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Fiscal Decentralisation in Colombia: New Evidence Regarding Sustainability, Risk Sharing and "Fiscal Fatigue"

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ABSTRACT/RÉSUMÉ

Fiscal Decentralisation in Colombia: New Evidence Regarding Sustainability, Risk Sharing and "Fiscal Fatigue"

Colombia has engaged in a sustained process of fiscal decentralisation over the past decades. This paper analyses three aspects of fiscal performance for Colombia's departments. First, it studies the sustainability aspects of subnational finances by estimating a fiscal reaction function. Evidence is presented that the current framework is conducive to fiscal sustainability, especially after the reforms in the late 1990s and early 2000s. Second, the paper analyses the impact of transfers and oil and mining royalties and the effort to raise own tax revenues at the departmental level. Overall, there is little evidence of a negative effect of transfers from the central government on departmental tax revenue, the so-called "fiscal fatigue". Finally, the paper presents evidence of a limited degree of risk sharing of departmental idiosyncratic shocks, as transfers from the central government are mostly pro-cyclical.

This Working Paper relates to the *2014 OECD Economic Survey of Colombia*.
(www.oecd.org/eco/surveys/economic-survey-colombia.htm)

JEL classification codes: C1, E62, H7
Keywords: subnational finances, fiscal fatigue, risk sharing, transfers, royalties, fiscal reaction function

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Décentralisation budgétaire en Colombie : Nouveaux résultats concernant la viabilité, le partage des risques et la « fatigue budgétaire »

La Colombie s'est engagée dans un processus soutenu de décentralisation budgétaire au cours des dernières décennies. Ce papier analyse trois aspects de la performance budgétaire des départements Colombiens. Premièrement, il évalue la viabilité des finances infranationales en estimant une fonction de réaction budgétaire. Les résultats montrent que le cadre actuel est favorable à la viabilité budgétaire, particulièrement à la suite des réformes de la fin des années 1990 et du début des années 2000. Deuxièmement, le papier analyse l'impact des transferts et des royalties du secteur pétrolier et minier ainsi que l'effort des départements pour collecter leurs propres recettes fiscales. Dans l'ensemble, l'analyse démontre peu d'effet négatif des transferts du Gouvernement central sur les recettes fiscales des départements, ce qu'on appelle une « fatigue budgétaire ». Pour finir, l'analyse démontre un degré limité de partage des risques face à des chocs idiosyncratiques car les transferts du gouvernement central sont, le plus souvent, pro-cycliques.

Ce document de travail se rapporte à l'*Étude économique 2014 de l'OCDE sur la Colombie*
(www.oecd.org/fr/eco/etudes/etude-economique-colombie.htm).

Classification JEL : C1, E62, H7
Mots clés : Finances infranationales, fatigue budgétaire, partage des risques, transferts, royalties, fonction de réaction budgétaire

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FISCAL DECENTRALISATION IN COLOMBIA: NEW EVIDENCE REGARDING SUSTAINABILITY, RISK SHARING AND "FISCAL FATIGUE"

By Guillaume Bousquet, Christian Daude and Christine de la Maisonneuve[1]

Introduction

1. The constitutional reform of 1991 implied a fundamental change to fiscal relations across levels of government in Colombia. Since then, Colombia has undergone a steady process of fiscal decentralisation. In particular, the 1991 reform – and subsequent adjustments – assigned more spending responsibilities to departments and municipalities, especially in the areas of education, health, water and sanitation. This process has been accompanied by an increase in the amount of national tax revenue shared with departments and municipalities and the creation of some subnational taxes as sources of own tax revenues. Currently, Colombia is the most decentralised unitary country in Latin America.

2. Subnational governments in Colombia have significant financial resources and spending responsibilities. Subnational expenditures currently amount to one third of total general government expenditures, slightly below the OECD average of around 40%. Furthermore, more than half of total public investment is done by subnational governments. However, their tax revenues represent only 18% of overall tax revenues, almost half the OECD average (OECD, 2014). This vertical fiscal imbalance is not necessarily a problem, as it might be more efficient to raise revenues at the national level while decentralising expenditures would better address demands for local public goods, but it poses some challenges. For example, it has been argued that large and fast growing transfers from the central government might reduce the incentives to raise more own revenues and improve the quality of expenditures at the subnational level.

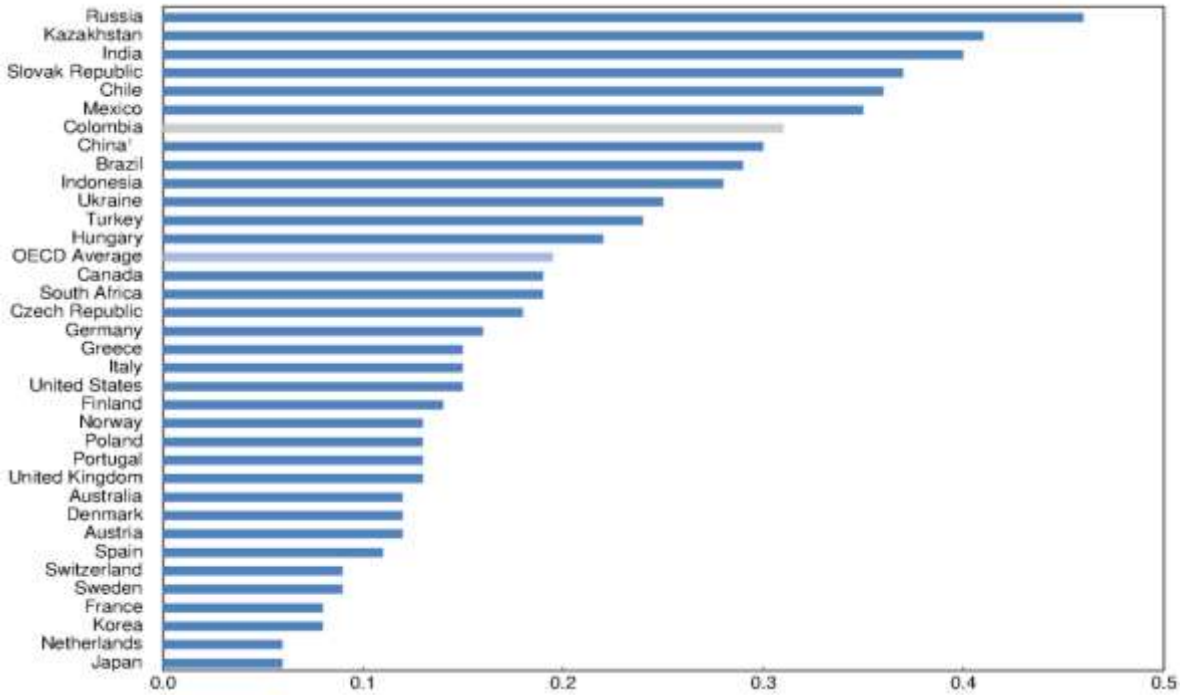
3. The effective degree of autonomy of subnational governments in Colombia in using the funds is limited. Most of subnational taxes and transfers from the revenue sharing system are earmarked, mainly for education, health, water and sanitation. The central government sets targets for coverage and quality standards in each sector. The main objective is to guarantee that everybody has access to these key public services with similar quality. Subnational governments are allowed to use any surplus resources in areas of their choice only if these targets and standards have been accomplished. Thus, in general subnational governments basically execute expenditures with no autonomy and little incentive regarding how to improve these services.

4. There are few signs of convergence in living standards across departments, despite significant efforts in fiscal decentralisation in the last two decades (Bonet, 2006). Inequality in GDP per capita across departments is high compared to OECD economies and other large emerging market economies (Figure 1). A recent study finds that it would take the department of Choco 200 years to converge to Bogota's income per capita levels (Galvis and Meisel, 2012). The revenue sharing system between the central and subnational governments (SGP) does little to change these inequalities, as fiscal equalisation has not been a priority. The system also does not compensate for the better ability of well-off departments and municipalities to raise their own revenues from local and departmental taxes compared to the poorer departments.

[1] The authors are members of the Colombia desk in the Economics Department of the OECD. The paper was originally prepared for the OECD Economic Survey of Colombia published in January 2015 under the authority of the Economic and Development Review Committee. The authors would like to thank Asees Ahuja, Pablo Antolin, Hervé Boulhol, Anna D'addio, Bob Ford, Horacio Levy, Angel Melguizo, Alvaro Pereira, Andrew Reilly and Piritta Sorsa and all participants of an internal OECD seminar for their for valuable comments on earlier drafts. Special thanks go to Anthony Bolton and Inés Gómez Palacio for general administrative support.

Figure 1. **Income per capita inequality across regions is high**

Gini coefficient across regions



1: For China, the autonomous regions of Hong Kong, Macau and Tapei were excluded.

Source: OECD (2013), Regions at a Glance.

5. Most of subnational financial resources come from transfers from the general budget, which amount to half of their municipal and departmental revenues. While transfers represented just 20% of total subnational revenues in 1985, they increased significantly after the Constitution of 1991, representing today around half of all revenues. At the same time, own tax revenues fell from above 60% to just 30% of total revenues (Figure 2).

6. Royalties from oil and mining activities are another source of significant revenue for subnational governments. The royalty sharing system (SGR) was reformed in 2012 to distribute financial resources more broadly across producing and non-producing regions and to take advantage of the commodity boom to close some infrastructure gaps. Before most of the royalties had been allocated to the oil and mining producing departments and municipalities, and spent on recurrent expenditures for education, health care, water sanitation and some basic infrastructure. As several resource-rich regions were institutionally weak, lot of the resources were diverted towards unproductive projects due to corruption (Echeverry et al., 2011). After the reform, all departments and most municipalities receive funds from the SGR for investment projects. The projects have to be approved by a collegial body (OCAD) that include public authorities from all levels of government and technical experts. As this reform is very recent, the data used in the present paper refer to the previous arrangements in terms of royalty allocation.

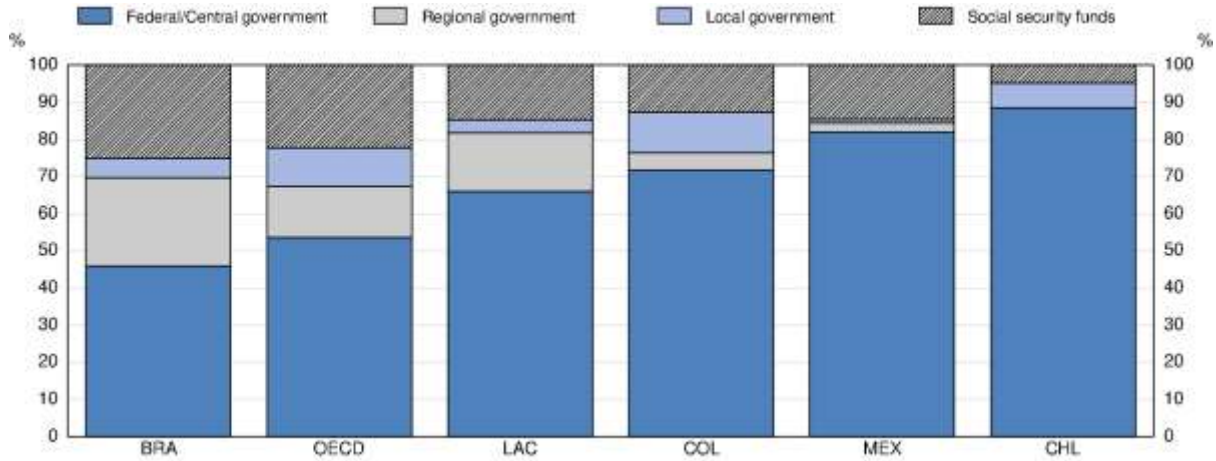
Figure 2. **Composition of subnational (municipal and departmental) revenues**

Note: Other income includes royalties, non-tax revenues, and co-financing of investment projects

Source: OECD (2014), OECD Territorial Reviews: Colombia.

7. As a result of the current framework, departments and municipalities currently rely on transfers from the national government and own tax revenues to finance current expenditures, while capital expenditures are mainly financed by the SGR. In principle, this division is reasonable. Royalties are transitory one-off revenues that should be used to foster investment projects, while current expenditures are excluded from the SGR due to their recurrent nature. The new system has increased significantly the allocation of resources towards poor regions compared to the old system (Bonet and Urrego, 2014). Nevertheless, the increase in subnational investment will require higher recurrent maintenance expenditures from the SGP in the medium term. This will put pressure on the system, as departments and municipalities have too little own revenues (OECD, 2014). In particular departments have limited own resources, compared to municipalities (Figure 3), despite the fact that departments do not only have their own responsibilities, but often have to administrate the resources and deliver public goods and services in smaller municipalities without sufficient capacity. Moreover, funds from the SGP are earmarked for departments and municipalities according to a formula based on poverty rates and demographic size. The lack of territorial data makes it difficult to take account of Colombia's rich diversity, and the amount of funds allocated through transfers has remained virtually unchanged since 2005. Given the large internal migration flows, it is possible that local needs have changed (OECD, 2014).

Figure 3. **Tax revenues by level of government in 2012**[1]



1. Colombia, departments are classified as regional government and municipalities as local government.

Source: OECD Revenue Statistics and OECD/ECLAC/CIAT (2013) Revenue Statistics in Latin America: 1990 – 2012.

8. The present paper evaluates a series of aspects of departmental finances. In particular, it explores if the current framework for subnational finances encourages towards sustainable fiscal outcomes, if it facilitates risk sharing of department-specific shocks and if transfers and royalties undermine the departments' effort to raise own tax revenues. The remainder of this paper is structured as follows. The next section presents some basic socio-economic information of the Colombian departments and their relationship with some fiscal indicators. Then, the sustainability of subnational fiscal policy is evaluated. The subsequent section analyses the relationship between the departments' own tax revenues and transfers. Finally, the degree of risk sharing of the current revenue sharing mechanism is assessed and compared with some OECD experiences.

Description of the data and some basic statistics

Socio-economic indicators

9. Colombia is composed of 32 departments that differ significantly in their size, economic structure and level of development. One source of disparities across departments is the concentration of economic activity. Table 1 shows that only 3 departments – Antioquia, Cundinamarca and Valle del Cauca – represent around 55% of the national GDP, while less than 45% of the Colombian population lives in these departments. The biggest cities of Colombia – Bogota, Medellin and Cali – are placed in these departments. Furthermore, these departments also have poverty rates among the lowest in the country. However, even within these three departments there are also significant differences across individuals and municipalities. For example, only Cundinamarca has a GDP per capita above the national average. It is also the only department out of the three where the unemployment rate is below the national level. According to data from the National Statistics Department (DANE), within Cundinamarca the city of Bogota itself represents about 25% of the national GDP, with a poverty headcount of 10.2% and lower levels of inequality with a Gini coefficient of 0.466.

10. Another indication of the large disparities across departments is that only 8 out of the 32 departments present a GDP per capita higher than the national average (Figure 4). These departments represent just 54% of the population but around 71% of the national GDP. At the same time, 9 departments have a GDP per capita more than 50% below the national average (for 10% of the population). This shows that economic activity in Colombia is concentrated in several places, but leaves large areas of the country without a strong basis of economic development (OECD, 2014).

Table 1. **Basic socio-economic indicators by department (2012)**

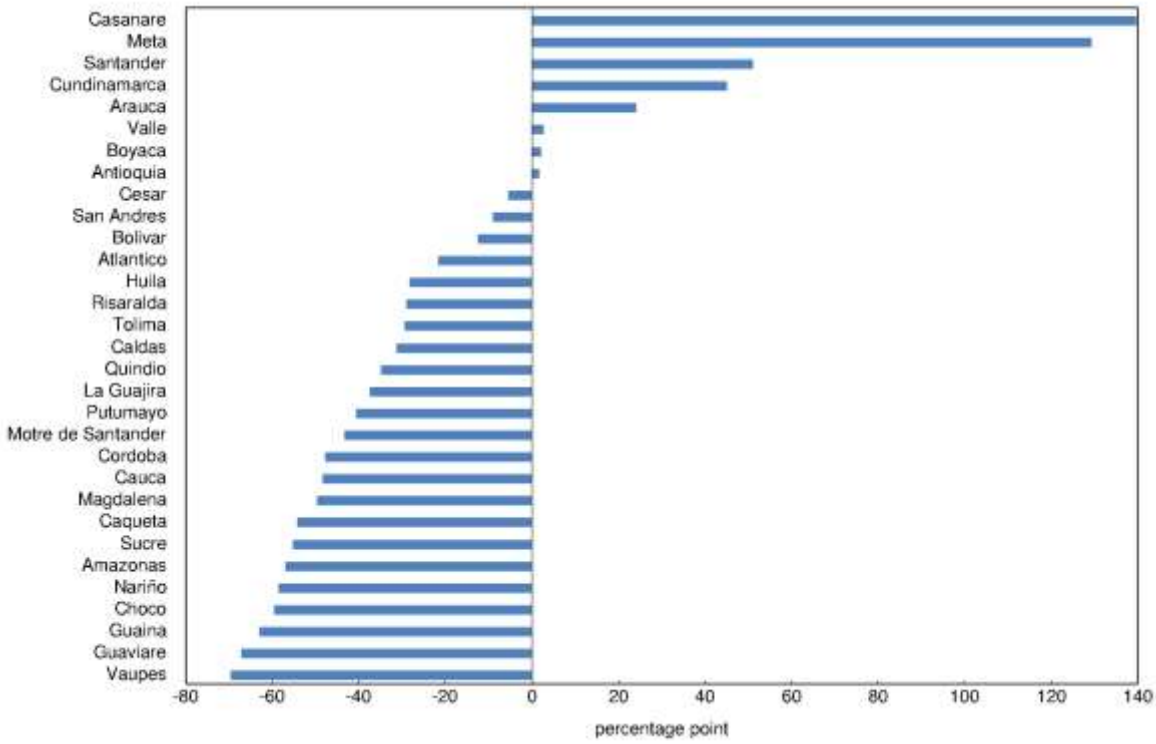
	Population	% of the National GDP	GDP Per Capita	Unemployment rate	Poverty[1]	GINI
		(%)	Millions of COP	(%)	(%)	
AMAZONAS	73,699	0.07	4.34	-	-	-
ANTIOQUIA	6,221,817	13.60	10.28	10.63	26.8	0.529
ARAUCA	253,565	0.68	12.55	-	-	-
ATLANTICO	2,373,550	3.99	7.90	8.00	33.9	0.464
BOLIVAR	2,025,573	3.80	8.84	7.62	44.2	0.507
BOYACA	1,271,133	2.79	10.32	7.30	35.6	0.532
CALDAS	982,207	1.45	6.93	10.15	35.4	0.522
CAQUETA	459,515	0.45	4.62	9.60	42.1	0.479
CASANARE	337,886	1.74	24.21	-	-	-
CAUCA	1,342,650	1.49	5.22	11.42	62.1	0.565
CESAR	991,584	2.01	9.55	9.19	46.8	0.518
CHOCO	485,543	0.42	4.09	10.73	68.0	0.616
CORDOBA	1,632,637	1.83	5.27	11.74	60.2	0.542
CUNDINAMARCA	10,128,968	31.56	14.66	9.41	21.3	0.490
GUAINIA	39,574	0.03	3.74	-	-	-
GUAVIARE	106,386	0.07	3.31	-	-	-
HUILA	1,111,947	1.71	7.24	9.71	45.4	0.559
LA GUAJIRA	874,532	1.17	6.31	8.50	58.4	0.556
MAGDALENA	1,223,875	1.32	5.09	7.83	52.3	0.510
META	906,805	4.47	23.16	10.53	29.5	0.505
NARIÑO	1,680,795	1.49	4.18	12.60	50.8	0.502
N. DE SANTANDER	1,320,777	1.61	5.72	12.44	40.4	0.485
PUTUMAYO	333,247	0.42	6.00	-	-	-
QUINDIO	555,836	0.78	6.58	15.39	38.9	0.525
RISARALDA	935,910	1.43	7.18	14.81	28.4	0.487
SAN ANDRES	74,541	0.15	9.19	-	-	-
SANTANDER	2,030,775	6.59	15.27	7.78	20.8	0.487
SUCRE	826,780	0.80	4.53	9.23	51.5	0.483
TOLIMA	1,396,038	2.12	7.13	11.28	42.3	0.523
VALLE DEL CAUCA	4,474,369	9.87	10.38	13.43	26.9	0.518
VAUPES	42,392	0.03	3.07	-	-	-
VICHADA	66,917	0.06	3.87	-	-	-
National average	**46,581,823**	**100.00**	**10.10**	**10.37**	**32.7**	**0.539**

1. Calculated as the number of people leaving below the national poverty line as a % of total population.

Source: OECD Economic Department Database and Dane.

11. Income inequality within all departments is quite high, which highlights the fact that, in addition to the regional dimension discussed here, inequality is a national phenomenon. However, at least 5 out of the 8 departments with relatively high GDP per capita levels have poverty rates and Gini coefficients below the national average (comparable data for Arauca and Casanare are not available). Not surprisingly, departments with a low GDP per capita have a poverty rate really higher than the national average: 42.1% for Caqueta (with a GDP per capita at 45% of the national level), 68% for Choco (with a GDP per capita at 40%) or 50.8% for Nariño (with a GDP per capita at 41%). Overall, remote and rural departments and those affected by the armed conflict present very low levels of socio-economic progress compared to the better-off parts of the country.

Figure 4. **GDP per capita gap relative to the national average**



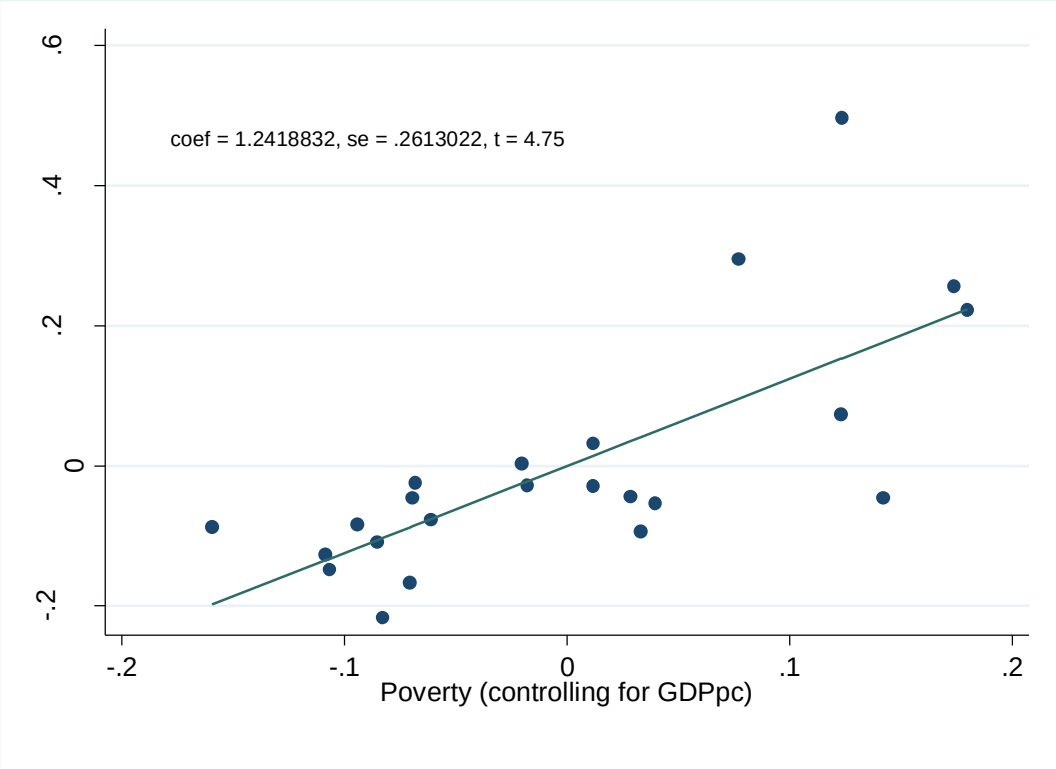
Source: OECD Economic Department Database and DANE

Differences in economic structures by department

12. Part of the disparities across departments in the socio-economic dimensions discussed above stems from the type of economic activities carried out in their territory. For the departments that include the three largest metropolitan areas, the strongest sectors are services (60% or more of the total added-value) and manufacturing (13% or more), the others five departments with a GDP per capita above the national average are rich in non-renewable natural resources with a significant share of their economic activity devoted to oil and mining. It goes from a share of 6% in value added for Santander (below the national one, but above that of almost two thirds of the others departments) to 62.8% of value added for Casanare (Table 2).

13. However, departments with significant oil and mining activity do not fare that well in terms of development and poverty. While there is a positive correlation (with a correlation coefficient of 0.56) between GDP per capita and the share of oil and mining, there is also a positive correlation between this share and poverty and inequality (with correlation coefficients 0.24 and 0.37, respectively). Furthermore, just 4 out of the 11 departments where oil and mining represent more than 10% of total value added have a GDP per capita above the national average. Seven of these departments have poverty rates above the national average (Table 2). The partial correlation – controlling for GDP per capita – between the share of oil and mining in total value added and the poverty rate is positive and significant (Figure 5).

Figure 5. **Partial correlation between oil and mining share in total value added and poverty rate by department**



Source: Authors' calculations based on DANE.

14. Poverty is also clearly associated with the agricultural sector and exacerbated by the prevalence of armed conflict (e.g. in Cauca and Choco). In 7 out of the 9 departments with the lowest GDP per capita the agriculture sector is more important than the national average (between 7.4 to 16.9% of the total value added). Overall, the correlation coefficient between departmental poverty rates and the share of agriculture is 0.51 and statistically significant.

Table 2. **Composition by sector of the total value added in 2012 by department**

(%)

	Agriculture	Oil & Mining	Manufacturing	Construction	Services	Electr. & Gas
AMAZONAS	11.7	0.0	2.0	0.0	84.7	1.6
ANTIOQUIA	6.7	2.2	16.0	7.5	61.7	5.9
ARAUCA	20.8	52.2	1.7	2.9	21.3	1.1
ATLANTICO	2.3	0.3	16.9	7.6	66.0	6.8
BOLIVAR	6.4	3.4	23.7	10.2	52.3	4.0
BOYACA	14.9	11.7	14.1	6.6	47.3	5.2
CALDAS	11.8	0.7	14.3	8.5	58.1	6.5
CAQUETA	16.7	0.8	3.6	12.8	64.0	2.0
CASANARE	11.0	62.8	2.4	4.6	17.7	1.5
CAUCA	10.6	1.8	18.1	8.0	57.9	3.5
CESAR	9.6	43.4	3.7	4.7	35.1	3.4
CHOCO	15.2	26.9	1.6	4.5	50.5	1.3
CORDOBA	15.9	14.3	3.3	7.7	54.6	4.1
CUNDINAMARCA	2.5	0.4	13.4	5.6	74.5	3.6
GUAINIA	7.4	0.0	3.0	9.6	79.3	0.7
GUAVIARE	0.5	0.5	2.7	12.1	83.0	1.1
HUILA	13.0	12.6	4.3	17.0	49.0	4.1
LA GUAJIRA	4.8	57.9	1.1	3.0	28.7	4.6
MAGDALENA	16.9	0.5	6.2	9.1	63.3	4.0
META	7.9	60.7	2.6	6.8	20.8	1.2
NARIO	15.3	1.8	5.7	7.3	68.0	1.9
NORTE DE SANTANDER	10.4	4.5	8.4	5.2	67.1	4.5
PUTUMAYO	4.6	48.0	1.3	1.7	43.4	1.0
QUINDIO	15.1	0.7	7.6	14.1	58.9	3.6
RISARALDA	9.6	0.5	15.5	6.9	64.0	3.6
SAN ANDRES	1.7	0.0	1.5	2.8	89.4	4.6
SANTANDER	7.1	6.1	23.3	15.3	45.7	2.5
SUCRE	14.0	1.0	8.4	5.9	66.1	4.5
TOLIMA	14.6	9.7	10.2	6.6	55.8	3.1
VALLE	5.5	0.3	18.5	4.8	66.9	4.0
VAUPES	4.8	0.0	0.8	5.6	87.9	0.8
VICHADA	8.3	0.4	1.6	8.7	79.8	1.2
National Average	**6.8**	**8.5**	**13.2**	**7.1**	**60.4**	**3.9**

Source: Authors' calculations based on DANE.

Basic fiscal indicators

15. This subsection presents the fiscal variables used in the rest of the paper. Most data come from DANE and the National Planning Department (DNP). In terms of time coverage, the starting range goes from 1984 to 2001 and end in 2012. There are two important issues with the datasets. First, for some series it is difficult to distinguish between genuine 0 values and those that are missing data. To address this issue,

all econometric estimates were performed by with and without these observations. Furthermore, breaks occur in many series. The main reason for this is that until 2012, departments were responsible for reporting fiscal data to the national authorities and agencies. When a 0 is reported it is difficult to know whether no money has actually been spent. Indeed, sometimes, expenditures are spread over several years but they are cumulated and reported for one year only with 0 the other years. This does not bias the results in a particular direction, but might create more noise and reduce the statistical significance of some estimates. For this reason, issues related to sub-national expenditures and investments were left out of the present paper. The DNP decided in 2012 to change the process of data reporting for department accounts and in the future data should become smoother and more accurate. Table A.2 in the Annex presents some basic summary statistics.

16. Table 3 presents the correlation between the main fiscal variables used in the regression analysis of the subsequent sections and the main departmental socio-economic variables. The results show that a higher share of oil and mining in total value added is positively correlated with higher debt levels. Furthermore, in addition of the high and positive correlation with royalties – which is natural as under the arrangement before the 2012 reform of the SGR royalties basically went to producing regions – other fiscal outcomes such as the amount of own taxes raised by department, the amount of transfers received from the central government or the primary balance have no significant correlation with the importance of oil and mining in the department. However, royalties present a positive and significant correlation with taxes, transfers and the primary balance. This provides preliminary evidence that royalties do not seem to undermine the departmental effort to raise own taxes nor fiscal results, although they are positively correlated with debt levels.

Table 3. **Correlation between fiscal and socio-economic variables**

	Oil & Mining	Manufac-turing	Services	Debt	Taxes	Transfers	Royalties	GDP	Primary Balance	Poverty rate
	% of GDP	% of GDP	% of GDP	per capita	per capita	per capita	per capita	per capita	per capita	
Oil & Mining	100									
Manufacturing	**-0.41**	100								
Services	**-0.88**	0.07	100							
Debt	**0.12**	**-0.13**	0.04	100						
Taxes	0.04	-0.05	0.07	**0.56**	100					
Transfers	-0.06	**-0.47**	**0.37**	0.08	**0.52**	100				
Royalties	**0.78**	**-0.29**	**-0.68**	**0.25**	**0.27**	**0.15**	100			
GDP	**0.59**	0.07	**-0.58**	**0.29**	**0.49**	-0.09	**0.73**	100		
Primary Balance	-0.08	-0.02	**0.17**	**0.27**	**0.60**	**0.35**	**0.07**	**0.24**	100	
Poverty rate	0.24	**-0.54**	-0.15	**-0.44**	**-0.60**	**0.42**	-0.09	**-0.67**	**-0.67**	100

Notes: Numbers in bold are significant at a 5% level.

Source: Authors' calculations based on OECD Economic Outlook database, DANE and *Banco de la República*.

17. In terms of departmental tax revenues, there is a positive and significant correlation with GDP per capita and a negative correlation with poverty, which confirms the intuition that revenues are higher in departments with a broader potential tax base due to a more significant density of economic activities and population with higher income. Furthermore, the positive correlation with the primary balance and transfers provides some preliminary evidence that transfers probably do not undermine the tax effort of departments in a significant way.

18. Finally, two additional issues are interesting to point out. First, transfers per capita present a positive correlation with the poverty rate, which indicates that the revenue sharing system has in principle a redistributive component. Nonetheless, data on poverty are only available for one year, which prevents from evaluating the actual redistributive effect of the SGP. Second, there is a positive correlation between the debt level and the primary balance, showing that departments with higher debt are on average saving more. The subsequent sections explore the preliminary finds discussed in this subsection in further detail.

Subnational fiscal sustainability

19. This section studies if fiscal policy at the department level is on average sustainable. A simple way to evaluate this is to test if the current policy framework forces subnational governments to increase their budget balance – i.e. savings – if its level of indebtness rises. It can be shown that this is a sufficient condition for fiscal sustainability (Bohn, 1998). This section evaluates this issue at the departmental level in Colombia, following a similar empirical strategy as De Mello (2008) for the case of Brazil. In particular, the following fiscal reaction function is estimated:

$$pb_{it} = \alpha pb_{it-1} + \gamma debt_{it-1} + \theta_i + \mu_t + \varepsilon_{it} \ ,$$

where *i* stands for the department and *t* are years, *pb* is the primary balance, *debt* the debt level normalised by GDP or population. In addition to a white noise error term, departmental fixed effects and time effects are included to control for unobserved effects potentially correlated with the explanatory variables and common shocks to all departments, respectively.

20. Fiscal policy is sustainable if the coefficient γ is positive, which means that the department saves more if debt increases, such that the debt level is stabilised around its current level. Table 4 presents the results of estimating the model with the variables normalised by departmental GDP as well as population, given that departmental GDP values are only available since 2001.

Table 4. **Subnational fiscal sustainability**

(1984-2012)

	Primary balance			Primary balance less transfers from central government		
Dependent variable:	% of GDP	Millions COP per capita	Millions COP per capita	GDP	Millions COP per capita	Millions COP per capita
Lagged dependent variable	0.049 (0.09)	0.397*** (0.11)	0.385*** (0.11)	0.019 (0.06)	0.325*** (0.10)	0.316*** (0.10)
Lagged Debt/GDP	0.148** (0.06)			0.293*** (0.10)		
Lagged Debt/Population		0.068 (0.05)	-0.116 (0.13)		0.129** (0.06)	0.017 (0.11)
Post 2001 dummy * lagged Debt/Population			0.190** (0.08)			0.117 (0.07)
Constant	0.006*** (0.00)	0.053*** (0.01)	0.054*** (0.01)	-0.000 (0.00)	0.014* (0.01)	0.014** (0.01)
Number of observations	343	544	544	343	544	544

Note: Standard errors in parentheses. ***,**,* significant at 1%, 5% and 10% respectively.
All the regressions are run with fixed-effects and time dummies

21. The results show that the current system of fiscal responsibility actually induces fiscal sustainability at departmental level. According to the estimates presented in the first column, a one-percentage point increase in debt leads to an improvement of around 0.15 percentage points in the primary balance. When estimating the model using a longer sample period and normalizing by population, the point estimate is positive but statistically not significant. This is not surprising as this period includes also the second half of the 1990s, where several departments and municipalities ran into fiscal sustainability problems, after transfers to subnational governments had increased significantly and borrowing constraints were loose.

22. To deal with fiscal sustainability problems of sub-national governments the Colombian authorities introduced a series of reforms from the late 1990s onwards. In particular, the Law 358 of 1997 introduced a "traffic light" system that classified sub-nationals according to liquidity and solvency indicators. Only those sub-national governments classified with a "green light" were allowed to borrow freely. By contrast, those with a "red light" had to seek authorization by the Ministry of Finance and fulfil certain performance conditionalities. In addition, the law 617 of 2000 introduced current expenditure caps. The regression in the third column of Table 4 shows that these had a positive impact on fiscal sustainability. While the coefficient on debt is not statistically significant before they took place, from 2001 onwards it becomes significant – with a similar magnitude as in the case of the normalisation by GDP. To test for the potential discretionary allocations of transfers, the regressions were run by excluding transfers from the central government from current income in the dependent variable. As can be seen in the last three columns of Table 4, the results are robust to the new specification.

Fiscal fatigue

23. Departments have mainly three sources of revenue: transfers from the central government, which on average represent around half of their revenue, their own tax revenues, which represent 30% of their revenue, and royalties and other income. The revenue composition of sub-national governments varies widely across OECD countries, transfers share amounting to between 10% (in Iceland) to 90% (in the Netherlands). A common question to most countries is if (and how) departments adjust their tax collection to the fluctuations of transfers from central government and non-tax sources of revenue such as royalties. The main issue is whether sub-national governments raise the same amount of taxes when the transfers or royalties increase or whether they show some "fiscal fatigue" and accordingly levy fewer taxes.

24. In principle, high transfers can reduce tax effort through weak budget constraints or moral hazard. A higher share of taxes in total sub-central revenues could promote efficiency and accountability of public spending. However, higher own revenues might increase spatial inequalities (Blöchliger and Petzold, 2009). 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).

25. To test for the so-called "fiscal fatigue" effect, the taxes levied by the departments (expressed as a % of GDP, of Population or of total revenue, according to the specification) is regressed on transfers and royalties using the following equation:

$$Tax_{it} = \alpha Transfers_{it} + \beta Royalties_{it} + \gamma GDPcap_{it} + \mu_t + \delta_i + \epsilon_{it},$$

where Tax_{it} is the own tax revenue (expressed as a percentage of GDP, population or total revenue) in year t for department i; $Transfers_{it}$ represents transfers received from central government through the SGP (as a percentage of GDP, population or total revenue) in year t for department i; $Royalties_{it}$ are oil and mining royalties received (as a percentage of GDP, population or total revenue) in year t for department i; $GDPcap_{it}$ is GDP per capita of department i in year t, μ_t are year fixed effects, and δ_i are departmental fixed effects. A negative estimate for α or β would imply that higher transfers or royalties reduce the departments' own tax collection effort, respectively.

26. Table 5 shows that the ratios of taxes to GDP are positively related to the ratios of transfers to GDP. When expressed per capita, taxes are positively related to the royalties. These results suggest that departments which receive an important level of transfers or royalties levy also more taxes. When taxes are expressed relative to total revenue, the results are not significant. GDP per capita, which displays a surprising negative sign when the dependent variable is expressed as a ratio to GDP, loses its significance when the dependent variable is expressed as a ratio to population. These first sets of results support the idea that departments do not relax their tax effort when they receive more transfers or royalties. As a consequence, the so-called "fiscal fatigue" hypothesis does not have empirical support.

27. To check the robustness of these results, the same regression is estimated excluding the oil producing departments. The royalties distribution system has been reformed in 2012, but previously (namely the period under review in this paper), most of the royalties were allocated to the oil and mining producing departments, which might have affected the tax collection of these departments. Table 6 show the results of the tax to GDP ratios regressed on transfers to GDP ratios excluding the departments for which the share of oil in the total value added is above 50%, 25% and 10%. All the results show that departments which receive an important level of transfers or royalties levy also more taxes. There is again no evidence of fiscal fatigue.

28. Nevertheless, it is not clear whether the so-called "fiscal fatigue" arise when looking at the evolution or at the levels of taxes and transfers. Despite that the regression in levels controls for fixed effects and common time effects – such that it is mainly the evolution over time that gives identification to the estimates, the regression in levels may suffer from misspecification. In order to check for this, the previous regressions were estimated in first differences (Table 7). The results show that an increase in transfers from the central government leads to a decrease in tax efforts from the department (when the variables are expressed as a % of GDP). However, this is the only variable that presents results consistent with fiscal fatigue. Furthermore, the estimated effect is relatively small. A one percentage point increase in transfers reduces by 0.02 percentage points the tax to GDP ratio. By contrast, when expressed as a percentage of total revenue, taxes are positively responding to an increase in transfers. Overall, there is little evidence that departments display some kind of fiscal fatigue.

Table 5. **Transfers and taxes in subnational governments**

(Ratios to GDP and population, 1984-2012)

Dependent variable:	Tax as a % of GDP	Tax as a % of GDP	Tax as a % of GDP	Tax as a % of GDP	Tax as a % of GDP	Tax as a % of GDP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax as a % of Toral revenue	Tax as a % of Toral revenue
Lagged Transfers/GDP	0.038***	0.038***			0.035***	0.034***								
	(0.01)	(0.01)			(0.01)	(0.01)								
Lagged Royalties/GDP			0.040	0.040	0.032	0.032								
			(0.03)	(0.03)	(0.03)	(0.03)								
Lagged Transfers/Population							0.024	0.033			0.024	0.034		
							(0.03)	(0.04)			(0.03)	(0.04)		
Lagged Royalties/Population									0.045***	0.060***	0.045***	0.061***		
									(0.01)	(0.01)	(0.01)	(0.01)		
Lagged Transfers/Total revenue													0.010	0.008
													(0.01)	(0.01)
Lagged GDP per capita		-0.258**		-0.273*		-0.260*		-1.814		-1.796		-1.623		-7.425*
		(0.11)		(0.14)		(0.13)		(2.42)		(1.07)		(1.22)		(4.31)
Constant	0.012***	0.013***	0.013***	0.015***	0.011***	0.013***	0.116***	0.065***	0.005	0.066***	0.109***	0.056***	0.686***	0.679***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.04)	(0.05)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Department fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	384	384	384	384	384	384	765	384	765	384	765	384	786	384
R-squared	0.18	0.20	0.15	0.17	0.20	0.21	0.77	0.66	0.78	0.68	0.78	0.69	0.13	0.07

Note: Standard errors in parentheses. ***,**,* significant at 1%, 5% and 10% respectively.

Table 6. **Transfers and taxes in subnational governments**

(Excluding oil producer departments, 2001-2012)

Dependent variable: Tax as a % of GDP	Excl. departments where oil represents >50% of total value added	Excl. departments where oil represents >50% of total value added	Excl. departments where oil represents >25% of total value added	Excl. departments where oil represents >25% of total value added	Excl. departments where oil represents >10% of total value added	Excl. departments where oil represents >10% of total value added
Lagged Transfers/GDP	0.037***	0.046***	0.047***	0.046***	0.046***	0.046***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Lagged GDP per capita		-0.370		-0.370		-0.234
		(0.86)		(0.86)		(0.98)
Constant	0.012***	0.015**	0.012***	0.015**	0.013***	0.014***
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Department fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	336	300	300	300	264	264
R-squared	0.18	0.22	0.21	0.22	0.22	0.22

Note: Standard errors in parentheses. ***,**,* significant at 1%, 5% and 10% respectively.

Table 7. **Transfers and taxes in subnational governments**

(First differences, 1984-2012)

Dependent variable:	Tax as a % of GDP	Tax as a % of GDP	Tax as a % of GDP	Tax as a % of GDP	Tax as a % of GDP	Tax as a % of GDP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax revenue per capita, millions COP	Tax as a % of Toral revenue	Tax as a % of Toral revenue
Transfers/GDP	-0.022***	-0.022***			-0.021**	-0.021**								
	(0.01)	(0.01)			(0.01)	(0.01)								
Royalties/GDP			-0.011	-0.011	-0.008	-0.008								
			(0.03)	(0.03)	(0.02)	(0.02)								
Transfers/Population							-0.009	-0.012			-0.008	-0.012		
							(0.01)	(0.01)			(0.01)	(0.01)		
Royalties/Population									-0.017	-0.020	-0.017	-0.019		
									(0.01)	(0.01)	(0.01)	(0.01)		
Transfers/Total revenue													0.030***	0.023***
													(0.00)	(0.00)
GDP per capita		-0.478*		-0.500**		-0.472*				1.553**		1.724***		-11.805
		(0.25)		(0.24)		(0.24)				(0.60)		(0.52)		(8.41)
Constant	0.002*	0.002*	0.002**	0.002**	0.002**	0.002**	0.001***	0.011***	0.001**	0.009***	0.001**	0.009***	-0.024	0.036*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.02)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Department fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	384	384	384	384	384	384	765	384	765	384	765	384	786	384
R-squared	0.14	0.15	0.13	0.13	0.15	0.15	0.14	0.12	0.15	0.13	0.15	0.13	0.29	0.22

Note: Standard errors in parentheses. ***,**,* significant at 1%, 5% and 10% respectively.

Transfers to the departments and risk sharing

29. Transfers are generally designed to reduce fiscal differences and equalise access to public services across regions. An important question is whether or not they are pro-cyclical with respect to economic fluctuations at the department level, meaning that they are generous in good times and lower in bad times. In such cases, transfers exacerbate fluctuations in the departmental own revenues rather than compensating departments (Blöchliger and Égert, 2013). In general, it is important that departments have flexible resources to meet changing budgetary needs, but also predictable enough to ensure an efficient allocation of resources. Revenue volatility can have efficiency costs and impair long-term growth by leading to sharp fluctuations in public expenditure. It can also have social and political costs if leads to sharp retrenchments in socially sensitive sub-national spending programmes during cyclical downturns, as shown by countries strongly affected by the recent global financial crisis (Caldera Sanchez, 2013).

30. In OECD countries, transfers are often found to be pro-cyclical. For example, the German system of intergovernmental transfers appears to have mixed effects: while horizontal equalisation (transfers from rich to poor sub-national governments) tends to be counter-cyclical, vertical grants (from the central government) are pro-cyclical (von Hagen and Hepp, 2000). In Denmark, business cycles and equalisation payment fluctuations have an asymmetric effect on the behaviour of municipalities: during upturns sub-national governmental expenditures increase, while in downturns tax rates are increased (Rattso and Tovmo, 1998). The Mexican transfer system is found to be highly pro-cyclical Caldera-Sanchez (2013). Furthermore, Rodden and Wibbels (2010) in a cross-country setting argue that discretionary transfers are either at best acyclical or pro-cyclical. Finally, Blöchliger and Petzold (2009) assess the revenue-stabilising properties of the intergovernmental grant systems of all OECD countries using a set of indicators. Their results suggest that at least half of these systems weaken sub-central budgets and tend to be pro-cyclical.

31. There are many ways to reduce the pro-cyclicality of transfers and strengthen their automatic stabiliser properties. Generally, in order to avoid excessive sub-central revenue volatility, transfers should be linked to effective needs of the sub-central government. Decoupling grants from central government tax revenue can be an important step towards more stable transfer allocations to sub-national governments. 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 (Blöchliger and Petzold , 2009).

Estimation

32. The methodology of von Hagen and Hepp (2000) is useful to evaluate the pro-cyclicality of transfers in Colombia. In this framework, the evolution of the transfers from the central government to the departments is regressed on different macroeconomic variables using the following equation:

$$\frac{x_{it} - x_{it-1}}{y_{it-1}} = \alpha_t + \delta_i + \beta.\frac{z_{it} - z_{it-1}}{z_{it-1}} + \varepsilon_{it},$$

where *i* denotes department and *t* denotes year, x_{it} stands for the transfers department *i* receives from the central government in year *t* and y_{it} stands for GDP or total revenue, z_{it} stands for GDP, total revenue or unemployment rate in department *i* at year *t*, depending on the regression, α_t are year fixed effects, and δ_i are department fixed effects. The coefficient β measures the extent to which transfers provide an insurance against asymmetric region-specific GDP shocks or shocks to local tax revenues, depending on the regression. A $\beta = -1$ indicates that the transfer system provides complete insurance against shocks. A $-1 < \beta < 0$ indicates that transfers partially stabilise GDP fluctuations, or fluctuations in departments' tax revenues, thus have a stabilising component. A $\beta > 0$ indicates that transfers are pro-cyclical, in the case of GDP, or destabilising, in the case of local tax revenues (Caldera-Sanchez, 2013).

33. The results are presented in Table 5. The first five columns are panel data least squared regressions with fixed effects and time dummies. In the three last columns, a GMM analysis is performed to control for potential endogeneity of departmental business cycles. The department's population is used as a control variable, as an important share of transfers is based on criteria linked to population (e.g. in education and health). Both estimations, OLS and GMM, suggest that transfers are pro-cyclical when the cycle is measured by the evolution of GDP. Indeed, the evolution of GDP displays a positive sign meaning that transfers' evolution follows that of GDP. This result is confirmed by the regression with unemployment rate which displays a negative and significant coefficient. When unemployment increases – reflecting a negative shock -- transfers tend to decrease. When considering fluctuations in the total revenues (which include own taxes, royalties and other income but not transfers), the coefficient is negative and significant. However, this result is not robust to correcting for potential endogeneity problems.

34. Overall, the results provide evidence that central government transfers are pro-cyclical, thereby exacerbating rather than damping the fluctuations at the department level. As a consequence departments' budgets may become more difficult to manage over the cycle. Departments 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 sub-national deficit spending or borrowing, making fiscal policy even more likely to be pro-cyclical (Blöchliger and Égert, 2013).

Table 8. **Transfers to the subnational governments and the cycle**

(Annual growth rates, 2001-2012)

Dependent variable:	Transfers as a % of GDP	Transfers as a % of GDP	Transfers as a % of GDP	Transfers as a % of GDP	Transfers as a % of Total revenue	Transfers as a % of GDP	Transfers as a % of GDP	Transfers as a % of Total revenue
	OLS	OSL	OLS	OLS	OLS	GMM	GMM	GMM
GDP	0.045**	0.051***	0.054***			0.035*		
	(0.02)	(0.02)	(0.02)			(0.02)		
Unemployment rate				-0.635*			-0.341	
				(0.38)			(0.35)	
Total revenue					-0.292***			-0.112
					(0.09)			(0.10)
Population			1.906**	0.174	41.655	5.858***	1.727*	99.239
			(0.91)	(0.67)	(36.07)	(1.39)	(0.92)	(63.64)
Lagged dependent variable						-0.480***	-0.071	-0.161***
						(0.05)	(0.06)	(0.05)
Constant	0.003	-0.002	-0.027**	-0.001	-0.562	-0.066***	-0.016	-0.870
	(0.00)	(0.01)	(0.01)	(0.01)	(0.49)	(0.02)	(0.01)	(0.79)
Year fixed effects	No	Yes	Yes	Yes	Yes			
Department fixed effects	Yes	Yes	Yes	Yes	Yes			
Number of observations	384	384	384	252	384	320	229	320

Note: Standard errors in parentheses. ***,**,* significant at 1%, 5% and 10% respectively.

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ANNEX A: BASIC FISCAL INDICATORS BY DEPARTMENT

Table A.1. **Main indicators of the department's accounts in 2012**

(Thousands of COP per capita)

	Primary balance	Debt	Taxes	Transfers	Royalties
AMAZONAS	-11.6	49.8	35.6	453.4	7.8
ANTIOQUIA	45.7	49.7	68.9	66.3	4.0
ARAUCA	-2.7	157.0	41.8	171.9	442.2
ATLANTICO	34.4	41.6	46.9	41.5	1.0
BOLIVAR	16.8	24.0	38.5	74.4	7.3
BOYACA	29.5	39.3	58.0	141.3	19.7
CALDAS	23.9	33.7	50.1	96.9	0.4
CAQUETA	10.1	17.5	32.8	138.5	0.0
CASANARE	33.5	186.9	70.4	168.9	673.6
CAUCA	7.4	42.5	24.3	122.6	1.4
CESAR	18.3	21.7	34.5	121.2	61.0
CHOCO	-1.7	41.0	26.4	140.1	1.9
CORDOBA	14.1	29.9	32.9	105.9	11.8
CUNDINAMARCA	22.6	28.9	31.0	26.5	0.7
GUAINIA	26.9	12.2	39.6	579.0	40.2
GUAVIARE	7.2	34.4	23.5	106.6	123.5
HUILA	38.8	18.1	60.9	300.4	16.0
LA GUAJIRA	17.0	46.3	45.1	98.6	71.6
MAGDALENA	12.8	39.2	32.0	98.1	4.5
META	30.3	75.2	69.3	94.4	189.1
NARIÑO	21.5	29.3	36.5	96.7	6.0
NORTE DE SANTANDER	13.8	27.2	27.6	101.7	0.5
PUTUMAYO	6.3	34.9	23.2	175.1	56.1
QUINDIO	24.4	21.6	39.7	86.0	0.0
RISARALDA	25.4	39.1	43.3	74.0	0.8
SAN ANDRES	141.4	451.0	193.9	369.6	9.7
SANTANDER	24.3	94.0	59.9	78.3	27.9
SUCRE	18.8	13.7	32.1	131.9	5.1
TOLIMA	9.5	37.6	41.4	107.8	22.6
VALLE DEL CAUCA	29.1	88.0	53.7	58.2	1.5
VAUPES	25.7	10.9	29.4	416.7	28.9
VICHADA	44.1	3.6	37.0	518.4	21.2
Average	**23.7**	**57.5**	**46.3**	**167.5**	**58.1**

Source: Authors' calculations based on DANE and DNP.

Table A.2. **Summary statistics of variables included in the econometric estimates**

	Observations	Average	Standard Deviation	Minimum	Maximum
Debt (as percentage of GDP)	416	0.9	1.6	0	13.2
Debt (thousands of COP, per capita)	576	57.5	98	0	724.3
Transfers (as percentage of GDP)	416	6.7	8.3	0.2	45.7
Transfers (thousands of COP, per capita)	896	167.5	255.4	0	1558.5
Transfers (as percentage of Total revenue)	928	2	3.2	0	25.7
Royalties (as percentage of GDP)	416	1	2	0	21.6
Royalties (thousands of COP, per capita)	896	58.1	196.5	0	1840.5
GDP (thousands of COP, per capita)	416	7.6	6	1.6	44.3
Primary balance (as a percentage of GDP)	416	0.6	1.4	-14.5	7.1
Primary balance (thousands of COP, per capita)	896	23.7	56.5	-444	558.7
Taxes (as percentage of GDP)	416	1.3	0.7	0.2	5.1
Taxes (thousands of COP, per capita)	896	46.3	54.6	0.6	445.7
Taxes (as percentage of Total revenue)	928	66.1	26.4	1.3	100
Total revenue (millions of COP)	928	98525.2	192068.1	15.7	1619935
Unemployment rate (percentage)	275	12	3.2	5.9	22.3
Population (thousands)	786	1232.2	1223.8	17.9	10100

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