OECD Economics Department Working Papers No. 706

Taxes or Grants: What Revenue Source for Sub-Central Governments?

Hansjörg Blöchliger,

Oliver Petzold

https://dx.doi.org/10.1787/223111363085

OECD

Unclassified **ECO/WKP(2009)47**

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development **03-Jul-2009**

English - Or. English

ECONOMICS DEPARTMENT

ECO/WKP(2009)47
Unclassified

TAXES OR GRANTS: WHAT REVENUE SOURCE FOR SUB-CENTRAL GOVERNMENTS?

ECONOMICS DEPARTMENT WORKING PAPERS No. 706

by
Hansjörg Blöchliger and Oliver Petzold

JT03267642

English - Or. English

ABSTRACT/RESUMÉ

Taxes or grants: what revenue source for sub-central governments?

This paper analyses trends in and driving forces of the revenue composition of sub-central governments (SCG). Between 1995 and 2005 the share of SCG in total government spending increased from 31 to 33%, while the SCG tax share remained stable at around 17%, increasing SCG's dependence on intergovernmental grants. While equal access to public services is the most common justification for such grants, the grant systems of most countries are much larger than required by equalization. Moreover, rather than smoothing out SCG revenue fluctuations over the cycle, grants often tend to exacerbate them. Finally, there is some evidence that grants reduce SCG tax raising effort, inflate SCG spending and increase SCG deficits and debt. The economic crisis will both sharply reduce SCG's own tax revenues and – via budget constraints at the central level – increase pressure on the grant system. The crisis could hence help rethink the SCG revenue mix, their tax structure and the size and design of intergovernmental transfers.

JEL classification: H42, H50, H77
Keywords: Fiscal federalism; local taxation; intergovernmental grants

++++++++++++++++

Impôts ou transferts : quels revenus pour les administrations infra-nationales ?

Ce papier analyse les tendances et les déterminants de la composition des revenus des administrations infra-nationales (AI). Entre 1995 et 2005, la part des dépenses des AI dans les dépenses publiques totales a augmenté de 31 à 33%, alors que leur participation aux recettes fiscales restait stable autour de 17%, accentuant de ce fait la dépendance des AI envers les transferts intergouvernementaux. Bien que l'égalité d'accès aux services publics soit la raison la plus souvent invoquée pour justifier ces transferts, les systèmes de transferts sont en réalité souvent bien plus importants que ceux qu'impliquerait la simple péréquation. Par ailleurs, les transferts ont tendance à amplifier plutôt qu'à réduire les fluctuations de revenus au cours du cycle. Finalement, il semblerait que les transferts réduisent l'effort fiscal des AI tout en augmentant leurs dépenses et donc leurs déficits et leur dette. La crise économique en cours à la fois va réduire fortement les impôts propres des AI et – suite aux contraintes budgétaires au niveau central – augmenter la pression sur le système des transferts. La crise pourrait donc inciter à repenser la composition des revenues des AI, la structure de leurs impôts et la taille et le design des transferts intergouvernementaux.

Classification JEL : H42, H50, H77
Mots clés : fédéralisme fiscal ; impôts locaux ; transferts intergouvernementaux

TABLE OF CONTENTS

Tables

Figures

Boxes

TAXES OR GRANTS: WHAT REVENUE SOURCE FOR SUB-CENTRAL GOVERNMENTS?

By Hansjörg Blöchliger and Oliver Petzold[1]

1. Introduction and summary of the main findings

1. Sub-central governments (SCG) have two main revenue sources, the first being own taxes and the second being grants from other government levels. Both revenue sources are primarily aimed at financing sub-central public expenditure. Yet own tax and grant revenues differ in the way they are generated, allocated and distributed to SCGs, thereby shaping decisions of all government levels about where, when and on what to spend money. The sub-central revenue composition or *revenue mix* is hence likely to affect fiscal outcomes such as public sector efficiency, equity in access to public services or the long-term sustainability of public finances at both the central and the sub-central level. Countries reforming the sub-central revenue mix in order to increase public finance efficiency – *e.g.* by strengthening tax autonomy – would also like to know the trade-offs, such as the implications for fiscal disparities across jurisdictions or the stability of sub-central revenue over time. The balance between taxes and grants has become a major issue in intergovernmental fiscal relations, and so have policy initiatives to improve efficiency of SCG revenues without jeopardising equity or stability objectives.

2. This paper presents issues and trade-offs for both central and sub-central governments regarding the balance between own taxes and grants, and is organised as follows: The first section presents the level and evolution of SCG revenue composition across countries, identifying the main forces affecting revenue composition. The second section presents key policy issues, *i.e.* the efficiency, equity and stability issues associated with SCG revenue composition. The third section presents some trade-offs for countries wishing to reform the SCG revenue composition. The paper relies on a new database with detailed and comparable information on the level and evolution of sub-central revenue in 28 OECD member countries. Data were obtained through a questionnaire sent to Member countries in spring 2008, OECD National Accounts and OECD Revenue Statistics, and national sources for certain countries. Additional information was provided by a workshop held in Vienna in May 2008. The paper does not focus on sub-central revenues from user fees, mainly due to the lack of reliable data.

---

1. OECD Economics Department, 2 rue André Pascal, 75775 Paris Cedex 16, France. The authors are, respectively, Senior Economist at the OECD Economics Department and Statistician at the German Ministry of Finance on secondment at the time of writing this paper. We would like to thank Claire Charbit, Lee Mizell, Jørgen Elmeskov, Christopher Heady, Peter Höller, Robert Price and Jean-Luc Schneider as well as Delegates from the Network on Fiscal Relations Across Levels of Government for their comments and suggestions. Special thanks are due to Susan Gascard for excellent technical assistance.

3. The main findings can be summarised as follows*:*

- *Spending has become more decentralised but taxation less so*. In the decade 1995 to 2005 the share of SCG to total government spending increased from 31 to 33%. This increase was essentially covered by more intergovernmental grants, while the SCG tax share remained almost stable. The vertical fiscal gap has increased; hence decentralisation has become more asymmetric. Today on average half of sub-central expenditure is covered by own taxes and half by grants.

- *A higher SCG tax share could increase efficiency and accountability*. A higher share of taxes in total sub-central revenues could promote efficiency and democratic accountability of public spending, particularly in countries where this share is low. While property taxes would be the most appropriate sub-central tax, they are strongly resisted on political grounds. Income taxes, probably of the piggy-backing type, could assume a greater part of SCG revenue. Sub-central corporate taxes are less appropriate, because they are prone to tax erosion and highly cyclical.

- *Grants are needed on equity grounds.* There is some evidence that increasing the SCG tax share deepens fiscal disparities, thereby jeopardising equal access to public services across jurisdictions. If the SCG tax share is to be increased, more intergovernmental grants will have to be dedicated to equalisation in order to keep disparities at bay. The rise of equalising grants would be more than offset by a decline in non-equalising grants, and the overall size of the grant system would fall.

- *Grants tend to destabilise SCG revenue*. Grants could have a stabilising role for SCG revenue, but actually often exacerbate rather than attenuate SCG revenue fluctuations. The destabilising effect tends to be stronger in countries with a small tax base and large grant systems. A grant system more closely based on actual sub-central needs could reduce SCG revenue volatility and improve the stabilisation properties of grants.

- *Fiscal externalities do not provide a rationale for the current transfer system.* Intergovernmental grants could be justified by fiscal externalities and they can promote and subsidize SCG public services that would otherwise be undersupplied. There is some empirical evidence for fiscal externalities, but their scope is limited and cannot justify the current level of grants, particularly matching grants.

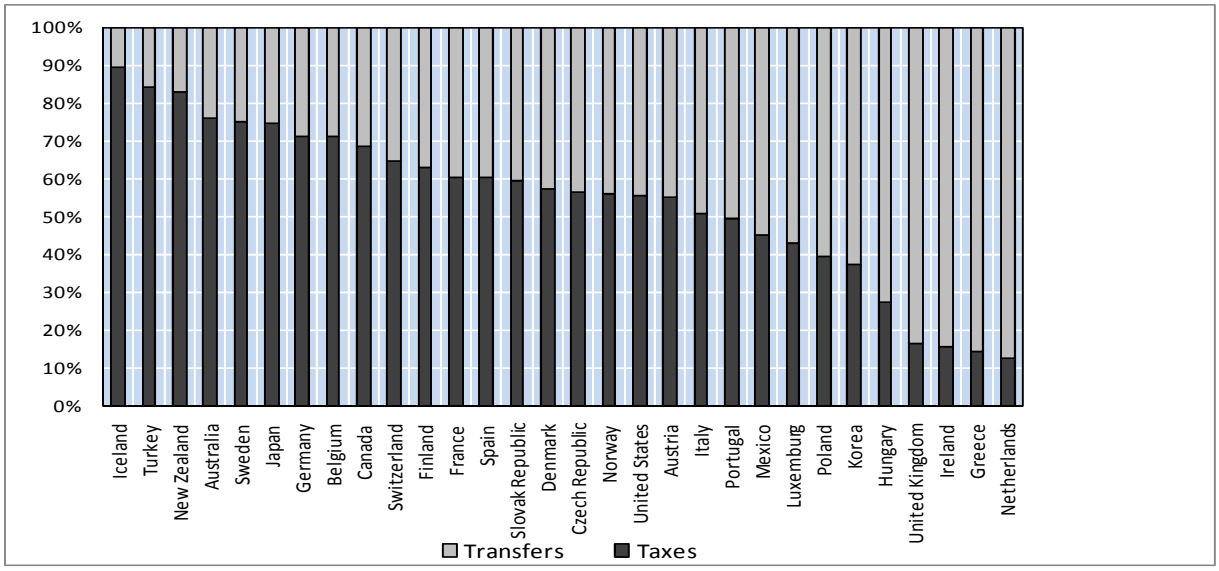
- *Grants can have undesirable side effects.* Grants are a common pool resource for the individual SCG, generating strain on fiscal policy. There is some evidence that grants may reduce SCG tax raising efforts, inflate SCG spending and increase deficits and debts at both government levels. Grants also weaken accountability, *i.e.* the link between those who benefit from sub-central public services and those who pay for them.

2. Trends and driving forces

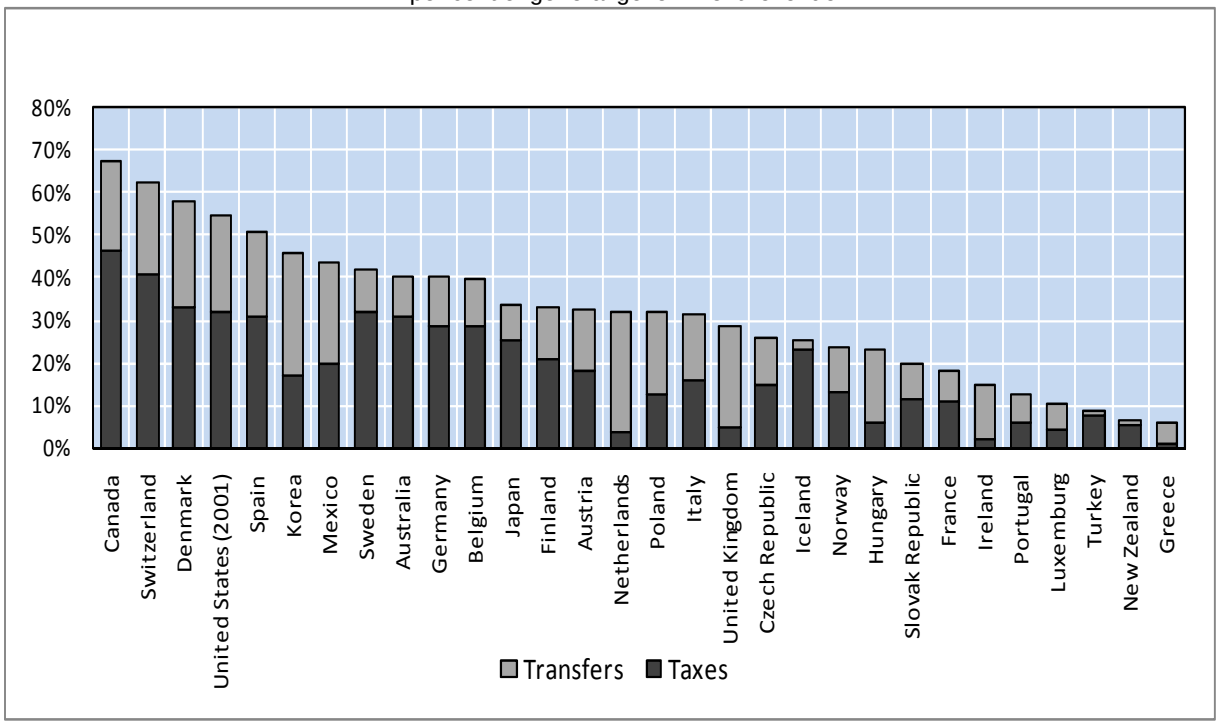
4. The revenue composition of sub-central governments (SCG) varies widely across OECD countries but has changed little over time. While around half of SCG revenue is covered by own taxes and half by intergovernmental grants on average, for individual countries the tax to total SCG revenue share varies between 90% for Iceland and 13% for the Netherlands (Figure 1a). Federal countries allocate a slightly higher tax share to SCGs than unitary countries. In terms of general government revenue, Canada has the highest sub-central share and Greece the lowest (Figure 1b). Countries whose SCG tax base consists mainly of property taxes – not shown in Figures 1a and b – have a lower own tax to total SCG revenue share, pointing to a limited potential of property taxes to generate sufficient revenue. On average,

the tax to total SCG revenue share remained roughly stable between 1995 and 2005 and changed significantly in only a few countries: up in Spain, Australia, Italy and down in Mexico, Poland, and the Slovak Republic. Apparently, the revenue composition of sub-central governments seems to be very country specific, quite stable and determined by history and institutions rather than policy choice.

Figure 1. **Revenue composition of sub-central government, 2005**
In per cent of total SCG revenue

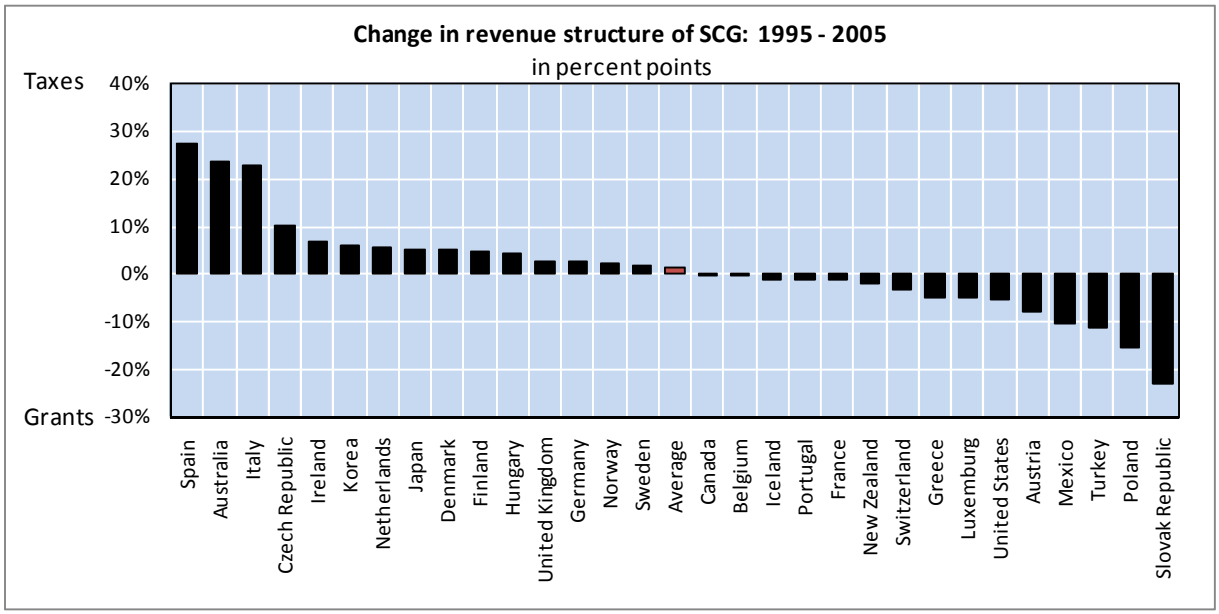


In per cent of general government revenue



Source: OECD National Accounts, OECD Revenue Statistics, IMF Government Financial Statistics, national sources, fiscal network database.

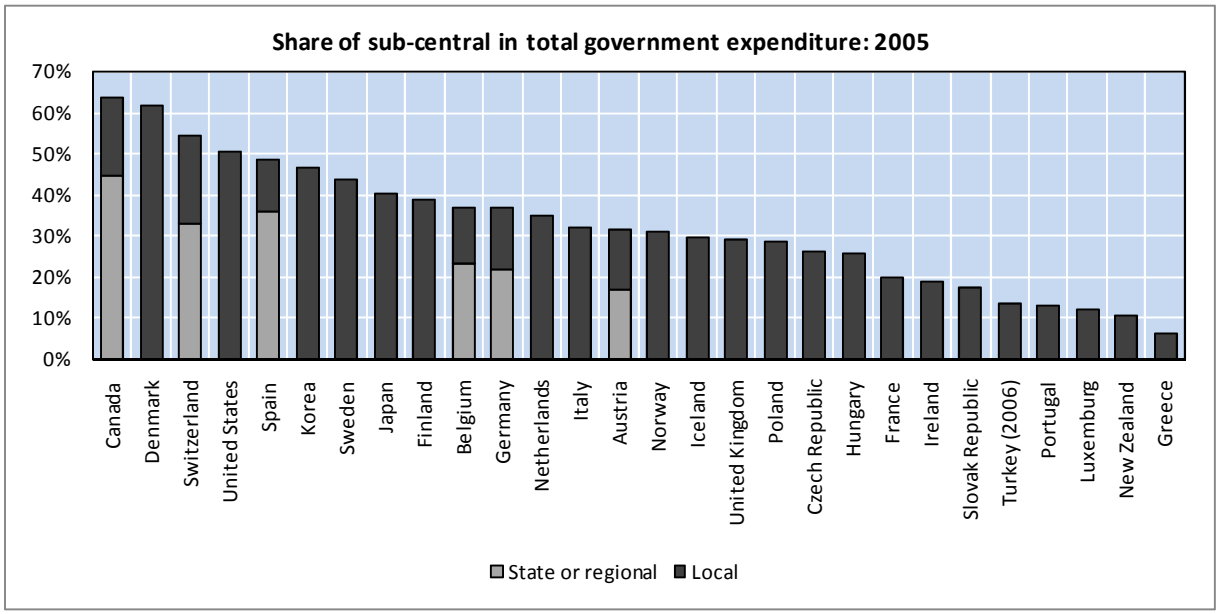
Figure 2. **Revenue composition of sub-central government, 1995-2005**



Note: a positive value means a tax share increase, a negative value means a grants share increase.
Source: See Figure 1.

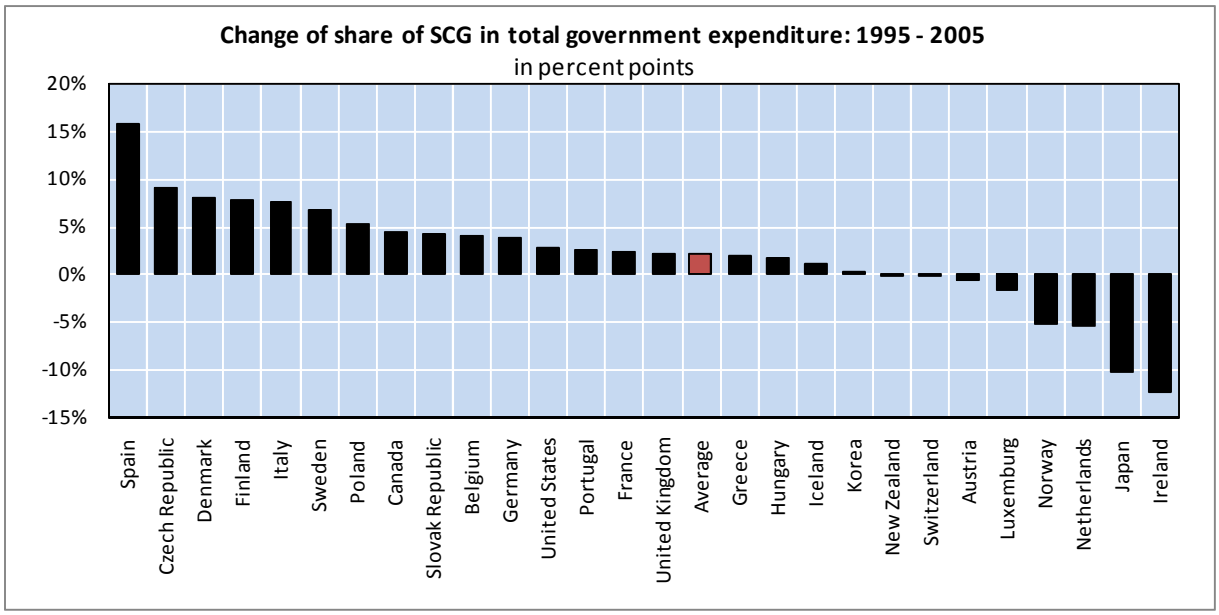
5. A closer look at this seemingly stable scenario reveals some countervailing forces, particularly on the spending side (Figures 3 and 4). While the ratio of SCG to total expenditure again varies strongly across OECD countries (61% for Canada, 5% for Greece), between 1995 and 2005 it increased from less than 31 to more than 33%. The increase is significant in a statistical sense. Only in Ireland, Japan, the Netherlands and Norway did the sub-central spending share not increase. In most countries SCG spending growth was regular and steady with some showing sharp increases close to or above 10 percentage points – such as in the Czech Republic, Finland, Poland, the Slovak Republic, or Spain. Federal countries have a higher expenditure ratio than unitary countries, with more spending power given to the state/regional level than to the local level; moreover, the increase of the ratio from 1995 to 2005 was also stronger in these countries. Seen from a spending perspective, the majority of OECD countries has decentralised in the last decade.

Figure 3. **SCG expenditure ratios, 2005**



Source: See Figure 1.

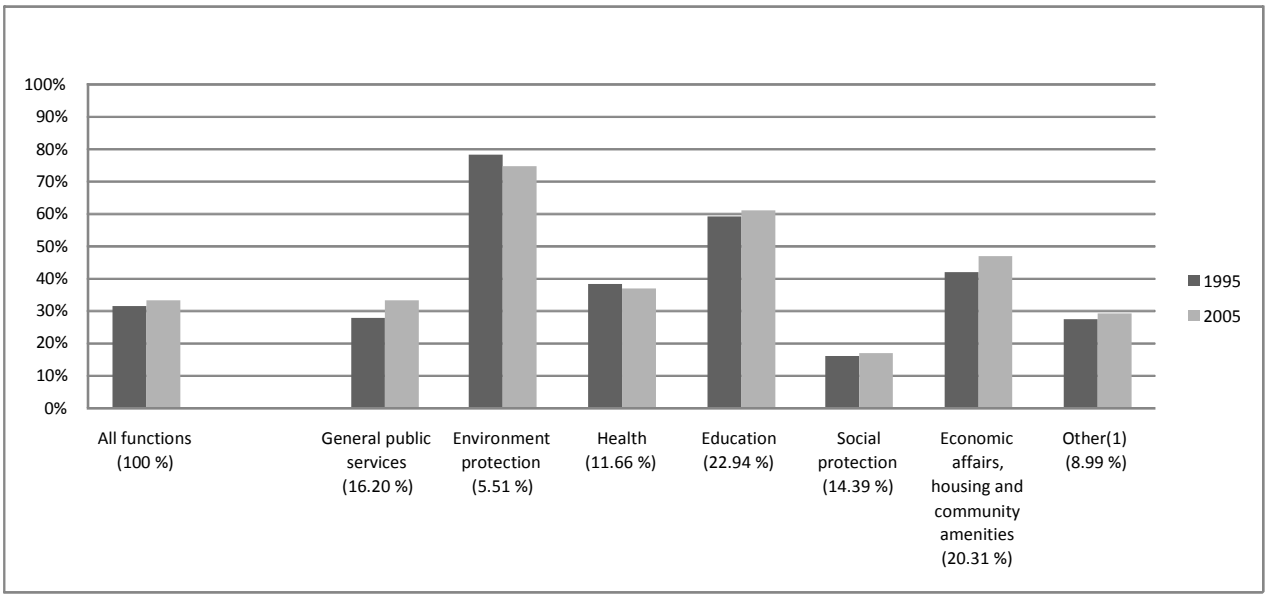
Figure 4. **SCG expenditure ratios, 1995-2005**



6. SCG spending shares and their evolution vary across policy areas and government functions (Figures 5 and 6). In areas where both total public spending *and* sub-central responsibility are traditionally large, the spending ratios have either risen slowly (education) or declined (health care). Social protection, which is the area with the highest increase in total government spending, is rather strongly centralised, and spending growth has hence had little impact at the sub-central level in most countries. The most significant SCG spending increases occurred in general public services and economic affairs, the latter comprising infrastructure and neighbourhood services where service responsibility has often been devolved to lower

government levels during the last decade. SCGs have so far escaped the fiscal pressure of demographic change, either because this pressure affects sectors for which the central government is responsible or because policy measures such as intergovernmental transfers have come to the rescue of SCGs. That said, spending pressure at the sub-central level varies considerably with a country's institutional set up.[2]

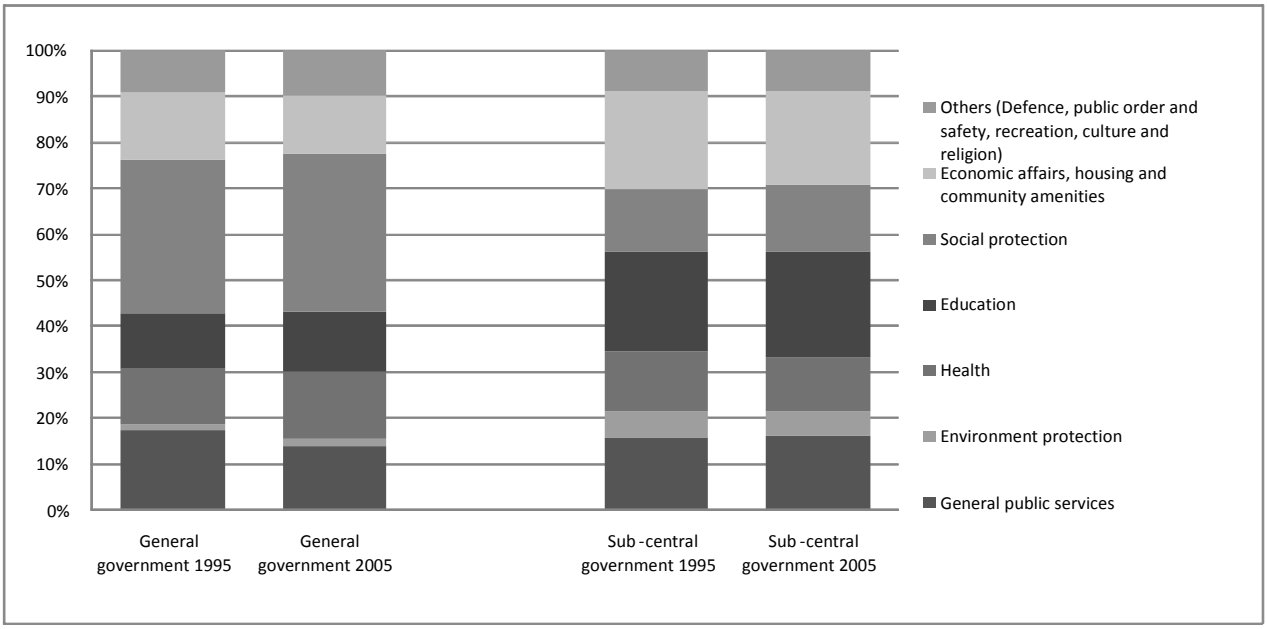
Figure 5. **Share of sub-central to total government expenditure, by main policy area**



Note: percentages in brackets indicate the share of this function in total government expenditure in 2005. See Figure 6.

2. Pressure on future sub-central spending is country specific, as it depends both on where expenditure responsibility is allocated and on the growth of that expenditure category. A German study on demographic change and multilevel public finance concludes that spending pressure will be felt more at the central than at the sub-central level, mainly because spending for social security– which is usually centralised – tend to grow above average, while primary and secondary education – which in most countries is a sub-central responsibility – will grow less (Seitz, 2008). A Canadian study sees little change in relative spending needs across levels of government (Slack and Kitchen, 2006), while an earlier study sees pressure on SCGs due to health care spending (Conference Board of Canada, 2002). An Austrian study claims that sub-central needs will be higher since responsibilities such as education, childcare, elderly care and transport infrastructure are growing faster than general government expenditures (Aiginger *et al*., 2006).

Figure 6. **Share of government expenditure by main functions, for general and sub-central government**



Source: see Figure 1.

7. Sub-central taxes cover only a part of sub-central spending and the share has been declining during the last decade. It varies between 46% (Canada) and 1% (Greece), with an average tax share of 17%. Federal countries grant a significantly higher SCG tax share than unitary countries (28 *versus* 13%). Between 1995 and 2005 the tax share rose slightly from 16 to 17% of total tax revenue, but this increase is mainly due to a few countries involved in secular decentralisation such as Hungary, Italy and Spain.[3] In all other countries, the sub-central tax share remained roughly stable or even decreased. Sub-central taxation appears to be a very stable feature of fiscal policy in general and in fiscal federalism in particular, with the taxing power of each government level often anchored in constitutional provisions or fundamental laws on sub-central autonomy. While stable fiscal frameworks make tax revenue more predictable, the widening gap between sub-central spending and sub-central tax revenue requires finding additional SCG resources.

3. Australia also shows a strong increase around the year 2000, but these numbers reflect a change in accounting following the introduction of the GST (Australian VAT) rather than a true expansion of SCG taxing power.

Figure 7. **Tax revenue ratios, 2005**

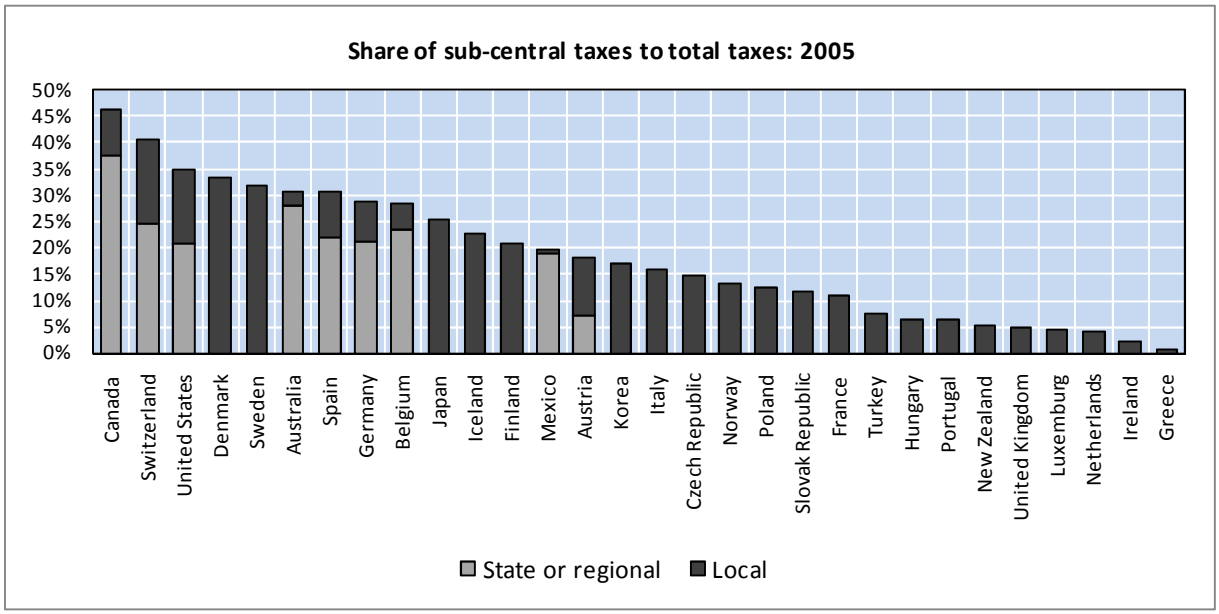
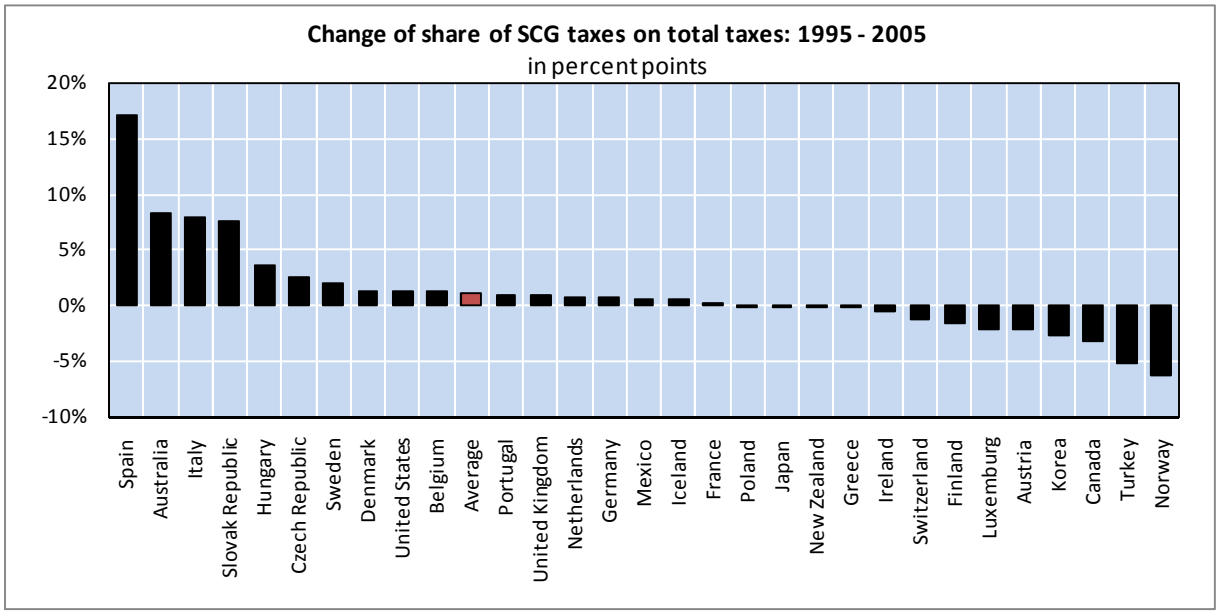


Figure 8. **Tax revenue ratios, 1995-2005**

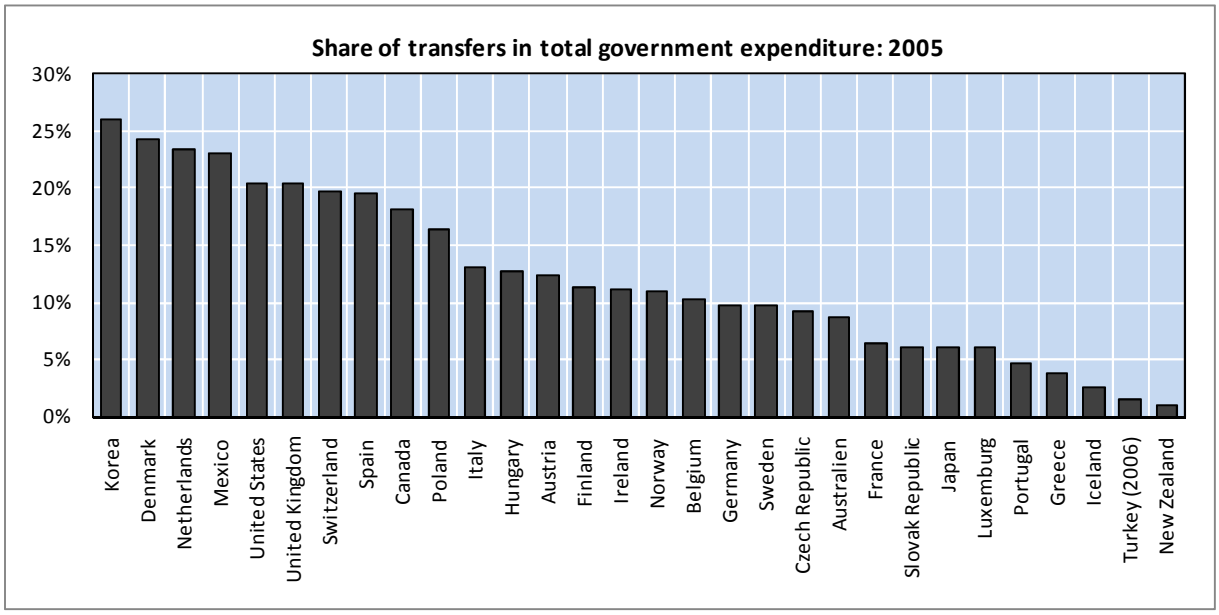


Source: See Figure 1.

8. The widening vertical fiscal imbalance is mostly covered by intergovernmental transfers. The share of sub-central transfers in total government expenditure varies between 26% (Korea) and 1% (New Zealand), with an average of around 14%. Federal countries have a higher transfer-to-government expenditure ratio than unitary countries, partly because there are more government levels disbursing grants. Between 1995 and 2005 the average ratio of transfers to total government expenditure rose slightly, having

grown steadily and regularly in around two-thirds of the OECD member countries.[4] Year-on-year increases in the transfer share are much more frequent than falls. The fact that incremental increases are considerably smaller than declines suggests that transfer growth is often systemic, while transfer reductions are likely to be policy-driven. The relationship between changes in transfers and changes in SCG spending is stronger than that between SCG taxes and SCG expenditure, suggesting that the transfer system reacts more swiftly to changing SCG spending needs than to own taxes. Grants also fluctuate considerably more than SCG taxes.[5] Grants have largely covered the growing fiscal gap of the 1995 to 2005 decade, acting as a main policy lever in the decentralisation process and determining the balance between the two SCG fiscal resources.

Figure 9. **Transfers to total government expenditure, 2005**

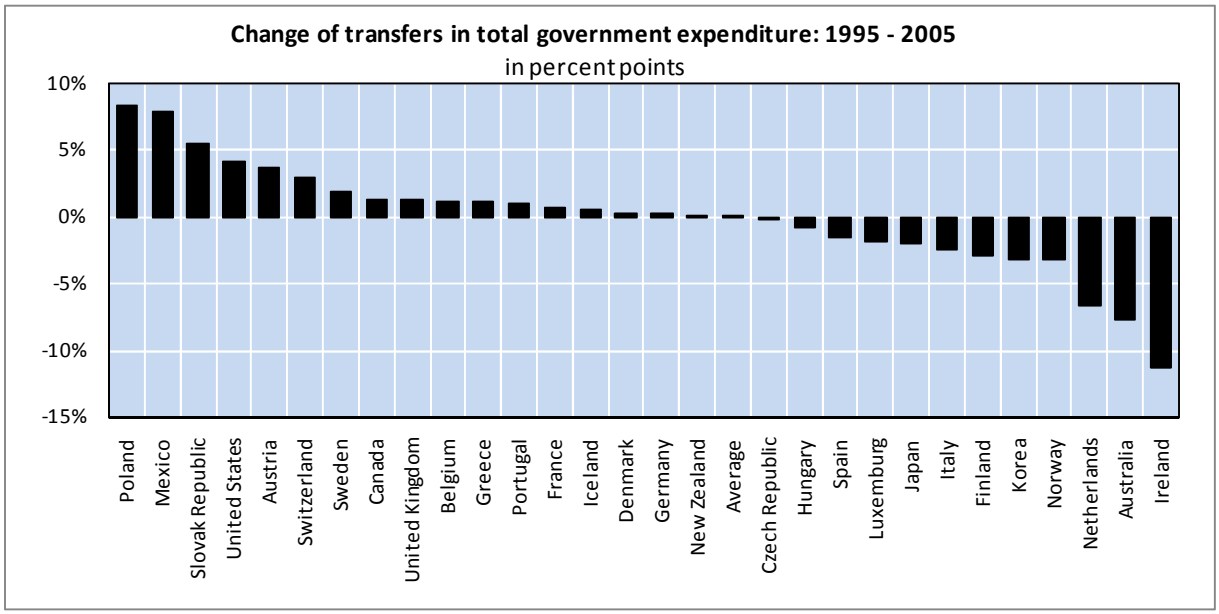


Source: See Figure 1.

4. The apparently strong reduction in Australia's and Ireland's transfer systems is mostly due to a change in accounting practices. Excluding the two countries would push the average increase up to around 1%.

5. A study on US municipalities tends to confirm that fluctuations in municipal revenue are essentially due to fluctuations in grant revenue (Büttner and Wildasin, 2006).

Figure 10. **Transfers to total government expenditure, 1995-2005**



Source: See Figure 1.

9. In sum, there is a clear tendency towards expenditure decentralisation in OECD countries. The higher spending can be traced back to rising needs in SCG neighbourhood services, infrastructure and, to a lesser extent, education. The increase in the SCG spending share was financed equally by an increase in SCG taxation and an increase in intergovernmental grants, with both SCG taxes and grants continuing to cover half of SCG spending in aggregate. Reliance on grants has, however, risen in a majority of countries and decentralisation is more asymmetric than a decade ago: the gap between SCG expenditure and SCG own tax revenue has widened and the share of intergovernmental grants in total government expenditure covering this gap has become larger. In most countries, transfers appear to have become the main policy instrument in the process of decentralisation. One of the critical questions therefore is how and to what extent does the current balance between taxes and grants, as well as the strong and increasing overlap of financial responsibilities across government levels affect public finance efficiency at both the central and the sub-central level.

3. The balance between taxes and grants: policy issues

10. Sub-central revenue sources can be analysed according to the three basic principles of fiscal policy, namely efficiency, equity and stability. On the efficiency side, SCG revenue sources should improve public spending efficiency, provide incentives for developing the economic and revenue base, and promote fiscal discipline. On the equity side, SCG revenues should ensure similar levels of public services at a similar tax burden throughout the country. And on the stability side, revenues should be stable over time and help SCGs to smooth economic cycles and asymmetric shocks. Taxes and grants affect those objectives differently, and the adequate SCG revenue structure is likely to look different depending on the weight given to each objective. Moreover, trade-offs between objectives may exist. This second chapter deals with the two sub-central revenue sources and how they affect the efficiency-equity-stability trinity. The first section deals with sub-central taxes and the second to fourth sections deal with intergovernmental transfers.

3.1. SCGs should have their own tax revenue, but some taxes are better suited than others

11. There is a prevalent view in fiscal federalism policy that SCG spending should essentially be covered by own tax revenue. SCG own taxes tend to make governments more responsive to citizens' tastes and preferences, thus improving resource allocation, and they tend to improve budget management as citizens become directly aware of the costs of publicly-funded activities. SCG own taxes also promote democratic accountability, since those who benefit from public services decide on taxation levels and finally pay the bill. Moreover, a high reliance on own-resource revenues provides SCGs with incentives for growth-oriented economic and fiscal policies, since they may fully reap their financial benefits. However, some taxes are better suited for the sub-central level than others, and devolving the wrong taxes to SCGs could jeopardise rather than strengthen the efficiency of the tax system. This section compares the central and the sub-central tax structures in OECD countries and discusses the taxes that would be best suited if the share of sub-central to total tax revenue was to be raised.

12. The predominant tax at the sub-central level is the income tax, followed by a set of property taxes and then consumption taxes.[6] The three tax categories make up around 95% of SCG tax revenue (Figure 11 a and b). Property taxes play a large role in fiscally centralised countries, while being replaced or supplanted by other taxes in more decentralised countries. The summary picture obscures the fact that the sub-central level usually has a less diversified tax mix than the central level: while in most English-speaking countries property taxes account for the overwhelming part of local taxes, income taxes are almost the sole sub-central tax source in *e.g.* Scandinavian countries. The tax mix has fluctuated little during the period 1995 to 2005, but a salient feature is the gradual decline of property tax revenue in around two thirds of all countries, from 34 to 31% of total SCG tax revenue. The share of indirect taxes has increased, although much of that is due to new tax sharing arrangements where SCGs have little taxing power. To summarise, SCG property taxes have slowly given way to sharing arrangements in respect of consumption taxes, while the income tax has retained its predominant role.

13. Sub-central corporate taxation has evolved in a somewhat unexpected way.[7] Given the higher mobility of capital compared to labour or other production factors and owing to tax competition, corporate tax revenue might have been expected to fall over time. Indeed, statutory corporate income tax rates fell considerably over the last 10 years in most OECD countries. However, corporate income tax *revenue* actually rose, from less than 12 to more than 15% of total tax revenue at the central level and from 7.5 to more than 8% at the sub-central level (Figure 12 a and b). Several effects that broadened the tax base – more incorporated businesses, higher profits, more saving and investment by the corporate sector, less generous tax deductions, lower depreciation rates, stricter enforcement – could have made up for the decline in tax rates at both government levels (OECD, 2007). The fact that corporate tax revenue grew less at the SCG than at the central level could be ascribed to high capital mobility across local and regional borders; hence SCGs might have been under stronger pressure to cut corporate tax rates. However, in the 8 countries with a sub-central corporate income tax, tax rates fell proportionally more at the central than at the sub-central level, with the exception of Japan and Switzerland. The current evidence gives hence little support to a "race to the bottom" for corporate taxes, but sub-central corporate taxation remains a puzzle that requires more research and explanation.

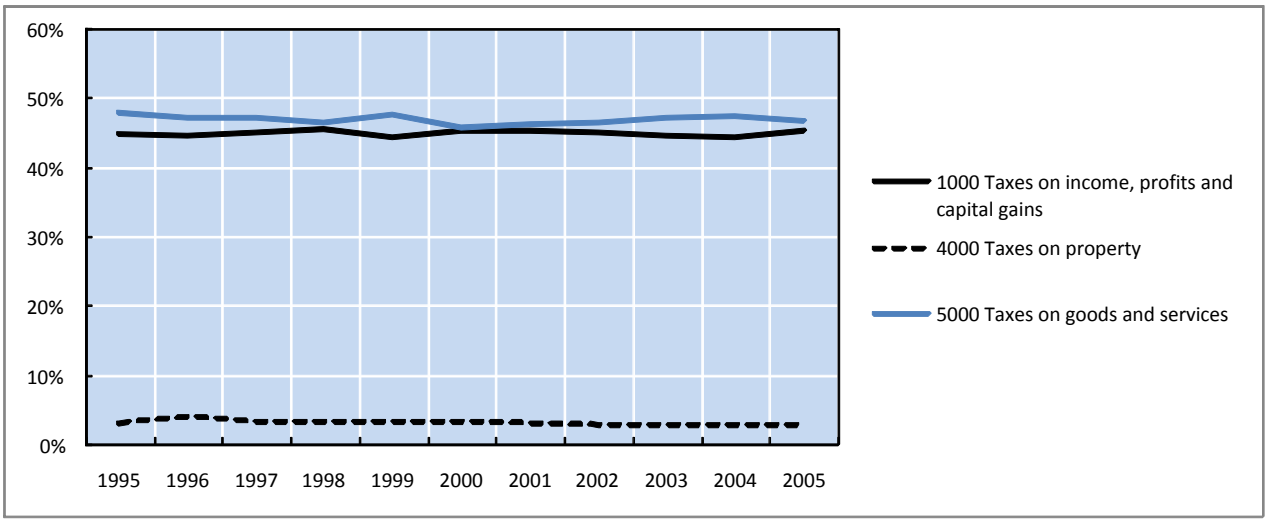
---

6. The property tax category (Revenue Statistics category 4000) comprises taxes on immovable property (category 4100), on net wealth (4200), on financial and capital transactions (4400) and inheritance and gift taxes (4300). At the sub-central level, taxes on immovable property account for around 90% of all property taxes.

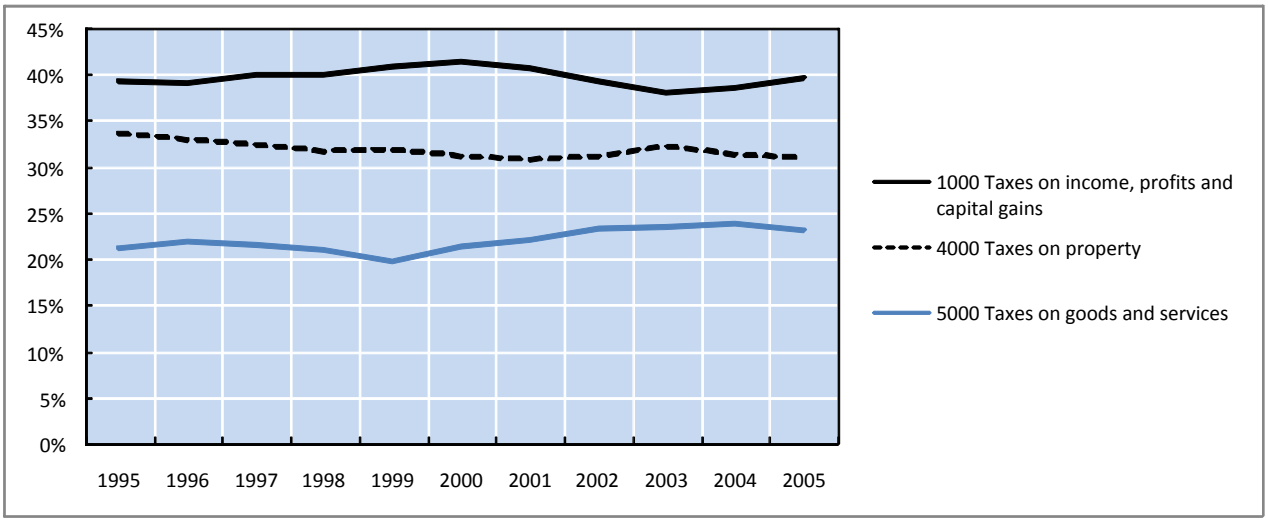
7. Corporate taxation as it is defined here comprises corporate income tax (Revenue Statistics category 1200), corporate taxes on net wealth (4220) and other taxes paid by business (6100). Around 85% of corporate tax revenue stems from corporate income tax.

Figure 11. **Tax structure, central and sub-central level, 1995-2005**

Central level



Sub-central level



Source: *OECD Revenue Statistics*.

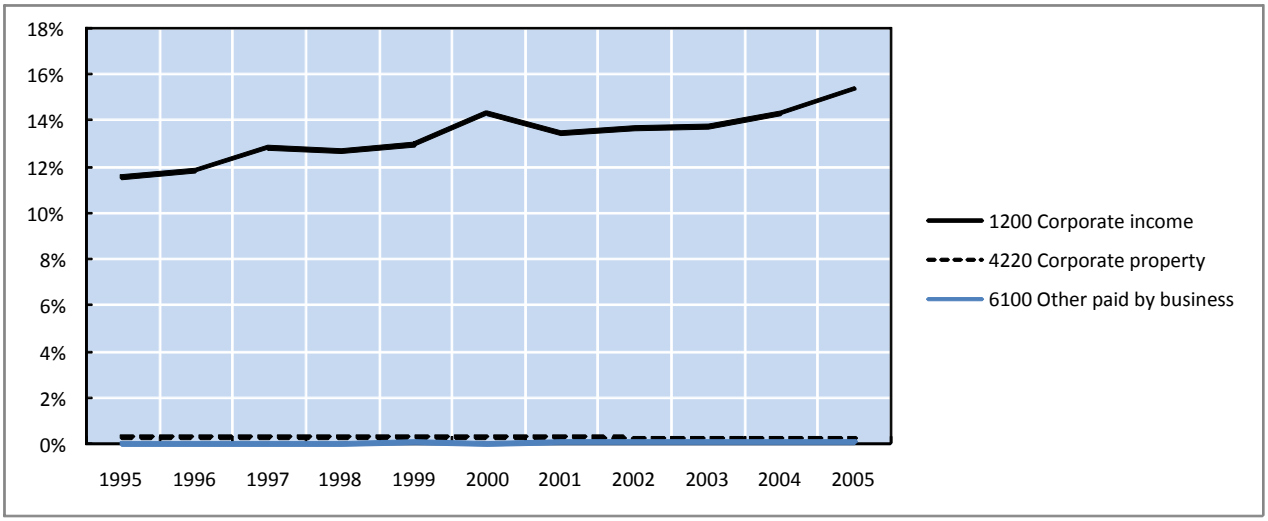
14. Given the current tax mix, the question arises: what is a "good" tax for sub-central government? The answer to this tax assignment problem will be given in three steps: first by assessing what a "good" tax is in general, second by assessing which taxes are "good" for state and local governments, and third by discussing a potential revenue-neutral increase of the sub-central tax share.

15. Whether a tax is considered "good" or "effective" depends on its objectives, such as a high and stable yield, low administrative and compliance costs, or whether it addresses equity and social concerns. In the following the perspective of economic growth is taken. Taxes and the tax mix affect the decisions of households and firms and by doing so are likely to determine the long term development path of a country. The OECD Economics Department and the Centre for Tax Policy have carried out an analysis of how the tax mix and economic growth are interrelated. Their empirical work suggests a tax and growth ranking with taxes on immovable property being the least distortive tax instrument in terms of per-capita GDP growth, followed by consumption taxes, personal income taxes and corporate income taxes (OECD, 2008, Table 11). To be simultaneously growth-enhancing and revenue neutral, the tax mix would have to shift

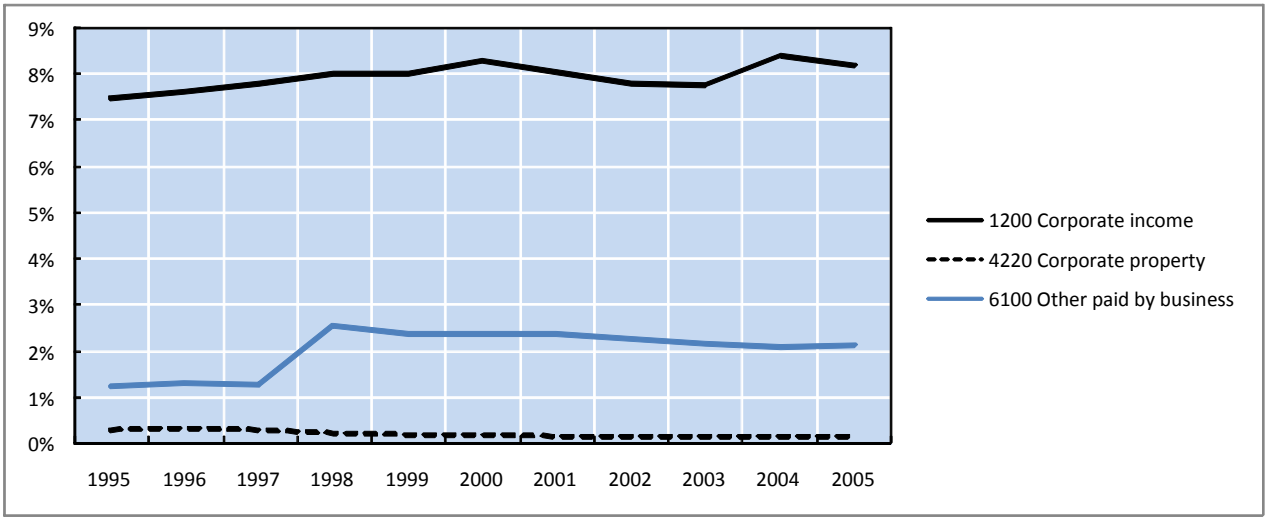
from personal and corporate income taxation towards immovable property and consumption taxation. The analysis also suggests limits to such a shift: reducing income taxation would be contested on equity grounds, and increases in the property tax – a highly "visible" tax – are likely to meet with strong political resistance.

Figure 12. **Corporate tax revenue, 1995-2005**

a) Central corporate tax revenue in per cent of total central tax revenue



b) Sub-central corporate tax revenue in per cent of total sub-central tax revenue



Source: *OECD Revenue Statistics*.

16. The conditions for a sub-central tax to be growth-enhancing are the same as for a national tax, but some additional constraints apply to make a "good" SCG tax. Although there is no equivalent to the empirically-tested ranking described above, there is quite a broad consensus on what makes an effective sub-central tax mix. As a basic principle, SCGs should rely on benefit taxation, *i.e*. taxes that provide, for households or firms, a link between taxes paid and public services received (Oates and Schwab, 1988). The criteria derived from this principle include: SCG taxes should be non-mobile and non-redistributive (to avoid tax erosion), non-cyclical (to avoid SCGs running stabilisation policy through debt and deficits), should not be exported to other jurisdictions (to avoid distortions in the tax burden), and the tax base

should be evenly distributed across jurisdictions (to avoid strong disparities and/or the need for huge fiscal equalisation systems). Based on these criteria, the property tax would occupy an even sunnier place in the sub-central than in the central tax mix, particularly for local governments (King, 2004). Sub-central personal income taxes would lose out because of their redistributive properties, and sub-central consumption taxes, especially sales taxes, would lose because they divert taxes among jurisdictions. Sub-central corporate income taxes come last: corporate tax revenue is mobile, highly cyclical, geographically concentrated and tends to shift the tax burden to non-residents.

17. The way ahead for countries wishing to increase the sub-central tax share is rocky but feasible. The property tax share in SCG tax revenue is less than 35% and declining, and property tax increases are highly contested by taxpayers. It is unlikely that property taxes could assume a substantial part of SCG tax revenue, particularly if the sub-central tax share is to rise. A revenue shift towards more consumption taxes – as suggested on the grounds of better economic performance – are likely to play a limited role for SCGs. Although there are a number of proposals for non-distortive sub-central consumption taxes such as a destination-based dual central/sub-central VAT or a mix of central VAT/sub-central sales taxes, such systems are confined to large countries with large regional jurisdictions (Bird, 1999; McLure, 2005; Marè, 2007; Martinez-Vázquez, 2008). Most countries would need to incorporate sub-central consumption taxes into tax sharing systems, leaving little tax autonomy to SCGs. On the other hand, personal income taxation – although less suitable on economic grounds – could provide a larger share of SCG tax revenues. Central government could cede a part of income taxation to SCGs, which in turn could introduce a proportional surcharge or flat rate on the reduced national income tax. Such "piggy-backing" – corresponding to the "b" category in the tax autonomy classification and practised in several countries – could satisfy both the need to increase incentives to work and the need to maintain benefit taxation at the sub-central level (OECD, 2006). With a mix of taxes on immovable property, proportional income taxes and – in selected cases – consumption taxes, a revenue-neutral increase of the sub-central tax share could go hand in hand with a more efficient overall tax system.

3.2. Grants have an equalisation role to play …

18. While a higher sub-central tax share is preferable on grounds of efficiency and accountability, it is likely to raise equity concerns. Tax raising capacity is unevenly distributed across jurisdictions and likely to entail an uneven level of the public services under sub-central responsibility. Reducing differences in tax raising capacity and public service needs across jurisdictions is therefore considered the most important role for intergovernmental grants (Boadway, 2007). This section gives a short overview on fiscal equalisation in OECD countries and the role equalising grants are likely to play if SCGs get more tax autonomy.

19. Most countries have introduced explicit or implicit equalisation systems using either vertical transfers to financially weak SCGs or horizontal transfers from financially strong to financially weak SCGs. An overview of fiscal equalisation indicators is given in Table 1. For the countries that provided data, equalisation covers around 2.3% of GDP, 4.8% of total government expenditure and around 55% of total intergovernmental grants.[8] Tax revenue equalisation and cost equalisation have roughly the same size, although tax revenue disparities are four to five times larger than disparities in the cost of providing public services (not shown in the table). On average, fiscal equalisation diminishes disparities in revenue raising capacity – as measured by the Gini coefficient or the variation coefficient – by almost two thirds, from 29% to 10% and to virtually zero in some countries. After equalisation, fiscal disparities are clearly below

8. Since some equalisation systems work *via* tax sharing not reported as intergovernmental grants, the share of equalising transfers in total transfers is likely to be lower than 55%. Moreover, many grants reported in the fiscal equalisation exercise as "equalising" consist of both an equalising and a neutral part, with the neutral part often larger than the equalising part.

economic disparities as measured by regional GDP, *i.e*. the potential to provide public services is more evenly distributed than economic wealth (OECD, 2007). Overall, fiscal equalisation and the corresponding transfers are a central policy driver in intergovernmental fiscal relations.

Table 1. **A snapshot of fiscal equalisation**
Equalising grants and their fiscal disparity-reducing effect

	Size of the equalisation system (in percent)			Effect on fiscal disparities (variation coefficient)		
	Percent of GDP	Percent of government expenditure	Percent of intergovern-mental grants	Disparities before equalisation	Disparities after equalisation	Difference
Federal/regional countries						
Australia	0.5	1.4	19	16.8	0.0	16.8
Austria	3.8	7.6	69	-	4.2	-
Canada	1.0	2.5	24	29.8	20.1	9.7
Germany	2.0	4.2	45	13.0	2.7	10.3
Italy	3.0	6.3	48	39.0	6.0	33.0
Mexico	3.7	-	78	-	-	-
Spain	3.0	7.6	67	26.5	10.1	16.4
Switzerland	3.0	8.2	80	31.8	23.2	8.7
Unitary countries						
Denmark	2.8	5.1	23	16.0	6.0	10.0
Finland	3.8	7.4	71	17.7	4.2	13.4
Greece	1.2	2.4	75	-	-	-
Japan	4.0	11.0	-	36.0	-	-
Norway	0.5	1.2	11	23.0	8.0	15.0
Portugal	1.8	4.0	81	90.0	28.0	62.0
Sweden	2.6	4.6	50	10.0	0.0	10.0
Turkey	1.1	-	82	39.0	14.0	25.0
Unweighted average	2.3	4.8	55	29.9	9.7	19.2

Source: Blöchliger and Charbit (2008).

20. A widely held view is that higher sub-central tax autonomy is associated with higher fiscal disparities and hence with more need for equalisation (*e.g*. for Germany: Seitz, 2008). In policy terms, a country wishing to increase sub-central taxing power could be interested to know whether and to what extent equalisation has to be strengthened in order to keep fiscal disparities at bay. A simple cross-section analysis suggests that countries with a higher SCG tax share tend to have larger equalisation systems (Box 1). A 10% *point* increase in the sub-central tax share is associated with an increase of the share of equalising grants in GDP by 0.6% *point* if disparities across jurisdictions are to remain stable. In relative terms: a 10% increase of the sub-central tax share is associated with a 15% increase of equalising grants to keep disparities stable. The sub-central tax mix also tends to affect the need for equalising grants: a higher share of property taxes is associated with a lower need for equalising grants, but this relationship is statistically not significant. Stronger tax autonomy, *i.e*. a higher share of taxes for which SCGs can set the base and the rate, is associated with a higher need for equalising grants, but again the effect is weak and not significant.

Box 1. **Testing the link between SCG tax autonomy and equalisation needs**

The empirical investigation of the sub-central tax share and equalizing transfers is based on the assumption that a higher sub-central tax share is associated with higher fiscal disparities. In this line of reasoning, if the SCG tax share is to rise, more equalizing grants would be needed to keep disparities constant. Since equalizing transfers not only depend on the SCG tax share but also on country-specific features such as the sub-central tax mix, sub-central tax autonomy or preferences for disparity reduction, some control variables have to be introduced. To keep the equation simple and also to take the low number of degrees of freedom into account, an empirical model of the type

$$transfer_i = \beta_0 + \beta_1 \cdot taxshare_i + \beta_2 \cdot taxstructure_i + \beta_3 \cdot reduction_i + \varepsilon_i$$

is chosen, where for each country "transfer" stands for the share of revenue-equalising grants in GDP, "taxshare" alternatively stands for the sub-central share in total tax revenue (for federal countries the share of the state level was used since equalization concerns only the state level) or the share in *autonomous* taxes, *i.e*. taxes of the "a", "b" and "c" type in the taxing power classification (OECD, 1999). "taxstructure" stands for, alternatively, the share of income taxes, immovable property taxes and consumption taxes, and "reduction" for the difference in pre- and post-equalization disparities (measured through the variation coefficient). Data are available for 12 countries and for the year 2005. The model was estimated both in its linear and log-linear form.

Regression results for the main specification are shown below, with the linear form on the left-hand panel and the log-linear form in the right-hand panel of Table 2. Coefficients for both the SCG tax share and the disparity reduction achieved are positive and statistically significant at the 5 or 10% level, suggesting that a higher sub-central tax share is associated with a higher transfer to GDP share, if disparities are to remain equal. The coefficient for the tax structure – represented by the share of immovable property taxes in total SCG tax revenue – tends to be negative but is not significant. In various alternative specifications, higher tax autonomy tends to have little influence on the need for equalizing grants, the share of income taxes in the sub-central tax mix also tends to have little influence, and a higher share of consumption taxes in the SCG tax mix tends to be associated with a lower need for equalizing grants, but none of these coefficients is significant.

Table 2. **Estimated effects of the SCG tax share on the need for equalization grants**

Linear regression			Log-linear regression		
Variable	Coefficient	Std. Error	Variable	Coefficient	Std. Error
C	-1.22	0.84	C	-9.10*	3.94
TAXSHARE	0.06**	0.02	LOG(TAXSHARE)	1.49*	0.64
REDUCTION	0.09***	0.02	LOG(REDUCTION)	1.72*	0.95
PROPERTYTAX	-0.08	0.05	LOG(PROPERTYTAX)	0.00	0.40
Number of observations	12		Number of observations	12	
Adjusted R-squared	0.51		Adjusted R-squared	0.34	
Prob(F-statistic)	0.03		Prob(F-statistic)	0.22	

Note: ***significant at the 1-% level, **significant at the 5-% level. For explanations see Box 1.
Source: Fiscal Network database.

The results have to be interpreted with great care. First, only a limited number of countries participated to this exercise. The data is likely to suffer from sample bias especially with respect to the tax structure, as countries with a high sub-central property tax share are under-represented. Second, coefficients may be biased for reasons of endogeneity. Disparity reduction – *i.e.* the variable reflecting preferences – could actually hold as another variable for the amount of equalization transfers, making the relationship between transfers and disparity reduction circular. Third, a cross-sectional analysis does not say anything about developments over time. Differences in tax raising capacity may evolve quite differently across countries once the sub-central tax share starts rising. To the extent that countries made or make reforms to the sub-central revenue composition, more detailed time series analysis should be carried out.

21. The empirical evidence tends to support the belief that more sub-central tax autonomy is associated with larger fiscal disparities, potentially requiring larger fiscal equalisation systems. For political economy reasons, any country wishing to increase sub-central tax autonomy is likely obliged to increase the share of transfers dedicated to fiscal equalisation. There is some consensus that fiscal equalisation is a necessary companion to tax decentralisation and that success of the second is likely to depend on a well-functioning equalisation system. Equalising grants will therefore play a central role in the decentralisation process. The size of the grant system in most countries suggests that intergovernmental grants can indeed assume that equalising role. Since explicit equalisation – as shown above – currently makes up less than a half of all intergovernmental grants on average, most countries have enough leeway to change a part of the non-equalising into equalising grants.

3.3. … and there is also a rather limited efficiency case for grants

22. Horizontal and vertical fiscal externalities or "spillovers" often serve to justify intergovernmental grants on efficiency grounds. Fiscal externalities can arise if the fiscal policy of one jurisdiction or government level affects outcomes in other jurisdictions, or, more technically, if governments do not fully perceive the social marginal cost and benefits of their taxing and spending decisions. Intergovernmental grants can compensate jurisdictions that are affected by such externalities. Fiscal externalities may be rooted both in the spending and the revenue side of decentralised budgets:

- *Spending externalities*. Spending externalities arise if a SCG's spending policy affects the residents of other jurisdictions. Examples include public services funded by one jurisdiction – *e.g*. infrastructure – benefiting the residents of neighbouring jurisdictions. Externalities may also arise if the spending decisions of an upper government level – *e.g*. for tertiary education – depend on spending of a lower government level, *i.e*. for primary and secondary education. Externalities may lead to undersupply of such public services.
- *Tax externalities*. Tax externalities arise if a SCG's tax policy affects the residents of other jurisdictions. Examples include tax exporting, *i.e*. local and regional taxes borne by non-residents, or strategic tax rate setting affecting tax revenues in other jurisdictions. Tax externalities may also arise if different government levels tax the same tax base. Tax externalities may lead to a distorted tax structure, to excessive or too low tax rates or to distorted spatial allocation decisions of firms and residents.

23. Intergovernmental grants – particularly matching grants – might correct for such externalities, to give incentives for SCGs to provide adequate levels of public services for non-residents or to compensate them for the tax policies of other jurisdictions. However, the rationale for grants as an anti-externality device is not always clear-cut and seems to be relevant in a limited number of countries with a specific institutional and fiscal background only.

- Horizontal tax externalities could play a role if SCGs have high taxing power *and* rely significantly on sales taxes. This is the case mainly in the United States, where autonomous sales taxes account for 50% of state and 20% of local tax revenue. The many studies trying to quantify the externalities associated with these taxes conclude that they both lead to considerable sub-central tax exporting and sub-central tax erosion (for a – somewhat outdated – overview see Hall and Smith, 1995), and a US report estimates the losses due to out-of-state-purchases at 0.5 to 5% of total tax revenue (OECD, 2005). However, policy proposals to cope with tax exporting and tax erosion hardly ever favour grants over straightforward reforms of the tax system (Bird, 1993). Reform proposals include: to replace SCG sales taxes by a sub-central Value Added Tax (McLure, 2000 or Marè, 2007) – despite sub-central VATs having drawbacks – or to integrate SCG indirect taxes into a tax sharing system, as was done in Australia in 2000 or Mexico in the 1980s, although that reduces the fiscal autonomy of SCGs.

- Horizontal spending externalities could be relevant in countries with large SCG spending power. Tertiary education could be particularly relevant, since geographical mobility of students could generate a disincentive for SCGs to invest in universities (OECD, 2008a and 2008b). Transport infrastructure is another example, where inter-jurisdictional externalities (or spillovers) could lead to underinvestment by sub-central governments (Sutherland, 2008). A number of Swiss studies estimate spillovers for various municipal services at 8 to 15% of total municipal expenditure, reaching 30% for some specific services such as road infrastructure (OECD, 2002). Since Switzerland is a likely benchmark in terms of both jurisdictional fragmentation and spending decentralisation, these percentages could hold as an upper limit for spillovers. In the case of Canada, spending externalities appear to be of little significance (Smart, 2005). Moreover, some spillovers tend to cancel each other out, which give affected jurisdictions an incentive to compensate them mutually (Rauscher, 2000).[9] As a consequence, rather than relying on central government, SCGs have often reached agreements for service use across jurisdictional borders.[10]
- Finally, vertical externalities could arise in countries where responsibilities overlap or where central and sub-central governments tap the same tax base. Central government may subsidise sub-central services like primary and secondary education or health care on the assumption that SCGs do not invest sufficiently there. However, the few empirical studies suggest that SCGs provide adequate levels of core services and in some cases even tend to overspend (OECD, 2005).[11] Vertical tax overlap, *i.e.* concurrent taxation of the same tax base is quite pervasive in many OECD countries, and tax externalities – particularly excessive tax rates – could arise if one government level does not allow for the impact of its tax policy on another government level (Dahlby, 1996). Vertical externalities tend to be relevant if both government levels tax a mobile base such as personal or corporate income (Keen and Kotsogiannis, 2002; Esteller-Moré and Solé-Ollé, 2001) However, since it is not clear which government level is actually responsible for vertical externalities, the question of who has to compensate whom remains open, and grants could as well flow from the sub-central to the central level (Keen, 1997). If governments feel that taxing a common tax base leads to externalities, changes to the tax framework rather than to the grant system may be the appropriate solution.

24. With their limited scope, actual fiscal externalities are likely to be smaller than the matching grants invented to tackle them. Earmarked matching grants plus discretionary earmarked grants – the latter often having a matching character – account for around 37% of intergovernmental grants and around 18% of total sub-central spending for both SCG levels taken together (Table 3). These percentages are well above the size of externalities identified in OECD member countries (for a summary see Joumard and Kongsrud, 2003). Moreover, matching rates in most countries are typically much larger than justifiable by any plausible level of externalities (see for the US: Inman, 1988 and for Switzerland: Blöchliger and Herrmann, 2001). It appears that the size and structure of intergovernmental grants, particularly matching grants, can be better explained by political economy factors and constraints – such as SCGs role and power

9. Service provision across jurisdictional borders can be seen as a repeated game. If the stakes of each jurisdiction are roughly symmetrical, the outcome is likely that all jurisdictions provide services taking into account the effect of their actions on others.

10. Around 3% of SCG spending is covered by grants from other jurisdictions of the same government level. This type of grants usually reflects horizontal compensation agreements.

11. Swiss cantons seem to provide excessive hospital care compared to what the federal level would do if it was responsible for this service (Steinmann *et al*., 2003). Some regions in Spain appear to overspend in transport infrastructure in order to lure economic activity (*e.g.* Delgado and Alvarez, 2007).

in the multilevel framework – than by purely fiscal considerations (Brennan and Pincus, 1990). For a summary of recent empirical studies see Blöchliger and Charbit (2008).

Table 3. **Grant revenue by type of grant, 2006**

As a percentage of total grants revenue

	Earmarked								Non earmarked			
	Mandatory				Discretionary				Mandatory		Discretionary	
	Matching		Non-Matching		Matching		Non-Matching		General purpose	Block grants		Total
	Current	Capital	Current	Capital	Current	Capital	Current	Capital				
Australia												
State	-	-	-	-	47.5	9.2	32.4	4.9	5.9	-	-	100.0
Local	-	-	-	-	15.6	-	2.8	0.0	81.6	-	-	100.0
Austria												
State	48.4	2.4	12.1	17.3	0.9	-	0.3	-	10.9	0.2	7.5	100.0
Local	36.5	3.3	11.5	28.7	1.8	-	0.2	-	18.0	0.1	0.0	100.0
Belgium												
State	1.0	0.3	-	-	-	0.0	-	-	97.1	1.6	-	100.0
Local	45.0	5.0	-	-	-	-	-	-	49.9	-	-	100.0
Canada												
State												
Local												
Czech Republic												
Local	12.4	-	-	-	-	-	72.3	15.3	-	-	-	100.0
Denmark												
Local												
Finland												
Local	5.8	-	-	-	-	-	1.9	1.7	14.2	75.8	0.6	100.0
France												
Local												
Germany												
State												
Local												
Greece												
Local	40.9	36.1	-	-	-	-	-	-	23.0	-	-	100.0
Hungary												
Local	36.2	10.5	-	-	-	-	5.3	10.6	36.2	-	1.1	100.0
Iceland												
Local												
Ireland												
Local												
Italy												
State	-	4.5	-	5.1	-	-	14.7	5.6	70.2	-	-	100.0
Local	-	-	-	-	-	-	30.5	31.5	38.0	-	-	100.0
Japan												
Local												
Korea												
Local	-	-	-	-	12.7	14.7	-	-	72.6	-	-	100.0
Luxembourg												
Local	86.3	13.6	-	-	-	-	-	-	-	-	-	100.0
Mexico												
State	-	-	49.0	-	-	-	5.7	-	45.4	-	-	100.0
Local	-	-	42.3	-	-	-	-	-	57.7	-	-	100.0
Netherlands												
Local	48.4	-	-	-	-	-	-	-	51.6	-	-	100.0
New Zealand												
Local												
Norway												
Local												
Poland												
Local												
Portugal												
Local	-	-	-	-	-	-	16.1	-	83.9	-	-	100.0
Slovak Republic												
Local												
Spain												
State	0.3	0.4	8.5	4.4	1.3	0.8	1.1	0.9	82.4	-	-	100.0
Local	17.1	17.8	2.1	-	-	-	-	-	62.9	-	-	100.0
Sweden												
Local												
Switzerland												
State	74.3	-	-	-	-	-	-	-	25.7	-	-	100.0
Local												
Turkey												
Local	-	-	-	-	-	-	-	57.0	-	-	43.0	100.0
United Kingdom												
Local												
United States												
State												
Local												
Unweighted average												
State [1]	17.7	1.1	9.9	3.8	7.1	1.4	7.7	1.6	48.2	0.2	1.1	100.0
Local	21.9	5.8	3.7	1.9	2.0	1.0	8.6	7.7	39.3	5.1	3.0	100.0

Source: Fiscal Network database.

3.4. Grants have unintended side effects

25. Intergovernmental grants constitute a "common pool" resource for an individual SCG. A SCG receiving a grant or an increase in grant allocation enjoys its full benefits, while it bears only a fraction of the cost in terms of the additional tax revenue or borrowing needed for the central government to finance these grants. This asymmetry between benefit and cost can alter sub-central fiscal behaviour and bring about moral hazard. Depending on the formulas that determine the grant allocation and depending on the political economy of fiscal relations in a country – especially SCGs influence on central government budget allocations and their interest in higher tax autonomy – intergovernmental grants can soften the sub-central budget constraint and deteriorate the fiscal stance of both central and sub-central governments. There are several channels through which moral hazard can work, affecting not only fiscal outcomes such as SCGs own tax revenue, expenditure, deficits, and debts, but eventually the size of the transfer system itself.

- *Grants may reduce sub-central tax effort:* In most countries grants ensure a minimal fiscal endowment to low-income jurisdictions, which is achieved by disbursing grants inversely related to a SCG's fiscal capacity. While such equalising grants are well justified on equity grounds, they tend to discourage SCGs from raising their own tax revenue since a SCG increasing its tax capacity must inevitably accept a reduction in grant entitlements. This "compensation rate", "equalisation tax" or "tax on tax revenue" can reach up to 80 or 90% of additional tax revenue, thereby undermining a SCG's tax effort and willingness to strengthen its fiscal base. As the equalisation tax is usually higher the more a jurisdiction lags behind, the reluctance to raise own tax revenue tends to become ever stronger the poorer a jurisdiction. Equalising grants hence risk prolonging rather than eliminating fiscal disparities and may lead to a long term expansion of the grant system. Individual country studies indeed suggest a negative relationship between equalising grants and economic and fiscal effort (for a summary see Blöchliger and Charbit, 2008).

- *Grants may put pressure on spending*: In most countries a part of the grant system is linked to the cost of sub-central services such as education, health or infrastructure. Grant formulas usually take specific unit cost and the number of service units produced or consumed in a jurisdiction into account. SCGs therefore have an incentive to manipulate those indicators in order to obtain more grants. Moreover, many grants have a matching character, so grant allocation increases the more a SCG spends on the matched service (see also Table 3). While some matching grants can be justified on externality grounds, they also invite overspending, especially if matching rates are high. Since cost-based grant systems often rely on a multitude of indicators and hence tend to be complex, they are prone to rent seeking and pressure from special interests. Country studies suggest that political economy forces exert considerable influence on the size and structure of both central grant allocation and sub-central spending (for a summary see Blöchliger and Charbit, 2008).

- *Grants may increase deficits and debt*: The grant system may cause self-propelling growth of deficits and debts. Depending on the political economy environment, central governments can sometimes give in to SCGs demands for bailouts or other forms of fiscal support, thereby blowing up the grant system. Aware that the central government is helping them out, SCGs increase their deficits and/or their debt in the next period expecting to obtain even higher grants. There is evidence that SCGs expecting a bailout borrow more than SCGs not expecting a bailout (see for Germany: Rodden, 2006). SCGs face a soft budget constraint, and transfer growth becomes endogenous: deficits bring about more grants, and more grants bring about higher deficits. An empirical study across 13 OECD

member countries suggests that there is a positive relationship between transfer growth and debt levels and that indeed deficits/debts and transfers tend to drive each other (de Mello, 2007). The grants-debt relationship tends to be asymmetric over time: an increase in grants is associated with higher debt issuance, but a reduction in grants is not associated with debt repayments (see for the US: Martell and Smith, 2004).

26. The variety of disincentives can be reduced with a skilful grant design, described in more detail in earlier Fiscal Network papers (*e.g*. Bergvall *et al*., 2006). A summary is provided in Box 2. However, with grants remaining a common pool resource for the individual SCG, disincentives may be limited albeit not entirely avoided.

Box 2. **Well-designed grants: a summary**

Countries have developed several approaches to contain the negative side effects of their intergovernmental transfer system (Bergvall *et al*., 2006; Blöchliger and Charbit, 2008). Their various approaches can be divided into 1) measures on the tax revenue side, 2) measures on the grant side, and 3) institutional measures, with the three groups sometimes overlapping. The approaches can be summarized as follows:

1. Tax effort can be increased if the potential tax base instead of actual tax revenue is used to assess SCG tax capacity. Many countries use a representative tax system (RTS), where potential revenue from each sub-central tax is determined by multiplying a standard tax base with a standard tax rate, or they use the revenues from a central government tax to assess sub-central tax capacity. A RTS should cover all major sub-central taxes and their bases. Alternative indicators for assessing potential tax capacity include sub-central GDP or household income (macroeconomic approach). RTS can help reduce strategic behavior and prevent SCGs from manipulating tax capacity indicators in order to obtain more grants.

2. Spending pressure can be reduced if grant allocation is based on a few broad-based geographic, demographic or socio-economic need indicators. Having few indicators covering principal sub-central needs tends to be more transparent and produces less statistical headaches in the allocation of entitlements. Indicators should be outside sub-central control to ensure that SCGs cannot manipulate them. Most countries today use standard or norm cost approaches whereby grant allocation is independent of actual expenditure incurred by SCGs. Also, spending performance can be increased if grants serving several purposes – *e.g.* simultaneously to subsidize SCG services and to equalize SCG disparities – are disentangled and separate grant systems developed.

3. Finally, institutional reforms can help contain grant-related budget drift. Some countries set transfer caps irrespective of sub-central financial needs. Establishing agencies and other arms' length independent bodies responsible for grant distribution can help channel transfer increases and reduce the pressure from special interest. Also, an adequate set of budget management rules can improve fiscal discipline. In several countries intergovernmental grants are shown as a single and separate budget item, thereby increasing transparency. A two-stage budget procedure, whereby the overall grant budget is negotiated separately from the distribution formula, can also contain pressure from special interest.

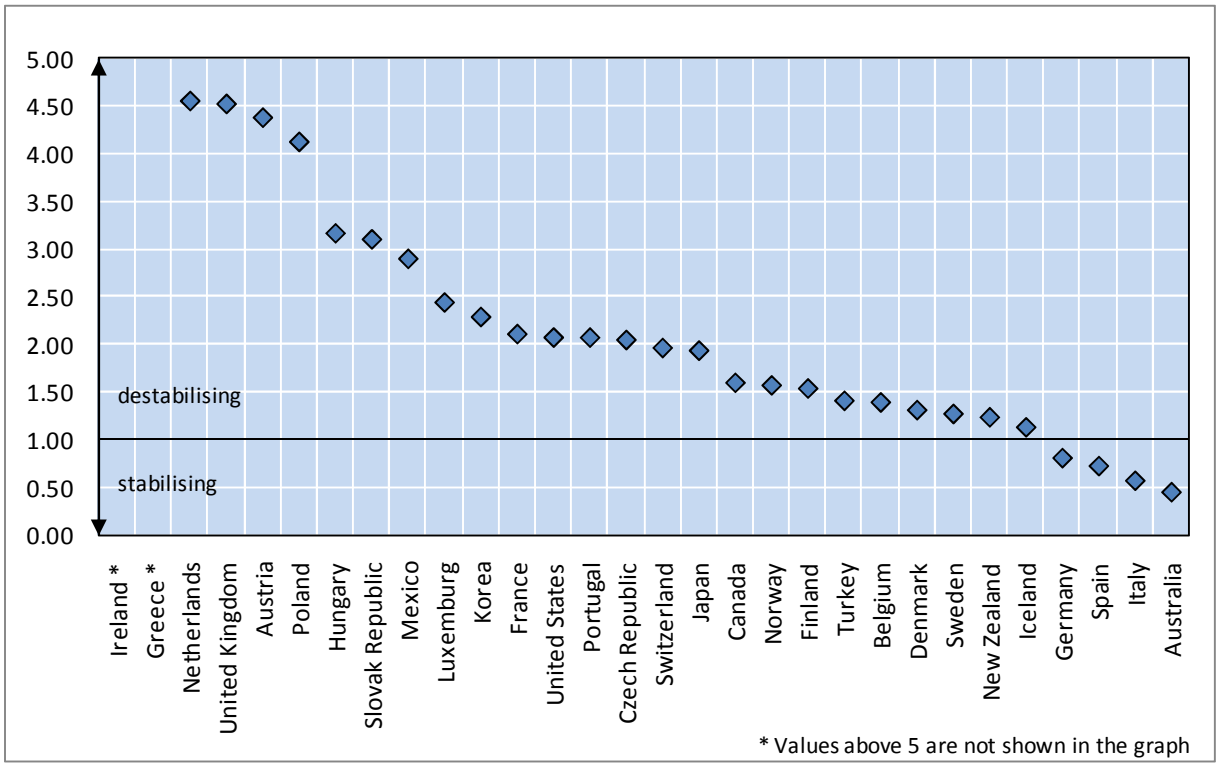
3.5. Grants could stabilise sub-central tax revenue but often do not

27. Sub-central revenue stability is a central indicator for functioning fiscal relations, and intergovernmental grants could play a crucial role in ensuring that SCG's total revenues remain stablеduring an economic crisis. The line of reasoning goes as follows: Sub-central tax revenue tends to fluctuate pro-cyclically, *i.e*. subject to the sub-central tax mix, the tax-to-GDP ratio tends to grow during an economic upswing and to decline during a downswing, as is currently the case. In order to stabilise total SCG revenue and to facilitate SCG budget policy, transfers could absorb tax revenue volatility and act as an insurance against asymmetric (idiosyncratic) shocks, especially if SCGs are unable or not allowed to borrow (von Hagen, 2008). Seen from the expenditure side, transfers could act as an automatic stabiliser for the central government. Properly designed, SCG tax revenues and grants would be inversely related: abundant tax revenues would meet with lower grant allocation and vice versa, and SCG total revenue volatility would be smaller than that of SCG tax revenue.

28. In practice however, many intergovernmental transfers system do not have these stabilisation properties. In a majority of OECD member countries, grants tend to exacerbate SCG revenue or GDP fluctuations rather than attenuating them (Box 3). Although there is no clear country pattern, the destabilising effect is particularly strong in countries with large transfer systems, little SCG taxing power and a relatively stable tax base like the property tax. SCG total revenue fluctuations tend to be smaller in countries with a higher SCG tax share. Destabilisation tends to be accentuated if lagged variables are used, *i.e.* transfer systems tend to overshoot once they react to an economic or fiscal impulse. The results are broadly in line with individual country studies for Canada and Germany (Boadway and Hayashi, 2004, and von Hagen and Hepp, 2001) and tend to confirm the pro-cyclicality of fiscal policy in the euro area during the last ten years (OECD, 2007). Although statistical indicators such as correlation coefficients and t values are often weak, pointing to a number of omitted variables, results suggest that intergovernmental transfers do often not stabilise SCG revenue and provide weak insurance against asymmetric shocks.[12] Methodological details are explained in Box 3, and individual country figures are shown in the Annex.

Figure 13. **Grants can destabilise total SCG revenue**

Ratio of SCG total revenue to SCG tax revenue fluctuations (F-values of normalised variances), 1995-2005



Note: a value >1 means that grants are destabilising SCG revenue. A value >2.52 means that the destabilising effect is statistically significant ($F_{26,26}$)

Source: Calculations based on OECD National Accounts.

12. To ascertain whether the grant system is indeed insuring against asymmetric shocks a more refined panel data analysis at the sub-central level is necessary, which does not only take *total* transfers into account but which compares the transfers to *each* single SCG over time.

Box 3. **Measuring the stabilisation properties of intergovernmental transfers**

The stabilisation properties of intergovernmental transfers can be assessed using a variety of indicators. The simplest indicator is the correlation between fluctuations in tax and transfer revenue, where a negative value points at a stabilizing and a positive value at a destabilizing transfer system; however correlation coefficients are an imprecise indicator that says nothing about the magnitude of the relationship. Comparing variances of pre- and post-transfer fluctuations can also help assess stabilisation properties, but such a comparison tends to overestimate pro-cyclicality when transfer revenue is "large" with respect to SCG's own tax revenue and when both variables exhibit a strong upward trend. A more reliable way is to use regressions that link annual fluctuations in transfer or total revenue to variables such as GDP or SCG tax revenue; sign and size of the coefficients indicate how transfers follow the cycle. To take into account that many transfer allocation formulas usually react with some delay or that policy changes take time to implement, explanatory variables should also be lagged.

Table 4 and Figure 13 assess the stabilization properties of the transfer system from different angles, using five indicators altogether. The choice of indicators is based on the methodology developed by von Hagen and Hepp (2001) and Boadway and Hayashi (2004) and adapted to the constraints of an international comparison.

Table 4 reads as follows:

- Column 2 shows the correlation coefficients between year-to-year fluctuations in taxes and grants.
- Column 3 shows the ratio of the normalised variances of pre-transfer and post-transfer SCG revenue fluctuations, delivering an F-value for each country. A value >1 means that post-transfer revenue fluctuations are larger than pre-transfer fluctuations, and a value > 2.52 means that it is statistically significant at the 5% level ($F_{26,26}$).
- Column 4 shows the fluctuations of sub-central tax revenue with respect to GDP. For each country the β coefficients of the regression $\frac{y_t - y_{t-1}}{y_{t-1}} = \beta_0 + \beta_1 * \frac{x_t - x_{t-1}}{x_{t-1}} + \varepsilon_t$ are shown, where y_t stands for SCG tax revenue in year t and x_t stands for nominal GDP in year t. Most countries have the expected positive sign, i.e. tax revenue appears to fluctuate pro-cyclically.
- Column 5 shows the fluctuations of transfer revenue with respect to GDP. For each country the β coefficients of the regression $\frac{y_t - y_{t-1}}{x_{t-1}} = \beta_0 + \beta_1 * \frac{x_t - x_{t-1}}{x_{t-1}} + \varepsilon_t$ are shown, where y_t stands for total transfer to SCGs in year t and x_t stands for nominal GDP. A coefficient between minus one and zero means that transfers stabilize the fluctuations in GDP (insurance). A coefficient >0 means that transfers are pro-cyclical.
- Column 6 shows the fluctuations of transfer revenue with respect to SCG tax revenue. For each country the β coefficients of the regression $\frac{y_t - y_{t-1}}{x_{t-1}} = \beta_0 + \beta_1 * \frac{x_t - x_{t-1}}{x_{t-1}} + \varepsilon_t$ are shown, where y_t stands for total transfer to SCGs in year t and x_t stands for tax revenue. A coefficient between minus one and zero means that transfers stabilize the fluctuations in SCG tax revenue. A value below minus one means that transfers are overcompensating. A coefficient >0 means that transfers are destabilizing.
- Column 7 provides an overall assessment of the transfer system's stabilization properties, based on the number of indicators pointing in one direction and their significance levels. The assessment "destabilizing and pro-cyclical" is applied if transfer revenue is positively linked to both SCG tax revenue and GDP.

Using lagged variables increases the number of countries with destabilizing transfer systems. Robustness checks using no intercept, using lags of two years or omitting years with annual changes in transfer allocations >25% (to allow for fundamental policy changes) does not change the general picture.

Table 4. **The stabilisation properties of transfer systems**
Summary of indicators measuring SCG revenue fluctuations

	Correlation and variance coefficients		Regression coefficients			Overall stabilisation properties of the transfer system
	SCG taxes and transfers	Variance ratio SCG total to SCG tax revenue	SCG taxes to GDP	Transfers to GDP	Transfers to SCG taxes	
Australia	-0.98	0.46	2.41	0.01	-0.86 ***	stabilising
Austria	-0.05	4.37 **	0.47	0.25	-0.06	rather destabilising
Belgium	-0.11	1.40	-0.93	0.56	-0.60	stabilising
Canada	0.41	1.60	0.83 **	0.08	0.37	destabilising and procyclical
Czech Republic	-0.32	2.05	-0.56	0.33	-2.90	indeterminable
Denmark	-0.49	1.32	0.81 **	-0.17 **	-0.83	stabilising
Finland	-0.45	1.54	0.88	-0.09	-0.74	stabilising
France	0.05	2.11	-1.53	-0.08	0.05	destabilising
Germany	0.54	0.81	0.86	-0.10	0.17 **	rather destabilising
Greece	0.26	14.09 **	3.25	-0.01	1.31	destabilising and procyclical
Hungary	-0.06	3.16 **	2.39 **	0.02	1.89	destabilising and procyclical
Iceland	0.14	1.14	1.11 **	0.01	0.10	rather destabilising
Ireland	-0.09	25.33 **	-0.40	0.28	39.50	destabilising
Italy	-0.86	0.58	3.94	0.01	-0.96 ***	stabilising
Japan			1.66 ***			
Korea	0.50	2.29	1.52 *	-0.02	0.88	destabilising and procyclical
Luxemburg	-0.39	2.44	0.18	0.02	-0.14	rather stabilising
Mexico	-0.03	2.90 **	1.09 ***	0.03	0.68	destabilising and procyclical
Netherlands	-0.38	4.55 **	0.04	0.16	-49.78 ***	indeterminable
New Zealand	0.47	1.24	0.62	0.03	-0.67	rather stabilising
Norway	-0.11	1.57	0.78	0.04	-0.13	neutral to slightly destabilising
Poland	-0.48	4.12 **	0.61	0.05	-1.54	rather destabilising
Portugal	0.16	2.07	1.87 *	0.06	0.84	destabilising and procyclical
Slovak Republic	-0.58	3.10 **	-6.73	0.13	-1.10	rather destabilising
Spain	-0.86	0.73	-5.98	0.29	-0.64 ***	stabilising
Sweden	-0.56	1.28	-1.53 *	0.18	-1.01 **	stabilising
Switzerland	0.08	1.97	1.08	0.01	0.11	destabilising and procyclical
Turkey			1.30 ***			
United Kingdom	0.72	4.52 **	1.23 *	-0.19	3.27	destabilising
United States	0.08	2.07	1.57 ***	-0.04	-0.24	neutral to destabilising

Note: ***significant at the 1% level, **significant at the 5% level, *significant at the 1% level. For explanations see Box 2.

Source: OECD National Accounts, OECD Revenue Statistics, Fiscal Network database.

29. What are the underlying forces that contribute to the destabilising nature of many intergovernmental grant systems? One should distinguish between formula-based and policy-based impacts.

- Some grant formulas contain an element of tax sharing, *i.e*. total spending on grants is to a certain extent determined as a percentage of central or sub-central tax revenue. Since tax revenue tends to move with the cycle, spending on transfers also becomes pro-cyclical and can exacerbate own tax revenue fluctuations of SCGs. The nature of some transfers as being akin to tax-sharing in France, Japan, Korea or Mexico could explain their destabilising impact on sub-central revenue, while the vigorously needs-based transfer systems of Denmark or Finland tend to have good stabilisation properties.

- A considerable part of grants (around 40%) are matching, whereby grant allocation becomes a percentage of sub-central expenditure. The more a SCG spends, the more transfer revenue it gets. If SCG spending varies positively with the cycle, then matching grants correspondingly tend to become pro-cyclical. The matching character of a large part of the transfer systems prevailing in Austria, Hungary, Switzerland (abandoned in 2007) and in the US – especially the large health care transfer to the states under Medicaid – could partly explain their destabilising and pro-cyclical nature.
- Fiscal equalisation transfers often rely on an average fiscal capacity indicator, where grant allocation is determined by the difference between an individual SCG's fiscal capacity and the national average. This average tends to move with the cycle. If recipient SCGs have weaker cycles than the national average, the difference between the average and an individual SCG's fiscal capacity tends to become destabilising. Fiscal equalisation transfers remain equalising across jurisdictions but not across time. Differences in the cycles of the average versus recipient SCGs could explain the destabilising behaviour of vertical equalisation in Canada and Germany.
- Finally, pro-cyclical transfers could be policy-driven. Revenue buoyancy tends to be associated with higher government expenditure (Joumard and André, 2008). Strong revenue growth can raise demands for higher spending, including spending increases on intergovernmental transfers. Since roughly 20% of all transfers are not formula-based but can be increased or cut at the discretion of central government, grants can rather easily be adapted to changing budget conditions and become pro-cyclical. Spending policy at the central level can hence be responsible for pro-cyclical volatility of sub-central revenues.

30. With central government transfers exacerbating rather than dampening SCG own revenue fluctuations, sub-central budgets become more difficult to manage over the cycle. SCGs are likely to be forced into running excessive surpluses or deficits if they want to maintain spending constant. Budgeting becomes even more awkward if fiscal rules set limits on SCG deficit spending or on borrowing, which is common in most countries at least for current spending (Sutherland, Joumard and Price, 2006). In this case, sub-central spending policy inevitably becomes pro-cyclical, generating particular headaches for SCGs with important social welfare responsibilities. SCGs could also react asymmetrically to excessive revenue fluctuations, by raising expenditure in good times and raising tax rates or borrowing in bad times, thereby extending government size and the public sector in the long run (Rattso and Tovmo, 1999).

31. There is a number of ways to reduce pro-cyclical fluctuations of intergovernmental grants and to strengthen their automatic stabiliser properties. As a general rule, in order to avoid excessive sub-central revenue volatility, transfers should be linked to effective needs of sub-central governments. Decoupling grants from central government tax revenue can be an important step towards more stable transfer allocations to SCGs (OECD, 2005). Reducing the percentage of matching grants is likely to break the link between central and sub-central spending and hence could help ease pro-cyclical pressures on the transfer system. Horizontal equalisation schemes tend to be less prone to cyclical fluctuations than vertical ones, so moving from one transfer system towards the other could improve the stabilisation properties of transfers. Finally, using lagged variables when determining a SCG's grant entitlements may reduce excessive revenue volatility, although such systems could lack the necessary flexibility in reacting to legitimate sub-central needs. Since transfers provide a transmission belt between central and sub-central fiscal outcomes, good coordination of central and sub-central fiscal policies is needed.

4. Conclusions

32. This paper analysed the revenue structure of sub-central governments and how it evolved over time. From 1995 to 2005, the share of sub-central expenditure grew from 31 to 33% of total government expenditure. The additional revenue needed to cover higher SCG spending was mostly covered by an

increase of the share of intergovernmental grants. Decentralisation has become more asymmetric than it was a decade before. SCGs are more dependent on central government, and the growth of transfer systems has tied central and sub-central fiscal policy and fiscal outcomes more closely together. This paper tried to show that both an increase of the sub-central tax share and reforms to the design of intergovernmental grants could help make fiscal relations more efficient.

33. The current economic crisis will deeply affect the revenue side of sub-central governments. SCG own tax revenues will decline sharply, and budget constraints at the central level are likely to jeopardise the intergovernmental grant system in its current form. Subject to the sub-central tax structure and spending needs, the working of fiscal rules and the extent to which SCGs are shielded from transfer cuts, the pressure for SCGs to consolidate their budget will be considerable. Reforming the SCG revenue side – such as the sub-central revenue composition, the sub-central tax structure or the design and the cyclical properties of intergovernmental transfers – could help SCGs better cope with the current and future downturns. Reforms could hence both help bolster SCG's resilience to shocks and improve the smooth functioning of the intergovernmental fiscal framework.

BIBLIOGRAPHY

Aiginger, K., Tichy, G. and Walterskirchen, E. (2006), WIFO White Paper: Towards Higher Employment via Economic Growth Based on Innovation and Qualification (with English summary), Vienna: Österreichisches Institut für Wirtschaftsforschung.

Bergvall, D., C. Charbit, J. Kraan and O. Merk (2006), "Intergovernmental Transfers and Decentralised Public Spending", *Journal of Budgeting*, Vol 5, No. 4.

Bird, R (1993), "Threading the Fiscal Labyrinth: Some Issues in Fiscal Decentralization", *National Tax Journal*, Vol. 46.

Bird, R. (1999), Rethinking Subnational Taxes: A New Look at Tax Assignment, *IMF Working Paper* No. 99.

Blöchliger, H. and C. Charbit (2007), Fiscal Equalisation, *OECD Economic Studies*, OECD, Paris.

Blöchliger, H. and D. King (2006), "Less Than You Thought: the Fiscal Autonomy of Sub-central Governments", *OECD Economic Studies 43*, OECD, Paris.

Blöchliger, H. and S. Herrman (2001), Funding Transport Systems in a Federal Country, Swiss Transport Conference, Ascona, http://www.strc.ch/2001.html.

Boadway, Robin (2007), "Grants in a Federal Economy: a Conceptual Perspective", in: Boadway, R. and A. Shah: *Intergovernmental Fiscal Transfers, Principles and Practice*, The World Bank, Washington D.C.

Brennan, G. and J. Pincus (1990), "An Implicit Contract Theory of Intergovernmental Grants", *Publius* Vol. 20.

Browning, K. (1999), The Myth of Fiscal Externalities, *Public Finance Review*, Vol. 27, No. 1, pp. 3-18.

Bucovetsky, S. M. Marchand, and P. Pestieau (1998), Tax Competition and Revelation of Preferences for Public Expenditure, *Journal of Urban Economics*, Vol. 44.

Büttner, T. and D. Wildasin (2006), "The Dynamics of Municipal Fiscal Adjustment", *Journal of Public Economics 90*.

Carlsen, F., B. Langset and J. Rattsø (2005), "The Relationship between Firm Mobility and Tax Level: Empirical Evidence of Fiscal Competition between Local Governments", *Journal of Urban Economics 58*.

Conference Board of Canada (2002), *Projection des équilibres financiers des gouvernements du Canada et des provinces*, www.gov.ns.ca/finance/pdf/FiscalImbalance.pdf.

Dahlby, B. (1996), "Fiscal Externalities and the Design of Intergovernmental Grants", *International Tax and Public Finance* 3, pp. 397-412.

Delgado, M. and I. Alvarez (2007), "Network Infrastructure Spillovers in Private Production Sectors: Evidence from Spanish High Capacity Roads", *Applied Economics 39.*

de Mello, L. (2007), "Local Government Finances: The Link Between Intergovernmental Transfers and Net Worth", *Economics Department Papers*, No. 581, OECD, Paris.

Devereux, M.P., B. Lockwood and M. Redoano (2007), Horizontal and vertical indirect tax competition: Theory and some evidence from the USA, *Journal of Public Economics* 91, 451-479.

Devereux, M.P., R. Griffith and A. Klemm (2002), "Corporate Income Tax reforms and International Tax Competition", *Economic Policy 35*, 451-495.

Esteller-Moré, A., and A. Solé-Ollé (2001), "Vertical Income Tax Externalities and Fiscal Interdependence: Evidence from the US", *Regional Science and Urban Economics 31*.

Föderalismuskommission (Kommission von Bundestag und Bundesrat zur Modernisierung der Bund-Länder-Finanzbeziehungen), Stellungnahme zur Anhörung am 8 November 2007, http://www.bundestag.de/Parlament/gremien/foederalismus2.

Hall, J. and S. Smith (1995), "Local Sales Taxation: an Assessment of the Feasibility and Likely Effects of Sales Taxation at the Local Level in the UK", Institute for Fiscal Studies, London.

Heppke-Falk, K. and G. Wolff (2007), "Moral Hazard and Bail-out in Fiscal Federations: Evidence for the German Länder", *Deutsche Bundesbank Discussion Paper* 7, Frankfurt.

Hewitt, D. and D. Mihaljek (1992), "Fiscal Federalism", in: V. Taints: *Fiscal Federalism in Economics in Transition*, Washington D.C: IMF, pp. 330-349.

Inman, R and D. Rubinfeld (1996), "Designing Tax Policy in federalist Economies: an Overview", *Journal of Public Economics* 60, pp. 307-334.

Inman, R. (1988), Federal Assistance and Local Services in the United States: the Evolution of a New Federalist Fiscal Order, *National Bureau of Economic Research Working Paper* No. 2283, Washington.

Johansson, Å., C. Heady, J. Arnold, B. Brys and L. Vartia (2008), "Taxation and Economic Growth", *Economics Department Working Papers*, No. 620, OECD, Paris.

Joumard, I. and C. André (2008), "Revenue Buoyancy and its Fiscal Policy Implications", *Economics Department Working Papers*, No. 598, OECD, Paris.

Joumard, I. and P. Kongsrud (2003), "Fiscal Relations across Levels of Government", *OECD Economic Studies 36*, OECD, Paris.

Keen, M. (1997), "Vertical Tax Externalities in the Theory of Fiscal Federalism", *IMF Staff Papers*, Washington.

Keen, M., and C. Kotsogiannis (2002), "Does Federalism Lead to Excessively High Taxes?", *American Economic Review 92*.

King, D. (2004), "Follow-up to the 2004 discussion of allocation of taxing powers", document prepared for the annual meeting of the Fiscal Network, OECD, Paris.

Marè, M. (2007), "Sub-Central Consumption Taxes", document prepared for the annual meeting of the Fiscal Network, OECD, Paris.

Martell, C.R. and B.M. Smith (2004), "Grant Level and Debt Issuance: Is There a Relationship? Is There Symmetry?", *Public Budgeting and Finance*, Vol. 24.

McLure, C. (2000), Implementing Subnational Value Added Taxes on International Trade: The Compensating VAT (CVAT), *International Tax and Public Finance* 7.

Oates, W. (1999), An Essay on Fiscal Federalism, *Journal of Economic Literature* Vol. 37, pp. 1120-1149.

Oates, W. and R. Schwab (1988), "Economic Competition among Jurisdictions: Efficiency-Enhancing or Distortion-Inducing?", *Journal of Public Economics* 35.

OECD (1999), *The Taxing Power of State and Local Governments*, Tax Policy Studies 1, Paris.

OECD (2001), *Territorial Reviews: Switzerland*, OECD, Paris.

OECD (2005), *Economic Surveys: Japan*, OECD, Paris.

OECD (2006a), *Economic Surveys: Euro Area*, OECD, Paris.

OECD (2006b), *Fundamental Reform of Personal Income Tax*, OECD Tax Policy Studies, Paris.

OECD (2007a), *Fundamental Reform of Corporate Income Tax*, OECD Tax Policy Studies, Paris.

OECD (2007b), *Regions at a Glance*, OECD, Paris.

OECD (2008a), *Economic Surveys: Germany*, OECD, Paris.

OECD (2008b), *Economic Surveys: Spain*, OECD, Paris.

Rattso, J. and P. Tovmo (1998), "Local Government Responses to Shocks in Denmark", Kommunal Budgetoversigt, Finansministeriet.

Rauscher, M. (2000), "Interjurisdictional competition and the environment", in: Folmer H. and T. Tietenberg, *International Yearbook of Environmental and Resource Economics*.

Riedl, A. and S. Rocha-Akis (2008), "Testing the Tax Competition Theory: How Elastic Are National Tax Bases in Western Europe?", *Österreichische Nationalbank Working Paper* No. 142.

Rodden, J. (2006), "And the Last Shall be First: Federalism and Soft Budget Constraints in Germany," *Working Paper*, Stanford University.

Seitz, H. (2008), "Minimum Standards, Fixed Costs and Taxing Autonomy of Subnational Governments", *CESifo Working Paper* 2341, Munich.

Seitz, H. (2008), Die Demographieabhängigkeit der Ausgaben und Einnahmen der öffentlichen Haushalte. Eine empirische Analyse unter Berücksichtigung der föderalen Verflechtungen, Bertelsmann-Stiftung, Gütersloh.

Slack, E. and H. Kitchen (2006), "Trends in Public Finance in Canada", Institute for Municipal Finance, Toronto University, Toronto, http://www.utoronto.ca/mcis/imfg/resources.htm#pub.

Smart, M. (2005), "Federal Transfers: Principles, Practice, and Prospects", *Working Paper*, C.D. Howe Institute, Toronto.

Steinmann, L. *et al*. (2003), "Measuring and Comparing the (In-)Efficiency of German and Swiss Hospitals", *Dresden Discussion Paper*, Economics Department, University of Dresden.

Sutherland, D., I. Joumard and R. Price (2006), "Sub-central Government Fiscal Rules", *OECD Economic Studies 41*, OECD, Paris.

Sutherland, D., S. Araujo, B. Égert and T. Kozluk (2009), "Infrastructure Investment: Links to Growth and the Role of Public Policies", *OECD Economics Department Working Papers*, No. 686, OECD, Paris.

Von Hagen, Jürgen (2008), "Achieving Economic Stabilization by Sharing Risk within Countries", in: *Intergovernmental Fiscal Transfers, Principles and Practice* (edited by R. Boadway and A. Shah), The World Bank, Washington.

ANNEX TABLES

Table A1. **Data sources**

Country	Expenditures	Transfers	Taxes and Social Contributions
Australia	NA 1995-2005 (only total gov.)	GFS 1998-2005	RS 1995-2005
Austria	NA 1995-2006	NA 1995-2006	NA 1995-2006
Belgium	NA 1995-2006	NA 1995-2006	NA 1995-2006
Canada	NA 1995-2006	NA 1995-2006	NA 1995-2006
Czech Republic	NA 1995-2006	NA 1995-2006	NA 1995-2006
Denmark	NA 1995-2006	NA 1995-2006	NA 1995-2006
Finland	NA 1995-2006	NA 1995-2006	NA 1995-2006
France	NA 1995-2006	NA 1995-2006	NA 1995-2006
Germany	NA 1995-2006	NA 1995-2006	NA 1995-2006
Greece	NA 1995-2006	NA 1995-2006	NA 1995-2006
Hungary	NA 1999-2006	NA 1999-2006	RS 1995-2006 [1)]
Iceland	NA 1998-2006	NA 1998-2006	NA 1998-2006
Ireland	NA 1995-2006	NA 1995-2006	NA 1995-2006
Italy	NA 1995-2006	NA 1995-2006	NA 1995-2006
Japan	NA 1996-2006	SN 2000-2006	NA 1995-2005
Korea	NA 2000-2005	NA 2000-2005	RS 1995-1999 + 2006 NA 2000-2005
Luxemburg	NA 1995-2006	NA 1995-2006	NA 1995-2006
Mexico	NA 1995-2004 (only total gov.)	SN 1998-2006	RS 1995-2006 [2)]
Netherlands	NA 1995-2006	NA 1995-2006	NA 1995-2006
New Zealand	NA 1995-2005	RS 1995-2006	RS 1995-1996 NA 1997-2002 RS 2003-2006
Norway	NA 1995-2006	RS 1995 NA 1996-2006	NA 1995-2006
Poland	NA 1995-2006	NA 1995-2000 GFS 2001-2006	NA 1995-2006
Portugal	NA 1995-2006	NA 1995-2006	NA 1995-2006
Slovak Republic	NA 1995-2006	NA 1995-2006	NA 1995-2005
Spain	NA 1995-2006	NA 1995-2006	NA 1995-2006
Sweden	NA 1995-2006	NA 1995-2006	NA 1995-2005
Switzerland	NA 1995-2005	NA 1995-2005	NA 1995-2005
Turkey	SN 2006 (only total gov.) [3)]	SN 2000-2006	RS 1995-2006
United Kingdom	NA 1995-2006	NA 1995-2006	NA 1995-2006
United States	NA 1995-2006 (without local level)	RS 1995-2001	NA 1995-2006

NA: National Accounts, OECD
GFS: Government Financial Statistics, IMF
RS: Revenue Statistics, OECD
SN: National Sources

1) NA contain data for 2000-2006, but large differences to RS, therefore only RS taken.
2) NA contain Data for 1995-2004, but without local level, therefore only RS taken.
3) Turkey provided the expenditure ratio for the year 2006.

Table A2. Methodology and definitions

Transfer ratio:	share of transfers in general government expenditure total transfers = sum of all transfers (current + capital) without transfers between central level and social security general government expenditure = reported general government expenditure share of transfers in total government expenditure = $\frac{\text{total transfers}}{\text{general government expenditure}}$
Expenditure ratio:	share of sub-central government expenditure (each level) in general government expenditure state level = $\frac{\text{reported state level expenditure - transfers (paid by state level)}}{\text{general government expenditure}}$ local level = $\frac{\text{reported local level expenditure - transfers (paid by local level)}}{\text{general government expenditure}}$
Tax ratio:	share of sub-central government taxes (each level) in general government taxes general government taxes = sum of tax receipts and actual social contributions received by all levels state level = $\frac{\text{taxes and social contributions (recieved by state level)}}{\text{total taxes}}$ local level = $\frac{\text{taxes and social contributions (recieved by local level)}}{\text{total taxes}}$

Table A2. Methodology and definitions *(cont.)*

Revenue ratio:	revenue structure of sub-central governments general revenue (each level) = sum of tax receipts and actual social contributions received by each level + sum of transfers received by each level **share of tax in total revenue:** state level = $\frac{\text{taxes and social contributions (received by state level)}}{\text{total revenue (received by state level)}}$ local level = $\frac{\text{taxes and social contributions (received by local level)}}{\text{total revenue (received by local level)}}$ **share of transfers in total revenue:** state level = $\frac{\text{transfers (received by state level)}}{\text{total revenue (received by state level)}}$ local level = $\frac{\text{transfers (received by local level)}}{\text{total revenue (received by local level)}}$

WORKING PAPERS

The full series of Economics Department Working Papers can be consulted at www.oecd.org/eco/working_papers/

705. *The spending power of sub-central governments: a pilot study*
(July 2009) Steffan Bach, Hansjörg Blöchliger and Dominik Wallau

704. *Price and volume elasticities of Brazilian foreign trade: A profit function approach*
(July 2009) Luiz de Mello and Mauro Pisu

703. *Current account sustainability in Brazil: A non linear approach* (July 2009) Luiz de Mello and Matteo Mogliani

702. *The incentives to participate in and the stability of international climate coalitions: a game-theoretic approach using the WITCH Model*
(July 2009) Valentina Bosetti, Carlo Carraro, Enrica De Cian, Romain Duval, Emanuele Massetti and Massimo Tavoni

701. *The economics of climate change mitigation: how to build the necessary global action in a cost-effective manner*
(June2009) Jean-Marc Burniaux, Jean Chateau, Rob Dellink, Romain Duval and Stéphanie Jamet

700. *Capital inflows, household debt and the boom bust cycle in Estonia*
(June 2009) Zuzana Brixiova, Laura Vartia and Andreas Wörgötter

699. *The effect of financial crises on potential output: new empirical evidence from OECD countries*
(May 2009) Davide Furceri and Annabelle Mourougane

698. *Employment - productivity trade-off and labour composition*
(May 2009) Hervé Boulhol and Laure Turner

697. *Labour market flexibility in Estonia: what more can be done?*
(May 2009) Zuzana Brixiova

696. *Structural policies to overcome geographic barriers and create prosperity in New Zealand*
(April 2009) Yvan Guillemette

695. *Ten years of product market reform in OECD countries – insights from a revised PMR indicator*
(April 2009) Anita Wölfl, Isabelle Wanner, Tomasz Kozluk and Giuseppe Nicoletti

694. *Structural reforms and the benefits of the enlarged eu internal market*
(April 2009) Jens Arnold, Peter Höller, Margaret Morgan and Andreas Wörgötter

693. *Co-benefits of climate change mitigation policies: literature review and new results*
(April 2009) Johannes Bollen, Bruno Guay, Stéphanie Jamet and Jan Corfee-Morlot

692. *The impact of monetary and commodity fundamentals, macro news and central bank communication on the exchange rate: Evidence from South Africa*
(April 2009) Balázs Égert

691. *Assessing the impacts of climate change: a literature review*
(April 2009) Stéphanie Jamet and Jan Corfee-Morlot

690. *The determinants of employment and earnings in Indonesia: a multinomial selection approach*
(April 2009) Margherita Comola and Luiz de Mello

689. *Inflation responses to recent shocks: do G7 countries behave differently*
(April 2009) Lukas Vogel, Elena Rusticelli, Pete Richardson, Stéphanie Guichard and Christian Gianella

688. *Infrastructure investment in network industries: the role of incentive regulation and regulatory independence*
(March 2009) Balázs Égert

687. *Government consumption volatility and the size of nations*
(March 2009) Davide Furceri and Marcos Poplawski Ribeiro

686. *Infrastructure investment: links to growth and the role of public policies*
(March 2009) Balázs Égert and Tomasz Kozluk and Douglas Sutherland

685. *Infrastructure and growth: empirical evidence*
(March 2009) Balázs Égert and Tomasz Kozluk and Douglas Sutherland

684. *The effects of population structure on employment and productivity*
(March 2009) Hervé Boulhol

683. *The macroeconomic consequences of banking crises in OECD countries*
(March 2009) David Haugh, Patrice Ollivaud and David Turner

682. *Adjusting housing policies in Slovakia in light of euro adoption*
(March 2009) Felix Hüfner

681. *Achieving fiscal flexibility and safeguarding sustainabilit - The case of Slovakia*
(March 2009) Isabell Koske

680. *Raising the flexibility of the Slovak economy during the catch-up phaseDo Latin American central bankers behave non-linearly? The experience of Brazil, Chile, Colombia and Mexico*
(March 2009) Isabell Koske

679. *Do Latin American central bankers behave non-linearly? The experience of Brazil, Chile, Colombia and Mexico*
(February 2009) Luiz de Mello, Diego Moccero and Matteo Mogliani

678. *Enhancing educational performance in Australia*
(February 2009) Vassiliki Koutsogeorgopoulou

677. *Quantifying the effect of financial conditions in the euro area, Japan, United Kingdom and United States*
(February 2009) Stéphanie Guichard, David Haugh et David Turner