", "if it remains statistically significant and of the theoretically predicted sign when the conditioning set of variables in the regression changes" (Levine and Renelt 1992, 943). Only Woller and Phillips (1998) pick up the critique of Sala-i-Martin (1997) regarding the Levine-Renelt (1992) procedure ("the test is too strong for any variable to pass it", Sala-i-Martin 1997, 179) and conduct additional robustness tests following his improvement advice, based mainly on the kind of the cumulative distribution of the estimates.

Major findings

While theory indicates a *positive impact of FD on economic growth* due to efficiency gains, the empirical verifications are only in part able to support this hypothesis. Oates (1995) detects a significant and robust positive correlation between FD and growth. The self-reliance variable is not statistically significant, but its first difference is. Lin and Liu (2000) show that China's overall growth rate depends positively on FD – mainly via efficiency improvements of resource allocation rather than via inducing more investment. Yilmaz (1999) finds for unitary countries a significant positive impact of FD on per capita growth while his results for federal countries are inconclusive. Desai et al. (2003) conclude that tax retention as a proxy for fiscal autonomy has shown a significant positive effect on industrial output recovery of the Russian regions since the break-up of the Soviet Union. The strongest effects can be observed in regions with limited opportunities for rent-seeking. Akai et al. (2004) demonstrate that FD affects economic growth of the US states positively and economic volatility negatively – thus, FD is conducive for providing a stable economic growth. Zhang and Zou (2001) detect a positive effect of the per capita FD shares on Indian regional economic growth, albeit the effect is only significant in the case of the per capita revenue share. The shares of central government budgetary spending on development as well as on social and community services show a significant positive impact on growth.

A significant and robust *negative impact* of FD on China's provincial economic growth is revealed by Zhang and Zou (1998 and 2001). Key infrastructure projects with nation-wide externalities, which are too decentralised in China, are the main reason for this result. Comparing this study with Lin and Liu (2000) it becomes clear that, interestingly, FD induces diverse growth performances at the national and at the provincial level. Davoodi and Zou (1998) find for the developing countries also a negative effect of FD on growth, albeit not significant, and for the developed countries no clear relationship. When the whole sample is used, this negative effect of FD on growth seems to be more significant. Excessive spending of sub-national governments on wrong expenditure items is stated as a reason. Woller and Phillips (1998) concur with Davoodi and Zou (1998) in finding no significant and robust relationship in LDCs. At best, they are able to detect a weak inverse relationship between the revenue share and growth. Xie et al. (1999) find for the US states also insignificant coefficients on local and state spending shares, but they argue, referring to their adopted theoretical model, that insignificant FD shares indicate consistency with growth maximisation. However, the model could even be wrong and insignificance could also indicate that FD is irrelevant to growth and should have no effect.
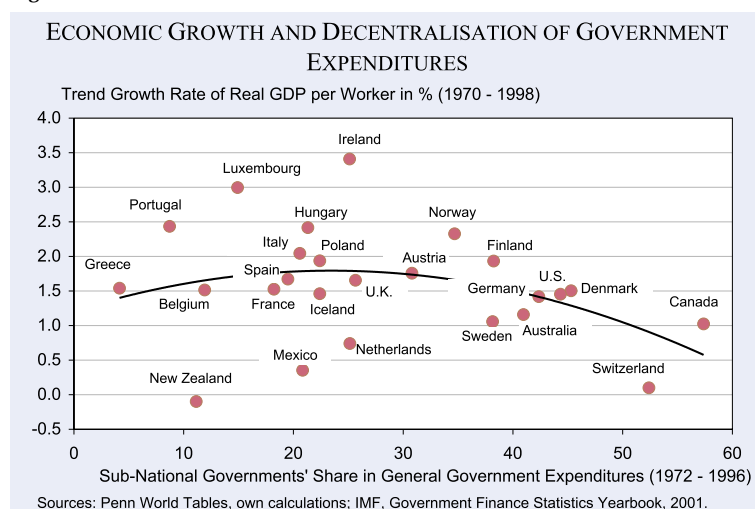
Observing the impact on growth from the opposite point of view – namely from the *centralisation perspective* – the results are still mixed. On the one hand, Behnisch et al. (2001) identify in Germany a statistically significant positive effect of overall centralisation on TFPG, but not for total public expenditures (insignificant, negative sign), central expenditures on education and science (weakly significant, negative sign) and central expenditures on transport and communication (insignificant, positive sign). They argue that co-ordination of policies among lower level jurisdictions is less efficient and overall central government intervention is still needed. On the other hand, Schneider and Wagner (2000) find that centralised wage bargaining shows a significant negative impact on long-run economic growth in the European Union, mainly because of transaction and free-rider costs.

Thießen (2000 and 2003) chooses a somewhat alternative approach. He tests the hypothesis of a *hump-shaped relationship* between FD and economic growth. In the case of too much decentralisation, inter-jurisdictional externalities cannot be internalised and economies of scale are not realised; negative growth effects are the consequence. The same holds for a low level of decentralisation: unconsidered preferences lead to inefficiencies in the provision of public goods, what inhibits, in turn, economic growth (see Breuss and Eller 2004). This theoretical trade-off construction indicates that the optimal degree of FD lies somewhere in between an extremely high and an extremely low one. Thießen (2000) finds that the hump-shaped relationship is particularly pronounced in the countries with highest per capita income[4] while there is evidence that low per capita income countries grow linearly with higher decentralisation degrees.[5] Figure 2 relates the degree of

[4] Australia, Belgium, Denmark, Finland, France, Germany, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United States
[5] Greece, Ireland, Portugal, Spain; Argentina, Brazil, Republic of Korea, South Africa.

Figure 2

ECONOMIC GROWTH AND DECENTRALISATION OF GOVERNMENT EXPENDITURES

Trend Growth Rate of Real GDP per Worker in % (1970 - 1998)

Sub-National Governments' Share in General Government Expenditures (1972 - 1996)

Sources: Penn World Tables, own calculations; IMF, Government Finance Statistics Yearbook, 2001.

expenditure decentralisation to the economic growth rate of 25 OECD countries. With the exception of a few outliers (Ireland, Luxembourg, New Zealand, and Mexico), the hump-shaped relationship is convincingly confirmed by descriptive data.

In addition, Thießen (2003) tests the *convergence of the FD shares towards a medium degree* implementing three dummy variables, which represent a low, medium and high degree of FD. Within the sample of 21 OECD countries the low and high degree are significant at the ten percent level, while the medium degree is significant at the five-percent level. The medium degree is associated with higher long-run per-worker growth than either a low or high degree. In this way, the observed trend of convergence among high-income OECD countries towards a medium degree of FD tends to promote economic growth (see Thießen 2003). Akai et al. (2004) classify their data set for FD variables also into high, medium and low degrees of FD in order to test the robustness of their estimations. All coefficients of the classified expenditure shares are highly significant at the one-percent level and show positive signs. Thus, FD is conducive to growth regardless of the current degree of decentralisation. Interestingly, the group with a low degree of FD shows the highest coefficient, indicating that US states with a low degree of FD tend to grow stronger.

Critical appraisal and future research necessities

Despite the intense theoretical and political debate of the pros and cons of FD, systematic evidence of the impact of FD on economic growth is still scarce. Ambivalent effects are at work; clear recommendations regarding the optimal degree of decentralisation are difficult to draw. This survey showed that there is no unambiguous, automatic, relationship between decentralisation and growth. Martinez-Vazquez and McNab (2001) reviewed six empirical studies estimating the direct impact of FD on growth. Our survey is enriched by eight additional studies. Despite meaningful variations and differentiation within the budget data dimension (e.g., diversification by governmental function and level, consideration of size variables and constitutional structure, or examination of the hump-shaped and convergence hypothesis), several deficiencies of the respective estimations stated in Martinez-Vazquez and McNab (2001) have been removed only marginally.

(a) There is still a *problem of possible misspecification* of the empirical estimation models. Since most authors apply the Levine-Renelt (1992) procedure and exclude some of the necessary control variables, an omitted variable bias may be the consequence. As Sala-i-Martin (1997, 180) emphasises, "missing important variables is more of a problem than introducing irrelevant variables".

(b) The *measurement of FD is still problematic* because of the omnipresent budget data approach, which is only in part able to account for the various dimensions of FD. The World Bank evaluates the application of the GFS on decentralisation issues and highlights various shortcomings, ranging from the lack of details on expenditure autonomy and own-source revenue to deficiencies regarding reported data for the sub-national levels and information scarcity for analysing dispersion among sub-national regions (see http://www1.worldbank.org/ publicsector/ decentralization). In order to cope with multi-level governments and with the multidimensionality of FD, the exploration of new approaches plays a crucial role (see also Ebel and Yilmaz 2002, 17). It is time for a new generation of decentralisation variables. It is nec-

essary to examine reliable and comparable indicators for federal autonomies. In this connection the attempts of the OECD ("Survey on Fiscal Design Across Levels of Government", with data for sub-national fiscal autonomy in Central and Eastern Europe), the World Bank ("Fiscal Decentralization Indicators Project"), or Treisman (2000; distinguishes five types of decentralisation: structural, decision, resource, electoral, and institutional decentralisation) have to be strongly supported.

(c) The different channels of interference and *potential bi-directional causalities* between FD and economic growth have not been sufficiently considered within theoretical models or empirical specifications, respectively. If decentralisation is seen as a superior good (due to possible quality gains in the supply of public goods) and shows therefore a higher income elasticity, then a higher income per capita can form the basis for additional expenditures used for the constitution of a new decentralised level. In this case per capita income is expected to have a positive effect on FD.[6] Since several studies showed that FD depends on the level of economic development, generally measured by per capita income (for a recent study see Letelier 2003), the problem of endogeneity and spurious correlation arises when FD is put as an explanatory variable into an economic growth regression.

Therefore, future research should intensify, firstly, the efforts to formalise the primary impact of FD on allocative efficiency, redistribution and macroeconomic stability. Then the linkage between these three branches and economic growth should be constructed. In this way the indirect impact of FD on growth can be considered. Secondly, given potential bi-directional causalities it is also necessary to address the present research regarding the impact of economic growth on FD and examine the various channels of interference. Thirdly, it is important to specify precisely the determinants and dimensions of both FD and economic growth and clarify which exogenous variables determine simultaneously the two variables of interest (as, e.g., population growth). Implementing these three fundamental components into a theoretical model will provide a basis for new, more sophisticated

empirical verifications. These, in turn, are not only led by the latest estimation procedures of economic growth empiricism (in order to overcome the problem of empirical misspecification) but resort also to a new generation of decentralisation data (in order to overcome the problem of data inaccuracy). In this way more satisfactory outcomes should be expected.

References

Akai, N. and M. Sakata (2002), "Fiscal Decentralization Contributes to Economic Growth: Evidence from State-level Cross-section Data for the United States", *Journal of Urban Economics* 2, 93–108.

Akai, N., Y. Nishimura and M. Sakata (2004), "Fiscal Decentralization, Economic Growth and Economic Volatility – Theory and Evidence from State-level Cross-section Data for the United States", *Discussion Paper Series* no. 03-F-2, The Centre for International Trade Studies, Faculty of Economics, Yokohama National University.

Armingeon, K., M. Beyeler and S. Menegale (2002), "Comparative Political Data Set 1960-2001", Institute of Political Science, University of Bern.

Barro, R. (1990), "Government Spending in a Simple Model of Endogenous Growth", *Journal of Political Economy* 98, 108–25.

Behnisch, A., T. Buettner and D. Stegarescu (2001), "Public Sector Centralization and Productivity Growth: A long-term View on the German Experience", Conference paper, 57th Congress of the International Institute of Public Finance (IIPF), A-Linz, August 27–30, 2001.

Breuss, F. and M. Eller (2004), "The Optimal Decentralisation of Government Activity: Normative Recommendations for the European Constitution", *Constitutional Political Economy* 15(1), 27–76.

Desai, R.M., L.M. Freinkman and I. Goldberg (2003), "Fiscal Federalism and Regional Growth, Evidence from the Russian Federation in the 1990s", *World Bank Policy Research Working Paper* no. 3138.

Davoodi, H. and H. Zou (1998), "Fiscal Decentralization and Economic Growth – A Cross-Country Study", *Journal of Urban Economics* 43, 244–57.

Ebel, R. and S. Yilmaz (2002), "Concept of Fiscal Decentralization and Worldwide Overview", The World Bank Institute, Washington, D.C.

Letelier, L. (2003), "Explaining Fiscal Decentralisation", Institute of Public Affairs, University of Chile, http://www.cien-politica.uchile.cl/lletelier/paper.pdf (accessed 27 August 2003).

Levine, R. and D. Renelt (1992), "A Sensitivity Analysis of Cross-Country Growth Regressions", *American Economic Review* 82(4), 942–63.

Lijphart, A. (1999), *Patterns of Democracy. Government Forms and Performance of Thirty-Six Countries*, Yale University Press, New Haven.

Lin, J.Y. and Z. Liu (2000), "Fiscal Decentralization and Economic Growth in China", *Economic Development and Cultural Change* 49(1), 1–23.

Mankiw, N.-G., D. Romer and D.-N. Weil (1992), "A Contribution to the Empirics of Economic Growth", *Quarterly Journal of Economics* 107(2), 407–37.

Martinez-Vazquez, J. and R.M. McNab (2001), "Fiscal Decentralization and Economic Growth" *Working Paper* no. 01–01, International Studies Program, Andrew Young School of Public Studies, Georgia State University.

Musgrave, R.-A. (1959), *The Theory of Public Finance*, McGraw Hill, New York.

Nishimura, Y. (2001), "Human Fallibility, Complementarity and Optimal Degree of Fiscal Decentralization for Economic Growth and Stabilization", Conference paper, 57th Congress of the

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[6] This hypothesis could particularly hold in high per capita income countries, such as Austria, Switzerland, or the United States, that are able to afford the costs for the implementation of decentralisation.

International Institute of Public Finance (IIPF), Linz, August 27-30, 2001.

Oates, W.-E. (1972), *Fiscal Federalism*, Harcourt, Brace, Jovanovich, New York.

Oates, W.-E. (1995), "Comment on 'Conflicts and Dilemmas of Decentralization' by Rudolf Hommes", in M. Bruno and B. Pleskovic, eds., *Annual World Bank Conference on Development Economics*, 351–53.

Sala-i-Martin, X. (1997), "I Just Ran Two Million Regressions", *American Economic Review* 87(2), 178–83.

Schneider, F. und A. Wagner (2000), "Korporatismus im europäischen Vergleich: Förderung makroökonomischer Rahmenbedingungen?", *Arbeitspapier* 0015, Universität Linz, Volkswirtschaftliche Abteilung.

Thießen, U. (2000), "Fiscal Federalism in Western European and Selected other Countries: Centralization or Decentralization? What is Better for Economic Growth?", Deutsches Institut für Wirtschaftsforschung (DIW), Discussion Paper no. 224.

Thießen, U. (2003), "Fiscal Decentralization and Economic Growth in High Income OECD Countries", Conference paper, 18th Annual Congress of the European Economic Association (EEA), SE-Stockholm, August 20–24, 2003.

Tiebout, C.M. (1998 [1956]), "A Pure Theory of Local Expenditures", in W.E. Oates, ed., *The Economics of Fiscal Federalism and Local Finance*, Cheltenham and Northampton.

Treisman, D. (2000), "Decentralization and the Quality of Government", University of California, Department of Political Science, Preliminary draft, November 2000.

Woller, G.-M. and K. Phillips (1998), "Fiscal Decentralization and LDC Economic Growth: An Empirical Investigation", *Journal of Development Studies* 34(4), 139–48.

Xie, D., H. Zou and H. Davoodi (1999), "Fiscal Decentralization and Economic Growth in the United States", *Journal of Urban Economics* 45, 228–39.

Yilmaz, S. (1999), "The Impact of Fiscal Decentralization on Macroeconomic Performance", National Tax Association, Proceedings of the 92nd *Annual Conference on Taxation*, US-Atlanta, October 24–26, 1999, 251–260.

Zhang, T. and H. Zou (1998), "Fiscal Decentralization, Public Spending, and Economic Growth in China", *Journal of Public Economics* 67, 221–40.

Zhang, T. and H. Zou (2001), "The Growth Impact of Intersectoral and Intergovernmental Allocation of Public Expenditure: With applications to China and India", *China Economic Review* 12(1), 58–81.