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SUBNATIONAL FISCAL
SUSTAINABILITY, RISK SHARING
AND “FISCAL FATIGUE” IN
COLOMBIA

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SUBNATIONAL FISCAL SUSTAINABILITY, RISK SHARING AND “FISCAL FATIGUE” IN COLOMBIA*

Christian Daude and Christine de la Maisonneuve

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KEYWORDS: fiscal reaction function, subnational finances, royalties, transfers, fiscal fatigue, risk sharing

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JEL classification codes: C1, E62, H7

Keywords: subnational finances, fiscal fatigue, risk sharing, transfers, royalties, fiscal reaction function

1. Introduction

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.

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). Vertical fiscal imbalances are 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. However, it has posed some challenges in Latin America in terms of creating soft budget constraints and an excessive size of government (Stein, 1998). Large and fast growing transfers from the central government might also reduce the incentives to raise more own revenues and improve the quality of expenditures at the subnational level.

This paper looks at the effects of fiscal decentralisation and subnational fiscal institutions in Colombia along three dimensions. First, we analyse if the current framework, which was modified by a series of reforms in the late 1990s and early 2000s are conducive to induce fiscal sustainability. Second, we analyse if existing vertical fiscal imbalances have a negative effect on the amount of own tax revenue of subnational governments. Third, risk sharing is another issue related to fiscal decentralization and

transfers that has recently received some attention in the literature (Hepp and von Hagen, 2001 and 2013).

The paper focuses on fiscal aspects of Colombia's departments, the intermediate level of government. Most of the literature in Colombia has focused on local government finances (municipalities), mainly because in the current institutional set-up municipalities have greater taxing powers than departments, e.g. by setting real estate taxes (*Impuesto Predial*) and some local business taxes.¹ While current tax responsibilities are currently limited, departments have important expenditure responsibilities. Furthermore, they have also gained an increasing role in managing revenues since the new oil and mining revenue sharing scheme SGR (*Sistema General de Regalías*) has been put in place in 2012, which are used to finance mainly regional infrastructure projects. Finally, given the recent decline in oil revenues, which is likely to have a rather permanent component, a structural fiscal reform is becoming inevitable. Such a reform could probably include some reshuffling of fiscal responsibilities across levels of government, new taxes levied at the subnational level, as well as a review of the general revenue sharing mechanism SGP (*Sistema General de Participaciones*). Therefore, it is relevant to analyse how fiscal decentralisation performs under the current institutional arrangements in Colombia on the departmental level.

The remainder of the paper is structured as follows. In section 2, we present a brief review of the main literature related to our paper. Section 3 presents the main data used in the analysis and some of the relevant institutional and legal aspects. Section 4 analyses fiscal sustainability by estimating a fiscal reaction function for Colombia's departments, while section 5 presents the results in terms of risk sharing. In section 6, we analyse the issue of fiscal fatigue. Section 7 presents the main conclusions, potential policy implications and future issues to be studied in the case of Colombia.

¹ See Sánchez Torres et al (2015) for a recent overview of the literature and the policy discussion regarding subnational finance in Colombia.

2. Brief Literature Review

The analysis of fiscal decentralisation traditionally covers several dimensions of economic policy and political economy issues, such as the devolution of expenditure and revenue responsibilities from the central government towards subnational governments, the degree of political autonomy, the size and nature of intergovernmental transfers and the extent of local governments borrowing autonomy (Stein, 1999). All of these dimensions have an impact on fiscal performance. In general, the literature has argued that fiscal decentralisation should lead towards a better provision of services at the subnational level. It is often argued that fiscal decentralisation improve the efficiency of public services as local governments have a better knowledge of the preferences of the citizens (Tiebout, 1956; Musgrave 1969; and Oates, 1972). Stronger political accountability of local governments can also make decentralisation contribute to enhancing expenditure efficiency (Sow and Razafimahefa, 2015, Fretes Cibils and Ter-Minassian, 2015). The evidence for developed economies shows that this seems to be particularly the case in social sectors such as education and health (Ahmad et al. 2008 and Cantarero and Sanchez, 2006). However, in developing countries or in general cases where political competition and accountability is low and corruption is a problem, the positive effects of fiscal decentralisation might be more difficult to materialise (Prud'homme, 1995). Furthermore, Oates (1985) argues that decentralisation may end up creating inefficiencies and increasing the size of the public sector because of the loss of economies of scale and accordingly additional administrative expenditure.

Brennan and Buchanan (1980) argue that decentralisation is a way to constrain the central government in its search of maximisation of the tax revenue it gets from the economy (known as the Leviathan hypothesis), as the mobility of individuals across jurisdictional borders leads to some tax competition between local governments. While several studies support the Leviathan hypothesis (Marlow, 1988; Grossman 1989 and Rodden, 2003), another part of the literature refutes the Leviathan hypothesis (Nelson, 1986, Forbes and Zampelli, 1989, Martinez-Vazquez and Yao, 2009).² Stein (1999) also suggests that decentralisation generates larger governments and potentially more fragile fiscal

² See Golem (2010) for a review of the empirical literature regarding the Leviathan hypothesis.

positions. According to this author, the effect is larger when vertical imbalances are high, transfers are discretionary and when subnational governments have a large degree of borrowing autonomy. In these cases, fiscal decentralization might end up generating a soft budget constraint for subnational governments and therefore undermine fiscal sustainability. While transfers in Colombia are mainly rule-based and borrowing of subnational governments is fairly regulated, vertical imbalances are relatively large. Therefore, it is relevant to analyse if the current framework of fiscal decentralisation is conducive to fiscal sustainability in Colombia.

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 subnational shocks, i.e. if they allow for idiosyncratic risk sharing or not. If they are pro-cyclical, transfers exacerbate fluctuations in the departmental own revenues rather than compensating departments (Blöchliger and Égert, 2013). In general, it is important that subnational government 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. They might also undermine fiscal sustainability and can also have social and political costs if adjustments during bad times lead to sharp retrenchments in socially sensitive sub-national spending programmes, as shown by countries strongly affected by the recent global financial crisis (Caldera Sanchez, 2013).

Another important issue related to vertical imbalances refers to the potential disincentives for subnational governments to raise more own revenues. The transfer of fiscal resources from the central government to sub-national governments, the so-called fiscal equalisation, aims at offsetting differences in revenue raising capacity or public service cost. Its principal objective is to allow sub-central governments to provide their citizens with similar sets of public services at a similar tax burden even if incomes differ across areas (Blöchliger and Charbit, 2008). Some studies have found a negative relationship between equalisation and economic and fiscal effort (OECD, 2006; Wurzel,

2003, Spahn, 2001).³ In developing countries, this problem manifests in different ways: by setting tax rates at a very low level, defining very narrow tax bases by providing generous exemptions, lax enforcement or chronic underinvestment in subnational tax administration (Brosio and Jimenez, 2012). Given the significant share of transfers from the central government in the total resources available to departments it is therefore important to analyse if transfers have a negative effect on the efforts to raise own revenues at the department level.

3. Description of fiscal and economic data and institutional arrangements

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. 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. In our estimations, Cundinamarca and Bogota has been excluded as, at the time of writing this paper, the available data were not coherent. For example, while GDP data are reported separately for Bogota and Cundinamarca, the fiscal variables did not.

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), which in turn tends to be reflected in terms of their capacity to raise revenues at the subnational level (see below). 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.

³ See Bird (2010) and Bird and Smart (2002) for a review of the policy issues regarding vertical as well as horizontal imbalances in developing countries.

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

	Population	% of the National GDP	GDP Per Capita	Unemployment rate
		(%)	Millions of COP	(%)
AMAZONAS	73,699	0.07	4.34	-
ANTIOQUIA	6,221,817	13.60	10.28	10.63
ARAUCA	253,565	0.68	12.55	-
ATLANTICO	2,373,550	3.99	7.90	8.00
BOLIVAR	2,025,573	3.80	8.84	7.62
BOYACA	1,271,133	2.79	10.32	7.30
CALDAS	982,207	1.45	6.93	10.15
CAQUETA	459,515	0.45	4.62	9.60
CASANARE	337,886	1.74	24.21	-
CAUCA	1,342,650	1.49	5.22	11.42
CESAR	991,584	2.01	9.55	9.19
CHOCO	485,543	0.42	4.09	10.73
CORDOBA	1,632,637	1.83	5.27	11.74
CUNDINAMARCA	10,128,968	31.56	14.66	9.41
GUAINIA	39,574	0.03	3.74	-
GUAVIARE	106,386	0.07	3.31	-
HUILA	1,111,947	1.71	7.24	9.71
LA GUAJIRA	874,532	1.17	6.31	8.50
MAGDALENA	1,223,875	1.32	5.09	7.83
META	906,805	4.47	23.16	10.53
NARIÑO	1,680,795	1.49	4.18	12.60
N. DE SANTANDER	1,320,777	1.61	5.72	12.44
PUTUMAYO	333,247	0.42	6.00	-
QUINDIO	555,836	0.78	6.58	15.39
RISARALDA	935,910	1.43	7.18	14.81
SAN ANDRES	74,541	0.15	9.19	-
SANTANDER	2,030,775	6.59	15.27	7.78
SUCRE	826,780	0.80	4.53	9.23
TOLIMA	1,396,038	2.12	7.13	11.28
VALLE DEL CAUCA	4,474,369	9.87	10.38	13.43
VAUPES	42,392	0.03	3.07	-
VICHADA	66,917	0.06	3.87	-
National Total	46,581,823	100.00	10.10	10.37

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.

Part of the disparities across departments stems from the type of economic activities carried out in their territory. For the departments that include the three largest metropolitan areas, the service sector represent more than half of total added-value and manufacturing more than 13%, 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. This share goes of 6% in value added for Santander to 62.8% of value added for Casanare. However,

departments with significant oil and mining activity do not fare that well in terms of development (Bousquet et al, 2014).

Next, we present 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.⁴ 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 not possible to verify 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 subnational 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.1 in the Annex presents some basic summary statistics.

Table 2 presents the correlation between the main fiscal variables used in the regression analysis of the subsequent sections. 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

⁴ For space considerations the econometric results do not report all options, but a longer working paper version of the paper includes some discussion and further estimates are available at request. Overall, this issue does not affect significantly the main results presented here.

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 2. **Correlation between fiscal and socio-economic variables**

	Oil and mining	Manufacturing	Services	Debt	Taxes	Transfers	Royalties	GDP	Primary balance
	% of GDP	% of GDP	% of GDP	per capita	per capita	per capita	per capita	per capita	per capita
Oil and mining	1.00								
Manufacturing	-0.40	1.00							
Services	-0.87	0.05	1.00						
Debt	0.11	-0.13	0.04	1.00					
Taxes	0.03	-0.03	0.08	0.56	1.00				
Transfers	-0.08	-0.46	0.40	0.07	0.52	1.00			
Royalties	0.78	-0.29	-0.68	0.25	0.27	0.14	1.00		
GDP	0.62	0.05	-0.62	0.33	0.62	0.18	0.74	1.00	
Primary balance	-0.08	-0.02	0.17	0.27	0.60	0.35	0.07	0.31	1.00

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*.

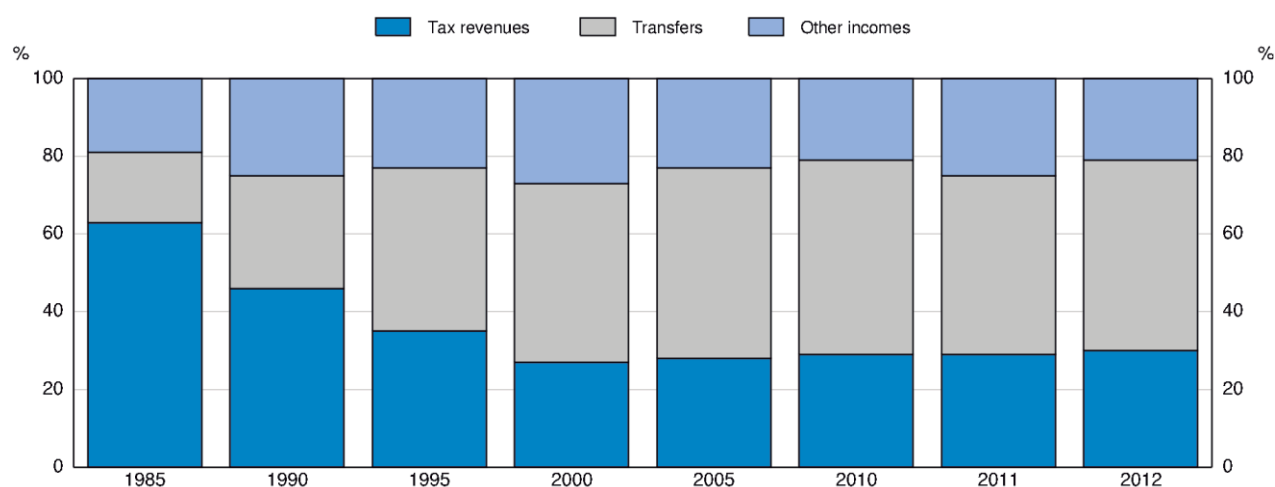
In terms of departmental tax revenues, there is a positive and significant correlation with GDP per capita, which confirms the intuition that revenues are higher in departments with a broader potential tax base due to a more significant density of economic activities and population with higher income. 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.

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.

Institutional arrangements

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. 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 1).

Figure 1. **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.

One of the objectives of the constitutional reform of 1991 was to move towards a more decentralised political system and government structure, e.g. by making subnational authorities electable by popular vote rather than being designated by the president and assigning more spending responsibilities.⁵ This implied that in principle almost half of the general government's current income had to be transferred to departments and municipalities. At the same time, expenditures were earmarked mainly to health, education and sanitation.

Initially, after a period of transition it was envisaged that departments and municipalities would receive a fixed share of national revenues. However, with the sharp economic downturn in the late 1990s, subnational finances became unsustainable as expenditures could not be cut at the speed of the decline in revenues. This triggered a constitutional reform in 2001, which created the general revenue sharing system (SGP), which allowed the national government to delink the transfers to subnational governments for a considerable period (until 2016) and a subsequent reform in 2007 reinforced this aspect. This allowed to contain subnational spending and resulted in a healthy consolidated fiscal balance (Bonet et al, 2014).

⁵ Mayors become electable by popular vote in 1986 and departmental governors in 1991.

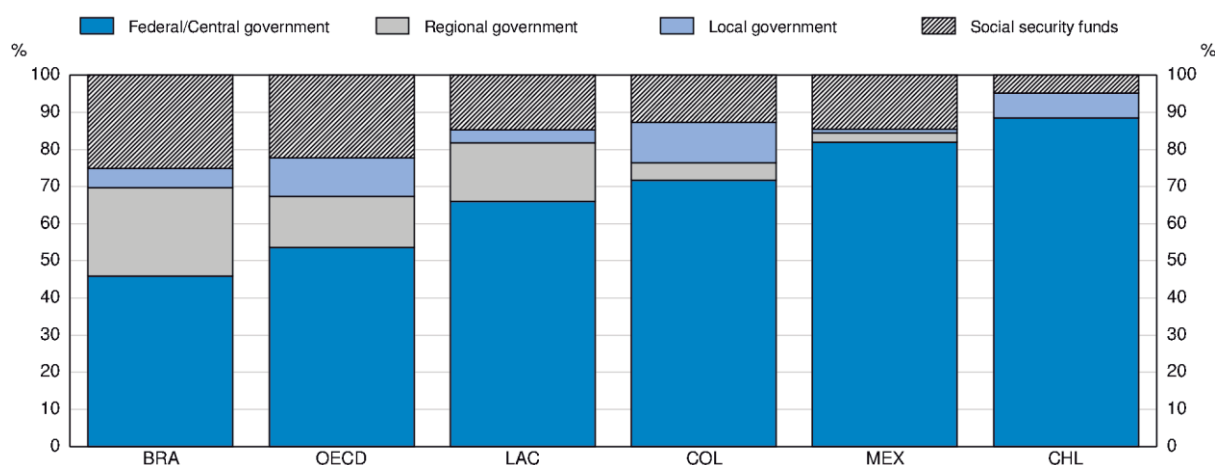
Furthermore, to deal with fiscal sustainability problems of sub-national governments, the Colombian authorities introduced a series of additional reforms from the late 1990s onwards. In particular, the Law 358 of 1997 introduced a “traffic light” system that classified sub-nationals according to liquidity 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 criteria. In addition, the law 617 of 2000 introduced current expenditure caps.

Royalties from oil and mining activities are another source of significant revenue for subnational governments. While historically royalties were assigned mainly to producing departments and municipalities, 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 local infrastructure projects, in the areas of 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 and created also important recurrent expenditures for maintenance that were not probably budgeted, creating more expenditure pressures (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.

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 2), 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 2. Tax revenues by level of government in 2012¹



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.

4. Subnational fiscal sustainability

This section analyses 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 debt rises. It can be shown that this is a sufficient condition for fiscal sustainability (Bohn, 1998). Many studies have found such fiscal reaction

functions in the European Union (Ballabriga and Martinez-Mongay, 2005, Afonso, 2008, Plödt and Reicher, 2014). Similarly, using a panel regression and a VAR analysis for OECD countries between 1970 and 2010, Afonso and Jalles (2011) found that governments have increased their primary balance after an increasing indebtedness. Bohn (1998) and Bohn (2008) also demonstrate that the US primary surplus is an increasing function of the debt-to-GDP ratio. Along the same lines, Mendoza and Ostry (2008) tested the primary surplus response over a large panel of industrial and emerging economies between 1990 and 2005. They show a strong positive conditional relationship between primary surplus and public debt over the entire panel and in the two regions treated separately. Interestingly, the response of primary balance to debt is stronger for emerging economies. In those countries, the response is weaker when the debt to GDP ratio exceeds 50%. Using different estimation methods, Burger et al (2011), also show that the South African government has reduced its primary deficit or increased its primary surplus in response to rising debt since 1946.

At the subnational level, the paper by De Mello (2008) for the case of Brazil is the closest to ours. In particular, we follow his approach to estimate the following fiscal reaction function:

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

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.

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 3. **Subnational fiscal sustainability**
(1991-2012)¹

Dependent variable	Primary balance as a % of GDP			Primary balance less transfers as a % of GDP		Primary balance as a % of Population	Primary balance as a % of GDP
							Bias-corrected LSDV
Lagged dependent variable	0.146** (0.06)	0.147** (0.06)	-0.062 (0.08)	0.041 (0.04)	0.023 (0.04)	0.384*** (0.11)	0.249*** (0.05)
Lagged debt/GDP	0.057 (0.09)	-0.046 (0.12)	0.140*** (0.04)	0.145*** (0.05)	-0.032 (0.04)		-0.163** (0.08)
Post 2001 dummy * (Lagged debt/GDP)		0.133*** (0.04)			0.232*** (0.03)		0.159** (0.07)
Change in population			0.002 (0.00)				
Change in unemployment rate			-0.000* (0.00)				
Lagged debt/population						-0.114 (0.13)	
Post 2001 dummy * (Lagged debt/population)						0.189** (0.08)	
Constant	0.006*** (0.00)	0.006*** (0.00)	0.003 (0.00)	-0.000 (0.00)	-0.000 (0.00)	0.054*** (0.01)	
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Department fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	482	482	228	482	482	527	527
Adjusted R-squared	0.104	0.108	0.152	0.080	0.100	0.363	

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

1. Except the third column: 2001-2012.

Source: Authors' estimations.

Table 3 presents the estimates for the fiscal reaction function. The first column shows that for the whole period, despite the expected positive sign the debt level is not significant (first column). This is not surprising as this period includes the second half of the 1990s, where several departments ran into fiscal sustainability problems, after transfers to subnational governments had increased significantly and borrowing constraints were loose. However, once interacted with a dummy after 2001, 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 0.13 percentage points in the primary balance (column 2). A potential issue might be that omitted variables, such as the internal migrant flow due to the armed conflict and differences in unemployment might be driving the results. To address this issue

in column 3, we have included the change in the department's population and the unemployment rate. Interestingly, once we control for these additional variables, fiscal policy seems to be sustainable over the whole period.

The regressions in Table 3 show 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. The magnitude is similar (slightly higher) when normalising by population instead of 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 shown in columns 4 and 5, the results are robust to the new specification.

It is well-known that the LSDV estimator is biased (Nickel, 1981). Using a lagged stock variable as our main variable of interest should reduce potential endogeneity issues, which could arise from several sources. For example, a high fiscal deficit could reduce the credit rating and therefore increase the interest rate paid on debt. This in turn could push up the debt level. Alternatively, a high deficit could trigger a threshold under the traffic-light system, having similar effects on the borrowing conditions for departments. Nevertheless, in general these issues would introduce an attenuation bias.

In the last column of Table 3, we address this issue by estimating the model using the bias corrected LSDV estimator (LSDVC). It has been shown that this estimator is more efficient estimator than alternative IV and GMM-estimators that also address the bias arising from the lagged dependent variable (Anderson and Hsiao 1981; Arellano and Bond 1991). For example, Judson and Owen (1999) use Monte Carlo simulations to show that for panels of all sizes the bias corrected estimator consistently has the lowest root mean squared error in comparison to OLS, Anderson-Hsiao and GMM estimators.⁶

⁶ Alternatively, GMM estimators render very similar results, although they do not pass the Sargan identification restriction tests. Furthermore, the LSDVC estimation gives similar results when the department's population growth and unemployment rate are included in the regressions. Results are available upon request.

5. Fiscal transfers and risk sharing

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.

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:

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

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.

The results are presented in Table 4. The first five columns are panel least squared regressions with fixed effects and time dummies. In the last column, we present the bias corrected LSDV estimate.⁷ 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 estimation methods suggest that transfers have been pro-cyclical since the 2000s, 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. The evidence is less strong when using the unemployment rate, which displays a negative and but statistically insignificant coefficient. When considering fluctuations in the total revenues (which include own taxes, royalties and other income but not transfers), the coefficient is negative and significant.

Overall, these 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).

⁷ A GMM analysis performed to control for potential endogeneity of departmental business cycles can be found in the working paper version (Bousquet et al, 2014).

Table 4. **Transfers to the subnational governments and risk sharing**

(Annual growth rates, 1991-2012)

	Transfers as a % of GDP				Transfers as a % of Total revenue	Transfers as a % of GDP
						Bias-corrected LSDV
GDP	0.004 (0.01)	-0.005 (0.01)	-0.005 (0.01)			-0.005 (0.01)
Post 2001 dummy * GDP	0.024** (0.01)	0.058*** (0.02)	0.057*** (0.02)			0.024* (0.01)
Population			0.298* (0.17)	0.209 (0.70)	25.939*** (7.78)	0.351** (0.17)
Unemployment rate				-0.635 (0.40)		
Total revenue					0.126 (0.08)	
Post 2001 dummy * Total revenue					-0.504*** (0.13)	
Lagged transfers as a % of GDP						-0.319*** (0.04)
Constant	0.006*** (0.00)	-0.004 (0.00)	-0.007 (0.00)	-0.001 (0.01)	-0.218 (0.26)	
Year fixed effects	No	Yes	Yes	Yes	Yes	
Department fixed effects	Yes	Yes	Yes	Yes	Yes	
Number of observations	682	682	682	241	837	651
Adjusted R-squared	-0.042	0.032	0.035	-0.025	0.084	

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

1. Except the fourth column: 2001-2012.

Source: Authors' estimations.

5. Fiscal fatigue

Colombia's 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. As discussed above, a common question to most countries is if (and how) subnational governments 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.

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).

Many empirical studies in emerging market economies have found a negative relationship between transfers from central to subnational governments and the tax effort. Based on a panel dataset of 14 major Indian states between 1981 and 2009, Dash and Raja (2013) found that increases in transfers, both conditional and unconditional, are negatively associated with tax collection. Moreover direct tax collection is more responsive than indirect tax collection to the evolution of transfers. These results for India are confirmed by Jha et al. (2011) who, using a village survey, show that both the cost of tax collection and the ratio of transfers that augment the local wage rate to those that do not have a significant negative effect on tax collection. Liu and Zhao (2011) found similar results for provinces in China. Using a panel of provincial data between 1995 and 2007, they found that total fiscal transfers and equalization grants have negative impact on provincial tax efforts.

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.

Table 5 shows that the ratios of taxes to GDP are positively related to the ratios of transfers to GDP, at least since the early 2000s. Taxes are also positively related to the royalties, but the coefficient has been significantly smaller since the 2000s, which might be a reflection of the growing importance of royalties during the commodity boom that started during that period. When taxes are expressed relative to total population or total revenue, the results show that the correlation with transfers has increased (and turned positive since the 2000s) and that royalties per capita are positively correlated to tax revenues.

Table 2. **Transfers and taxes in subnational governments**

(Ratios to GDP, population and total revenue, 1991-2012)

Dependent variable	Tax as a % of GDP			Tax as a % of Population	Tax as a % of Total revenue	Tax as a % of GDP
						Bias-corrected LSDV
Lagged transfers/GDP	0.023 (0.02)	0.019 (0.02)				0.004 (0.01)
Post 2001 dummy * (Lagged transfers/GDP)	0.030** (0.01)	0.031** (0.01)				0.012** (0.01)
Lagged royalties/GDP	0.151** (0.06)	0.041 (0.03)				0.049*** (0.01)
Post 2001 dummy * (Lagged royalties/GDP)	-0.081* (0.05)					
Lagged transfers/Population				-0.043** (0.02)		
Lagged royalties/Population				0.049*** (0.01)		
Post 2001 dummy * (Lagged transfers/Population)				0.058** (0.03)		
Lagged Transfers/Total revenue					0.000 (0.01)	
Post 2001 dummy * (Lagged transfers/Total revenue)					0.013** (0.00)	
Lagged GDP per capita	-0.240** (0.11)	-0.434* (0.23)	-0.255** (0.12)	-0.256 (0.94)	-5.412 (3.27)	-0.113* (0.06)
Lagged Tax as a % of GDP						0.617*** (0.03)
Constant	0.011*** (0.00)	0.016*** (0.00)	0.011*** (0.00)	0.116*** (0.01)	0.631*** (0.04)	
Year fixed effects	Yes	Yes	Yes	Yes	Yes	
Department fixed effects	Yes	Yes	Yes	Yes	Yes	
Number of observations	633	633	633	633	633	612
Adjusted R-squared	0.301	0.172	0.310	0.776	0.081	

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

Source: Authors' estimations.

GDP per capita displays a surprising negative sign when the dependent variable is expressed as a ratio to GDP, but loses its significance when the dependent variable is expressed as a ratio to population. This might be due to the fact that with the inclusion of department fixed effects or due to the large increase in GDP per capita in resource intensive departments. When estimating the bias corrected LSDV, the results overall are the same.⁸ In general, these first sets of results support the idea that

⁸ Similarly, GMM estimates not reported here yield similar results (Bousquet et al, 2014).

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.

To check the robustness of these results, we estimated the same regression 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 with respect to fiscal transfers.

Table 3. **Transfers and taxes in subnational governments**

(Excluding oil producer departments, 2001-2012)

Dependent variable: Tax as a % of GDP	Excluding departments where oil represents >50% of total	Excluding departments where oil represents >50% of total	Excluding departments where oil represents >25% of total	Excluding departments where oil represents >25% of total	Excluding departments where oil represents >10% of total	Excluding departments where oil represents >10% of total
Lagged transfers/GDP	0.027 (0.02)	0.023 (0.02)	0.032 (0.02)	0.023 (0.02)	0.033 (0.02)	0.023 (0.02)
post2001_ttransfr	0.030** (0.01)	0.027** (0.01)	0.028** (0.01)	0.027** (0.01)	0.028** (0.01)	0.027** (0.01)
Lagged GDP per capita		-0.977** (0.40)		-0.977** (0.40)		-0.958** (0.43)
Constant	0.010*** (0.00)	0.017*** (0.00)	0.010*** (0.00)	0.017*** (0.00)	0.010*** (0.00)	0.017*** (0.00)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Department fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	551	488	488	488	432	432
Adjusted R-squared	0.290	0.338	0.325	0.338	0.323	0.334

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

7. Conclusions

This paper has presented discussed a series of fiscal issues for Colombia's departments, which have not played a crucial role in tax mobilisation, but have increasing responsibilities in terms of

expenditures and coordinating regional infrastructure projects. In particular, the paper presented evidence regarding the effect of fiscal decentralisation on the fiscal outcomes and behaviour of Colombia's departments along some significant dimensions. The analysis shows that the reforms introduced in the late 1990s and early 2000s have contributed to subnational fiscal sustainability. However, in terms of distributing idiosyncratic risk more efficiently, the evidence shows that the pro-cyclicality of subnational fiscal shocks has increased. This tension between hard budget constraints and cyclicity tends to be common problem in many countries. A way forward to conserve sustainability while reducing pro-cyclicality might be a combination of more diversified revenue sources at the department level or trying to de-link more the transfer of resources from the cycle. A potentially useful step in this direction is the recent reform of the SGR. A proper evaluation of its effects on subnational finances is definitely important.

A positive finding of this paper is that there is little evidence of "fiscal fatigue" at the department level in Colombia. Therefore, the rules-based revenue sharing framework seems to have avoided negative effects on the efforts to raised revenues at the subnational level.⁹

Finally, one issue that we have not addressed in this paper is the potential for fiscal policy to reduce the large differences in living standards across regions in Colombia. There are few signs of convergence in living standards across departments, despite significant efforts in fiscal decentralisation in the last two decades (Bonet, 2006) and inequality in GDP per capita across departments is high compared to OECD economies and other large emerging market economies.¹⁰ 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 and the system also does not compensate for the better ability of well-off departments and municipalities to raise their own

⁹ However, an alternative interpretation could be that this result is driven by the low income elasticity of the taxes raised at the department level and the limited autonomy to allocate expenditures.

¹⁰ 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).

revenues from local and departmental taxes compared to the poorer departments. In this sense, it might be important to consider a more explicit way to reduce regional inequalities through fiscal policies that should take into account the proper incentives to continue mobilising revenues at the subnational level.

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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