Fiscal Consolidation Across Government Levels - Part 3. Intergovernmental Grants, Pro- or Counter-cyclical?

Hansjörg Blöchliger,

Balázs Égert

OECD

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FISCAL CONSOLIDATION ACROSS GOVERNMENT LEVELS
PART 3: INTERGOVERNMENTAL GRANTS, PRO- OR COUNTER-CYCLICAL?

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By Hansjörg Blöchliger and Balázs Égert

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ABSTRACT / RÉSUMÉ

Fiscal consolidation across government levels
Part 3: Intergovernmental grants, pro- or counter-cyclical?

This paper provides empirical analysis that measures the cyclical properties of intergovernmental transfers (or grants). Modelling a fiscal policy reaction function this paper tests whether the transfers systems in OECD countries are pro- or counter-cyclical, *i.e.* whether they offset cyclical fluctuations of sub-central economies or, on the contrary, exacerbate them. Regression results suggest that transfer systems tend to be pro-cyclical in general and in more than half of OECD countries they tend to destabilise sub-central budgets. Transfer pro-cyclicality may be the result of several factors: Transfer spending is often determined as a share of central government tax revenue, which itself tends to fluctuate with the cycle. Moreover, many grants are matching sub-central spending and hence tend to exacerbate fluctuations of that sub-central spending. Pro-cyclical grants could partly explain the often observed pro-cyclicality of sub-central government fiscal policy.

JEL classification codes: H42; H50; H77

Keywords: Fiscal federalism; stabilisation; intergovernmental grants; pro-cyclicality

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Assainissement budgétaire aux différents niveaux d'administration
Partie 3 : Les dons interadministrations ont-ils un effet pro ou anticyclique ?

Ce document présente une analyse empirique qui évalue les propriétés cycliques des transferts (ou dons) interadministrations. En modélisant une fonction de réaction de la politique budgétaire, ce document détermine si les systèmes de transfert dans les pays de l'OCDE sont pro ou anticycliques, c'est-à-dire s'ils compensent les variations cycliques des économies infranationales ou, au contraire, les amplifient. Les résultats des régressions suggèrent que les systèmes de transferts sont procycliques en général et dans plus de la moitié des pays de l'OCDE, et ont tendance à déstabiliser les budgets des administrations infranationales. La procyclicité des transferts peut être la conséquence de plusieurs facteurs : les dépenses de transfert représentent souvent un pourcentage des recettes fiscales de l'administration centrale, qui elles-mêmes fluctuent en fonction du cycle. En outre, de nombreux dons sont proportionnels aux dépenses infranationales et ont donc tendance à amplifier les fluctuations de ces dépenses infranationales. Le caractère procyclique des dons pourrait expliquer en partie la procyclicité souvent observée de la politique budgétaire des administrations infranationales.

Classification JEL : H42 ; H50 ; H77

Mots-clés : fédéralisme budgétaire ; stabilisation ; dons et transferts interadministrations ; procyclicité

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**FISCAL CONSOLIDATION ACROSS GOVERNMENT LEVELS
PART 3: INTERGOVERNMENTAL GRANTS, PRO- OR COUNTER-CYCLICAL?**

by

Hansjörg Blöchliger and Balázs Égert[1]

1. Introduction

Intergovernmental grants are an important revenue source for sub-central governments (SCG), in general designed to cover spending needs or to equalise tax raising capacity. However, while most grant systems tend to reduce fiscal differences between SCGs, they do not necessarily the economic cycle and stabilise own sub-central revenue over time. Many intergovernmental grants could be pro-cyclical, *i.e.* grant allocation is generous in good times and parsimonious in bad times, thereby exacerbating revenue fluctuations at the sub-central level. In such cases, sub-central fiscal policy could become pro-cyclical, especially if SCGs are bound by fiscal rules constraining deficits or prohibiting borrowing.

This paper tests the cyclical properties of intergovernmental grant systems based on a central government fiscal policy reaction function. The paper is organised as follows. The next section presents a short overview on the literature on the cyclical properties of grants. Section three describes the model, the estimation technique and the data. Section four presents the regression results, both in general and for individual countries. Section five suggests some underlying reasons for why many transfer systems are pro-cyclical. Reducing the pro-cyclical properties of intergovernmental grants could be an instrument for general government fiscal consolidation.

2. Literature overview

The literature on the cyclical behaviour of intergovernmental grants is scarce[2]. There are only a few within-country studies. The Canadian equalisation system tends to destabilise provincial budgets and is likely to be pro-cyclical (Boadway and Hayashi, 2004). The German system of intergovernmental transfers appears to have mixed effects: while horizontal equalisation (transfers from rich to poor sub-central governments) tends to be counter-cyclical, vertical grants (from the central government to SCGs) are pro-cyclical (von Hagen and Hepp, 2000). Rattso and Tovmo (1998) argue that business cycles and equalisation payment fluctuations have an asymmetric effect on the behaviour of Danish municipalities: in

2.   Most studies deal with intergovernmental transfer systems from a risk-sharing and equalisation point of view, which leaves out the dimension of stabilisation over time. For a survey on this literature see von Hagen (2008).

an upturn SCG expenditure are increased while in a downturn tax rates are increased, prompting the public sector to increase. Caldera-Sanchez (2013) argues that the Mexican transfer system is highly pro-cyclical. Rodden and Wibbels (2010) in a cross-country setting argue that discretionary transfers are either at best a-cyclical or pro-cyclical. Finally, Blöchliger and Petzold (2009) assess the SCG-revenue-stabilising properties of the intergovernmental grant systems of all OECD countries using a set of indicators and suggest that at least half of these systems destabilise sub-central budgets and tend to be pro-cyclical.

3. Estimation and data issues

3.1. The model specification

The methodology to measure the cyclical properties of intergovernmental transfers is largely identical to the one used by Égert (2010) for assessing the cyclicality of a set of fiscal policy variables such as general government budget balances, tax revenues and various spending categories. Several approaches exist to measure the cyclical behaviour of fiscal policy variables. The approach taken here is to link intergovernmental grants to their own lagged values, the cyclical position of the economy and a number of control variables. All determinants of intergovernmental grants – not only the cyclical position – are inserted into one equation. Hence a linear multivariate fiscal policy reaction function of the following form is estimated:

$$F_t = \alpha_i + \beta \cdot F_{t-1} + \gamma \cdot cycle_t + \sum_{j=1}^{k} \delta_j \cdot X_{j,t} + \varepsilon_t \qquad (1)$$

where F is the intergovernmental grants variable, $cycle$ is a measure of the business cycle and X_j represents the control variables where k is the number of control variables. The business cycle variable reflects the state of the national economy and does not account for variations in the cycle across SCGs within a country, and the grants variable reflects growth of total grants disbursed to SCGs.[3] Hence, the extent to which grants react to idiosyncratic shocks in individual jurisdictions cannot be assessed. Different control variables X could be inserted sequentially into the equation but only results using the full variable set will be presented.

To assess the cyclical properties of transfers for each country, a pooled OLS regression is estimated in which the cycle variable is interacted with country dummies:

$$F_t = \alpha_i + \beta \cdot F_{t-1} + \sum_{i=1}^{n} \gamma_i \cdot cycle_{i,t} \cdot D_i + \sum_{j=1}^{k} \delta_j \cdot X_{j,t} + \varepsilon_t \qquad (2)$$

where n is the number of countries and D is a country dummy that takes the value of 1 for a given country and is zero otherwise.

3.2. Estimation methods

Following Égert (2010), annual panel data are used to analyse the extent to which fiscal policy reacts to the cycle. Different estimation techniques are applied: a) the Least Square Dummy Variable estimator (LSDV or country fixed effects OLS), with or without the lagged dependent variable; b) the system GMM estimator, developed by Arellano and Bover (1995), to account for possible endogeneity of the business cycle variable, again with or without the lagged dependent variable. It should be noted that all estimation methods have some drawbacks. Static models (not considering the lagged dependent variable) may be subject to omitted variable bias. LSDV estimations applied to a dynamic setting (including the lagged dependent variable) may suffer more an endogeniety bias. The GMM estimator, while accounting for endogeneity arising from the inclusion of the lagged dependent variable as an explanatory variable, and

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3.   Instead of regressing the growth rate of transfers on the output gap, the use of a cyclical component of transfers could also be used as the dependent variable.

possibly between the intergovernmental grant variable and the other control variables, is designed for datasets with a large cross-section dimension (N) and a relatively small time dimension (T): our dataset has a limited N. The Kiviet estimator (Kiviet, 1995; Bruno, 2005a; Bruno, 2005b) corrects the LSDV estimator for the bias induced by the lagged dependent variable but it assumes that all other right-hand side variables are strictly exogenous to the dependent variable (results based on the Kiviet estimator are not reported but are available upon request).

3.3. Data

Data on intergovernmental transfers are drawn from the OECD's Fiscal Decentralisation database. The dependent variable is measured as real growth of intergovernmental transfers. Transfers are financial flows accounted for on the spending side of an upper level government and on the revenue side of a lower level government, as defined in the OECD National Accounts. For federal/regional countries, total transfers are calculated as the sum of transfers from central to state/regional, from central to local and from state/regional to local government. Transfers to or from the social security sector are excluded, as well as transfers flowing from lower to upper level governments. Because growth rates are sometimes strongly fluctuating, especially in some Central and Eastern European countries due to important structural changes in the assignment of responsibilities and resources, we also account for the effect of outliers by restricting our dataset to growth rates below 30% per year in absolute terms. However, these restrictions have little impact on the results.

The cycle is measured either by real GDP growth rates or the output gap estimated by the OECD or the growth rates of these variables. The other control variables include standard controls used in the literature such as the lagged public debt-to-GDP ratio, debt servicing (interest payments as a per cent of GDP), openness (exports and imports as a ratio of GDP), population growth, the size of the public sector (government consumption as a per cent of GDP), a EU and euro area dummy, a measure of inflation (CPI) and GDP volatility. Political economy variables are also added that capture the strength of left or right-wing governments, the educational and professional background of the prime minister and the timing of elections (first half or second half in a given year). The growth rate of the real house and stock prices are also used as controls to see the extent to which transfers fluctuations are affected by asset price cycles.

The cycle variable is measured alternatively as the output gap and the real GDP growth rate, both in levels and first differences, obtained from the OECD's Economic Outlook database. Control variables are mostly obtained from the Economic Outlook database and other OECD sources. Exceptions are the political economy variables that are sourced from the Comparative Political Dataset I and II 1960-2006 compiled at the University of Bern and from www.electionguide.org. Data for the years 2007 and 2008 are collected from internet sources (mostly Wikipedia). The data concerning the background of politicians draw on Dreher *et al*. (2009). House prices are obtained from the OECD house price database (a compilation of national data sources) and from national sources (central banks and statistical offices). Sources for all data except intergovernmental grants are detailed in Égert (2010). The choice of the (almost) identical dataset with the dataset used in Égert (2010) allows for comparisons with the cyclicality of other fiscal policy variables, especially other government spending items which are shown in Table 10 in Égert (2010).

4. Results

4.1. Overall link between transfers and the cycle

The LSDV estimation without lagged transfers suggests that intergovernmental transfers are pro-cyclical if the cycle is measured by the output gap. The coefficient estimate is around 0.8 with little difference whether the full sample is taken or whether annual changes in grant volume larger than +/-30% are excluded (such changes often reflect changes in accounting rather than true policy changes). This implies that a 1 percentage point change in the output gap is associated with 0.8 percentage point higher growth rate of intergovernmental transfers (Table 1, Panel A). The results suggest that in general transfer systems are rather ineffective in accommodating sub-central needs in times of an economic downturn and in insuring against a shrinking SCG tax revenue base. The estimated coefficients are insignificant for the other cycle variables (real growth rate, change in output gap, change in real growth rate). Adding the lag of transfers as an independent variable to the estimation hardly changes results, and the lag is insignificant (not shown).

Table 1.   Intergovernmental transfers and the cycle

Panel A. OLS with country fixed effects, no lags

Dependent variable	Transfer growth				Transfer growth, absolute changes > 30% excluded			
Cycle variable								
output gap	**0.789****				**0.780****			
real growth rate		**0.205**				**0.226**		
D_output gap			**0.182**				**0.298**	
D_real growth rate				**-0.0401**				**-0.0682**
D_inflation	-0.00154	0.0506	0.0545	0.0411	0.0596	0.108	0.12	0.0969
D_house prices	-0.0698	-0.052	-0.0462	-0.0321	-0.0561	-0.0395	-0.0396	-0.0163
D_share prices	-0.0225	-0.0322*	-0.0323*	-0.0300*	-0.00941	-0.0196	-0.0205	-0.0169
D_debt	-0.231	-0.299*	-0.305*	-0.297*	-0.0759	-0.139	-0.149	-0.134
Debt servicing	-0.0834	-0.0787	-0.0789	-0.079	-0.0561	-0.0514	-0.0516	-0.0517
D_openness	0.015	-0.0227	-0.0214	-0.00057	-0.00277	-0.0419	-0.0493	-0.0145
D_dependency ratio	2.580*	2.208*	2.084*	1.949	0.148	-0.176	-0.251	-0.468
D_government size	1.308*	1.309*	1.296*	1.256	1.734**	1.736**	1.759**	1.694**
D_interest rate	-0.52	-0.252	-0.253	-0.215	-0.691**	-0.430*	-0.450*	-0.389*
Maastricht dummy	1.060**	1.110**	1.111**	1.120**	0.706*	0.759**	0.753**	0.770**
Euro area dummy	-2.248	-1.846	-1.933	-2.004	0.36	0.751	0.697	0.575
GDP growth volatility	0.668	0.314	0.308	0.277	0.47	0.12	0.124	0.0766
Left wing government	0.053	0.00179	-0.0087	-0.0109	-0.014	-0.0468	-0.0582	-0.0596
Right wing government	-0.176	-0.176	-0.181	-0.182	-0.160*	-0.161*	-0.165*	-0.166*
Prime minister's background	0.497	0.588	0.538	0.541	-0.263	-0.196	-0.245	-0.241
Election date early in year	3.303**	3.230**	3.225**	3.202**	3.796**	3.742**	3.745**	3.716**
Election date late in year	0.926	0.799	0.8	0.864	0.62	0.485	0.462	0.568
Number of observations	*393*	*393*	*393*	*393*	*385*	*385*	*385*	*385*
adj. R-sq	*0.032*	*0.018*	*0.017*	*0.017*	*0.073*	*0.047*	*0.048*	*0.045*

Notes: * and ** denote statistical significance at the 10% and 5% levels. The four variables reflecting the cycle are inserted sequentially into the equation. D_ before a variable name indicates first differences. The estimations are run alternatively a) for all transfers (full panel) and b) excluding annual changes in transfer growth exceeding +/- 30%. Positive values for the cycle variables mean pro-cyclicality, negative ones counter-cyclicality. Coefficients reflect point elasticities, *i.e.* a coefficient of 0.20 means that a one percentage point increase in the real GDP growth rate is associated with a 0.2 percentage point increase in real transfer growth.

Table 1. Intergovernmental transfers and the cycle (*cont.*)

Panel B. System GMM with lagged transfers as independent variable

Dependent variable	Transfer growth				Transfer growth, absolute changes > 30% excluded			
Cycle variable								
output gap	**0.638****				**0.629****			
real growth rate		**0.433***				**0.474***		
D_output gap			-0.00443				0.0359	
D_real growth rate				-0.0624				-0.144
Transfers(-1)	0.0321	0.0354	0.0447	0.0449	0.110	0.107	0.124	0.125
D_inflation	0.0355	0.0671	0.0614	0.0608	0.0116	0.0385	0.0347	0.0317
D_house prices	-0.0356	-0.0479	-0.00452	-0.00209	-0.00336	-0.0185	0.0264	0.0349
D_share prices	-0.0171	-0.0292**	-0.0245*	-0.0237	-0.00900	-0.0218*	-0.0173	-0.0150
D_debt	-0.231*	-0.284*	-0.285*	-0.277*	-0.134	-0.177*	-0.179*	-0.159
Debt servicing	-0.0774	-0.0711	-0.0697	-0.0702	-0.0609	-0.0546	-0.0523	-0.0532
D_openness	0.0523	-0.00460	0.0427	0.0489	0.0348	-0.0228	0.0281	0.0464
D_dependency ratio	2.094**	2.550**	1.801*	1.783*	-0.00667	0.467	-0.273	-0.346
D_government size	1.008	1.110	0.909	0.951	1.410**	1.555**	1.326**	1.414**
D_interest rate	-0.420	-0.250	-0.181	-0.179	-0.488*	-0.321	-0.261	-0.247
Maastricht dummy	1.257**	1.303**	1.341**	1.341**	0.960**	1.005**	1.047**	1.050**
Euro area dummy	-1.513	-1.217	-1.454	-1.459	0.00697	0.314	0.0444	0.0233
GDP growth volatility	0.622	0.218	0.274	0.271	0.770*	0.356	0.428	0.413
Left wing government	0.132	0.144	0.132	0.132	-0.0330	-0.0223	-0.0340	-0.0355
Right wing government	-0.0517	-0.0525	-0.0598	-0.0593	-0.0391	-0.0458	-0.0539	-0.0541
Prime minister's background	0.490	0.645	0.494	0.503	-0.416	-0.265	-0.437	-0.424
Election date early in year	2.448**	2.412**	2.373**	2.381**	2.385**	2.324**	2.312**	2.333**
Election date late in year	1.152	1.018	1.141	1.169	1.301*	1.148	1.282	1.362*
Number of observations	372	372	372	372	358	358	358	358

Notes: * and ** denote statistical significance at the 10% and 5% levels. The four variables reflecting the cycle are inserted sequentially into the equation. D_ before a variable name indicates first differences. Transfers(-1) is the lagged transfer variable. The estimations are run alternatively a) for all transfers (full panel) and b) excluding annual changes in transfer growth exceeding +/- 30%. Positive values for the cycle variables mean pro-cyclicality, negative ones counter-cyclicality. Coefficients reflect point elasticities, *i.e.* a coefficient of 0.20 means that a one percentage point increase in the real GDP growth rate is associated with a 0.20 percentage point increase in real transfer growth.

Some control variables show interesting features. Government size is strongly and positively related with transfer growth, although this could reflect some endogeneity as transfers could be one of the causes of a large public sector. The variable reflecting an election date early in the year is strongly related with higher transfers, suggesting that electoral cycles could have a considerable impact on transfer growth. EU countries (represented by the "Maastricht" dummy variable) feature higher transfer growth rates. Higher interest rates are associated with lower transfer increases, although this holds only true for the panel where annual transfer changes of more than +/-30% are excluded. A higher old-age dependency ratio is associated with higher transfers, but only for the panel incorporating all transfers. Increasing debt is associated with lower transfer growth.

The system GMM estimator improves estimation results compared to the LSDV estimation since both the output gap and real GDP growth now become positively and significantly associated with transfer growth, corroborating the pro-cyclical effect of transfer systems (Table 1, Panel B). The lagged variable is again insignificant. The coefficients for the control variables are close to the LSDV estimation.

4.2. Link between transfers and the cycle for individual countries

The pooled regression for individual countries tends to corroborate the findings of the overall estimation. The pooled regression using the output gaps as the cycle variable suggests that around one third of national grant systems are counter-cyclical, while around two-thirds are pro-cyclical, although the relationship is often not significant (Table 2, Panel A). Using real GDP growth, the change in real growth or the change in the output gap changes the results for some countries, with some turning from significantly positive to significantly negative or vice versa, suggesting that the results are not always robust to the choice of the cycle variable.

Using an OLS estimator, including the lagged dependent variable, does not change the overall picture of generally pro-cyclical transfer systems, but coefficients tend to be larger and more significant, while the lag of the transfer variable is insignificant (Table 2, Panel B). Again, the cyclical effect of the transfer system in some countries depends on the choice of the cycle variable.

Table 2. Country-specific reactions of transfer systems to the cycle

Panel A. Pooled estimator, no lags

	All transfers				Transfer growth with absolute changes > 30% excluded			
	Output gap	Real growth	D_output gap	D_real growth	Output gap	Real growth	D_output gap	D_real growth
AUT	0.468	0.470	3.786**	4.713**	1.558	-0.300	3.630**	4.472**
BEL	1.057*	-0.984*	-0.403	-0.387	0.907**	-0.832*	-0.391	-0.396
CAN	0.0341	-0.327	-0.843**	-0.502*	-0.0886	-0.227	-0.865**	-0.522*
CHE	0.252	-1.260*	0.395	0.000340	-0.0354	-1.097*	0.240	-0.0771
CZE	0.437	0.945	6.167	4.179	0.324	-0.662	-2.792	-3.111
DEU	0.758	-1.920**	0.653	0.446	0.519	-1.740**	0.511	0.320
DNK	0.597	-0.0835	0.207	0.0245	0.497	0.0569	0.226	-0.00864
ESP	-0.652	-0.0826	0.466	-0.153	-0.960	0.0309	0.405	-0.404
FIN	0.565	-0.537	-1.072**	-0.617	0.488	-0.453	-1.069**	-0.620
FRA	-0.662	-0.692	-2.190**	-0.622	-0.863	-0.518	-2.251**	-0.601
GBR	2.690	-0.369	-3.706**	-1.716	0.278	-0.440	-2.703**	-0.502
HUN	0.624	-0.459	0.553	0.865	1.869*	-0.585	2.537*	0.359
IRL	0.539	0.131	-0.328	-0.823	0.972*	0.725**	0.147	-0.275
ISL	0.497	1.556	1.608	1.995	1.303**	0.756	0.368	0.530
ITA	0.729	-1.243*	0.0721	0.487	0.340	-1.081	-0.0895	0.396
KOR	-2.385	0.816*	-1.635	-1.698**	-2.932	0.909**	-1.779	-1.822**
MEX	-0.140	0.413	-0.123	0.302	-0.391	0.533	-0.130	0.240
NLD	0.628	-0.636	-0.354	-0.375	0.245	-0.160	-0.114	-0.346
NOR	0.201	-0.793	-0.407	-1.430	0.581	-0.664	-0.354	-1.555
POL	2.370**	1.022**	0.294	-0.733	2.813**	1.099**	0.379	-0.783
PRT	0.329	1.465	2.978	1.679	-0.615	-0.187	-0.0477	0.126
SVK	-8.238	3.076	-1.968	4.466	-2.761**	-0.748	-3.236*	5.129**
SWE	0.970	-0.254	0.297	0.757	0.939	-0.940*	-0.763	0.309
USA	-0.111	0.141	0.0855	0.410	-0.241	0.244	0.0655	0.405
TUR	-0.123	0.500	-0.172	-0.395	-0.355**	0.778*	-0.409**	-1.060**
Observations	*459*	*459*	*458*	*459*	*443*	*443*	*442*	*443*
Adj. R-sq	*0.040*	*-0.032*	*-0.026*	*-0.011*	*0.028*	*0.025*	*0.018*	*0.033*

Notes: ** and ** denote statistical significance at the 10% and 5% levels. The four variables reflecting the cycle are inserted sequentially into the equation. The estimations are run alternatively a) for all transfers (full panel) and b) excluding annual changes in transfer volume exceeding +/- 30%. Positive values for the cycle variables mean pro-cyclicality, negative ones counter-cyclicality. Coefficients reflect point elasticities, *i.e.* a coefficient of 0.20 means that a one percentage point increase in the real GDP growth rate is associated with a 0.20 percentage point increase in real transfer growth. Control variables shown in Table 1 were included in the estimation but are not reported here.

Table 2. Country-specific reactions of transfer systems to the cycle (*cont.*)

Panel B. OLS estimation with lagged transfers as independent variable

	All transfers				Transfer growth, absolute changes >30% excluded			
	Output gap	Real growth	D_output gap	D_real growth	Output gap	Real growth	D_output gap	D_real growth
AUT	0.262	3.732**	3.304**	4.304**	1.542**	4.009**	3.732**	4.753**
BEL	1.024**	-0.362**	-0.336**	-0.387**	1.036**	-0.350**	-0.362**	-0.406**
CAN	0.000542	-0.753**	-0.794**	-0.689**	0.0089	-0.546**	-0.753**	-0.615**
CHE	-0.639**	0.506**	0.289	0.00506	-0.605**	-0.577**	0.506**	0.218
CZE	-5.637**	0.0136	3.766**	6.638**	1.083**	-0.0202	0.0136	-2.945**
DEU	-0.0329	-0.406**	-0.525**	-0.353**	0.0182	-0.533**	-0.406**	-0.272**
DNK	0.525**	0.164**	0.199**	0.0864*	0.539**	-0.437**	0.164**	0.0354
ESP	-1.222**	0.483**	0.405**	0.0636	-1.206**	-0.290**	0.483**	-0.161
FIN	0.568**	-1.037**	-0.912**	-0.546**	0.569**	-0.782**	-1.037**	-0.564**
FRA	-0.532**	-2.511**	-2.501**	-2.561**	-0.545**	-1.942**	-2.511**	-2.410**
GBR	5.038**	-1.497**	-2.684**	-2.112**	1.277**	-1.098**	-1.497**	0.17
HUN	0.349	-0.124	0.281	1.031**	-0.812**	1.027**	-0.124	-0.776**
IRL	0.546**	0.766**	-0.211**	-0.978**	1.079**	0.676**	0.766**	0.00193
ISL	1.168**	0.912**	0.27	0.725**	1.101**	0.994**	0.912**	1.001**
ITA	-0.096	-0.872**	-0.955**	-0.290**	-0.0476	-0.677**	-0.872**	-0.308**
KOR	0.972**	-0.390**	-0.557**	-0.872**	1.013**	-0.315	-0.390**	-0.710**
MEX	0.148	0.0515	0.172	1.396**	0.0718	0.139	0.0515	1.361**
NLD	0.335**	-0.248**	-0.205**	-0.224**	0.350**	-0.299**	-0.248**	-0.255**
NOR	1.575**	-0.0898	0.0235	-1.270**	1.642**	0.496**	-0.0898	-1.603**
POL	1.532**	0.601**	0.788**	0.626**	1.455**	0.705**	0.601**	0.381*
PRT	0.322*	-0.480**	2.476**	2.144**	-0.374**	0.164**	-0.480**	-0.0345
SVK	-9.050**	-1.137**	-0.896**	4.700**	-2.675**	-1.326**	-1.137**	4.852**
SWE	0.0732	-0.494**	0.554*	2.774**	0.216	0.312*	-0.494**	1.799**
USA	-0.103	0.0778	-0.0452	0.249**	-0.059	0.0695	0.0778	0.294**
transfers (-1)	0.0574	0.129	0.132	0.143	0.0232	0.0262	0.0272	0.0253
N	430	430	430	430	404	404	404	404
Adj. R-sq	0.049	-0.024	-0.027	0.007	0.003	-0.005	-0.013	0.030

Notes: * and ** denote statistical significance at the 10% and 5% levels. The four variables reflecting the cycle are inserted sequentially into the equation. The estimations are run alternatively a) for all transfers (full panel) and b) excluding annual changes in transfer volume exceeding +/-30%. Positive values for the cycle variables mean pro-cyclicality, negative ones counter-cyclicality. Coefficients reflect point elasticities, *i.e.* a coefficient of 0.20 means that a one percentage point increase in the real GDP growth rate is associated with a 0.20 percentage point increase in real transfer growth. Transfers(-1) stands for the lagged transfer variable. Control variables shown in Table 1 were included in the estimation but are not reported here.

5. Why are transfers often pro-cyclical?

There are a number of reasons why many intergovernmental transfer systems have pro-cyclical properties:

- Many grant formulas contain an element of tax sharing, *i.e.* total grant spending is determined by total or central government tax revenue. Since tax revenue tends to move pro-cyclically, spending on transfers also becomes pro-cyclical. The nature of some transfers as being akin to tax-sharing in Japan, Korea or Poland could explain their destabilising impact, while the needs-based transfer systems of Sweden or Finland tend to have good stabilisation properties.

- Many grants (around 40%) are matching 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 in Austria or Hungary could 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, as in Canada or Germany.

- Finally, political economy forces could be responsible for pro-cyclical transfers. 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 easily be adapted to changing budget conditions and become pro-cyclical.

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 more likely to run excessive surpluses or deficits if they want to limit spending fluctuations. Budgeting becomes even more difficult, if fiscal rules set limits on SCG deficit spending or on borrowing, rendering pro-cyclical SCG fiscal policy even more likely.

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