Sectoral Fiscal Multipliers and Budget Inflexibility: The Role of Allocative Inefficiency

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Abstract

This paper studies fiscal multipliers in Colombia, an emerging economy with a high degree of inflexibility of expenditure at the sectoral level. The results show that the multiplier is almost twice as large in sectors in which the execution of flexible expenditure is favored over inflexible expenditure. This result is closely related to the fact that flexible expenditure is done in capital intensive sectors. Microsimulation estimations show that the reallocation of a 1% from inflexible to flexible spending has a positive effect of approximately 17% on the total fiscal multiplier. We provide empirical evidence of an inverted U-shaped fiscal multiplier on the reallocation effect across sectors.

Keywords: Fiscal multipliers; Spending reallocation; Emerging Market Economies; Colombia.

JEL classification: E62; O23.

1. Introduction

The literature on fiscal multipliers has grown significantly in recent years. Most of the work has focused on the macroeconomic level, emphasizing on their asymmetric behavior over the cycle, their response to real and nominal frictions, and their interaction with monetary policy (Forni et al., 2009; Erceg and Lindé, 2010; Christiano et al., 2011). The literature has brought forth the notion that there is no such thing as *a* fiscal multiplier, as these depend on country

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characteristics, the state of the economy and the type of fiscal instrument (Ilzetzki et al., 2013). However, little attention has been given to sectoral fiscal multipliers. The magnitude of multipliers, though, can depend strongly on sectoral characteristics. Considering this source of heterogeneity is therefore crucial for fiscal policy design. In this paper, we exploit the heterogeneity at the sector level, showing the impact that budget inflexibility has on the sign and magnitude of multipliers. Additionally, we quantify the effect of resource reallocation across sectors, considering the degree of inflexibility in each of them.

We consider a typical small open economy with considerable budgetary inflexibility, Colombia, to carry out the empirical application. We use a unique database of monthly-government budget executions between 2000 and 2017. This information maps each sector to the national sectoral accounts. Additionally, we build a budget inflexibility index by sector, which allows us to calculate the fiscal multiplier as the marginal impact of the budget execution on the economic activity by sector.

We study the allocative inefficiency at the sectoral level. Our results show a multiplier that is almost twice as large in sectors where the execution of flexible spending is favored over inflexible spending. In line with the literature, we find that sectors in which capital is mobilized more easily, have a greater return on the economy (Ramey, 1998; Barro and Redlick, 2011). In the case of Colombia, flexible spending in the National Budget (PGN) concentrates on more capital-intensive sectors like construction, trade, energy, gas, and water.

We follow previous studies that analyze the effects of government expenditure on the economic activity of developing economies to estimate the sectoral fiscal multiplier. For example, Iltzetzki et al. (2013) find that, in the short term, the aggregate fiscal multiplier for emerging economies is negative but negligible (-0.01%); however, the effect substantially increases (0.6%) when only spending on investment is considered. Using the loans to developing countries expected by multilateral organizations as an instrumental variable, Kraay (2014) estimates that the short-term fiscal multiplier is between 0.3% and 0.6%. Ojeda and Guzman (2018) find that fiscal multipliers are higher in periods of strong economic growth (0.51%) with respect to periods of recession (0.26%). Similarly, these authors find that fiscal multipliers are higher during periods of monetary expansion (1.37%), while they become negative during monetary contractions (-0.78%).

We add to the literature by performing microsimulations that allow the reallocation of public expenditure between sectors. Specifically, we consider reallocations between sectors in which expenditures are flexible and those in which they are inflexible, and estimate fiscal multipliers resulting from these reallocations. Microsimulation estimations show that the reallocation of a 1% of spending from inflexible to flexible sectors has a positive effect of approximately 17% on the total fiscal multiplier and improves the fiscal multiplier in sectoral expenditures individually. This result highlights the importance of giving flexibility to public expenditures in emerging market economies for achieving better macroeconomic outcomes.

The rest of the paper is organized as follows. Section 2 presents a brief review of fiscal adjustment policies in Latin America. Section 3 presents the construction of the budget inflexibility index. Section 4 describes the methodological approach and estimations of the sectoral fiscal multipliers. The final section concludes.

2. Recent Fiscal Adjustment Processes in Latin American Countries

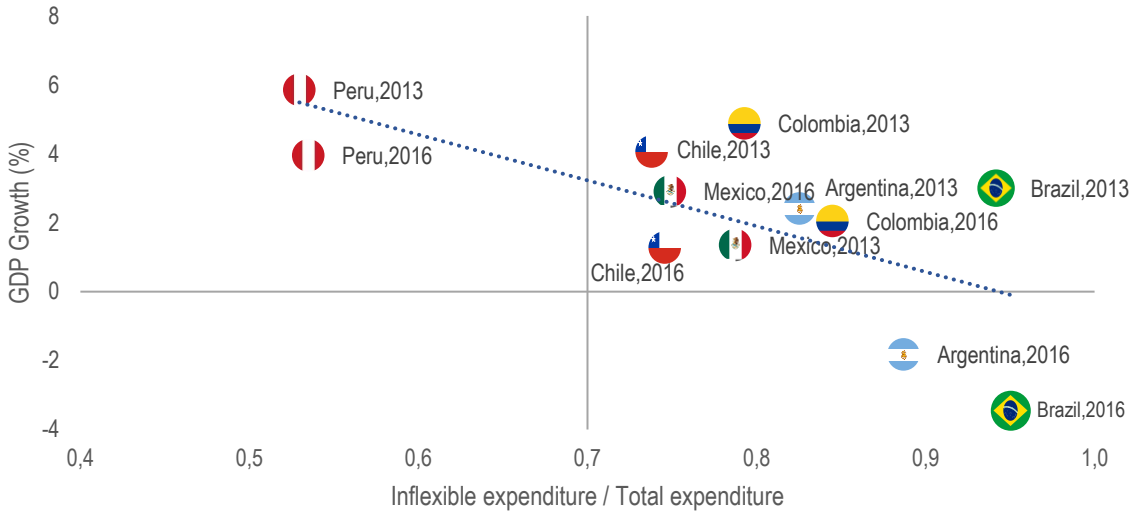
After the Global Financial Crisis and the fall in oil prices between 2014 and 2016, the fiscal balance of the region's economies has deteriorated significantly. Latin American and Caribbean (LAC) economies showed persistent primary deficits of approximately 2.5% on average, and gross debt increases to levels around 60% of GDP. This fact contrasts with the fact that during the period of the commodity price booms, spending expanded by at least 8 percentage points on average in the region (Izquierdo et al., 2018).

The large fiscal adjustment in the region was associated with lower government spending levels intended to offset to some extent the deterioration of the fiscal balance. Nevertheless, the adjustments were done by reducing expenditures in times of lower growth (or of a negative output gap), which are typically done on capital spending. For example, in the case of the Central Government of Colombia, while tax revenues dropped by 0.6 percentage points of the GDP between 2014 and 2017, capital spending dropped by 1.0 percentage point, and current spending, including interests, increased slightly proportional to the output.

Moreover, there is a procyclical bias against public investment. In other words, investment spending decreases in bad times but does not increase in good times, and current spending increases in good times but does not decrease in bad times (Izquierdo et al., 2018, and Ardanaz and Izquierdo, 2017). Cavallo and Powell (2018) estimate that between 1980 and 2016, the bias against capital was higher in the LAC region (9,7 percentage points drop of the total spending).

Emprical evidence at the macroeconomic level shows that capital spending multipliers are typically higher than current spending multipliers. Usually, the most inflexible sectors correspond to sectors that concentrate current spending, mainly transfers. It is very important to note that the inflexibility of spending acts as a real friction that prevents resources from being optimally allocated. In fact, after the fall in oil prices, the region has experienced an economic slowdown accompanied by an increase in the degree of the inflexibility of public spending (See Figure 1).

Figure 1. Inflexibility of expenditure and GDP growth in selected Latin American countries



Source: WEO - IMF.

3. Budgetary Inflexibility in Colombia and the Inflexibility Index

Budget inflexibility compromises the capacity of the elected government to carry out effectively its expenditure plans (Echeverry et al., 2004). Moreover, it might endanger macroeconomic stability because it makes adjustments difficult when there is a persistent fiscal deficit.

However, the existence of budgetary inflexibilities can be justified by the government's need to protect spending in areas that require stability, for which fluctuations of the political and electoral cycles are not desirable (Cárdenas et al., 2006). Hence, based on economic and social economic stability mandates, the main source of budgetary inflexibilities in Colombia come from the legislation.

By law there are five main sources of budgetary inflexibility: i) The Constitutional mandates that prioritize social spending over any other type of spending, granting it a rule of minimum annual growth (Article 350 of the Political Constitution); (ii) Decentralization requirements set forth by the Constitution and contained on articles 356 and 357 channelled a large portion of the current revenues of the nation towards the General Transfer System; iii) The Constitution orders the creation of means to ensure that the purchasing power of pensions is mantained (article 48 of the Political Constitution); iv) The salary of civil servants must guarantee a vital minimum wage, therefore their salary must retain its purchasing power through time (Ruling C-1433 of 2000); and v) The earmarked revenues created by the article 359 of the Political Constitution.

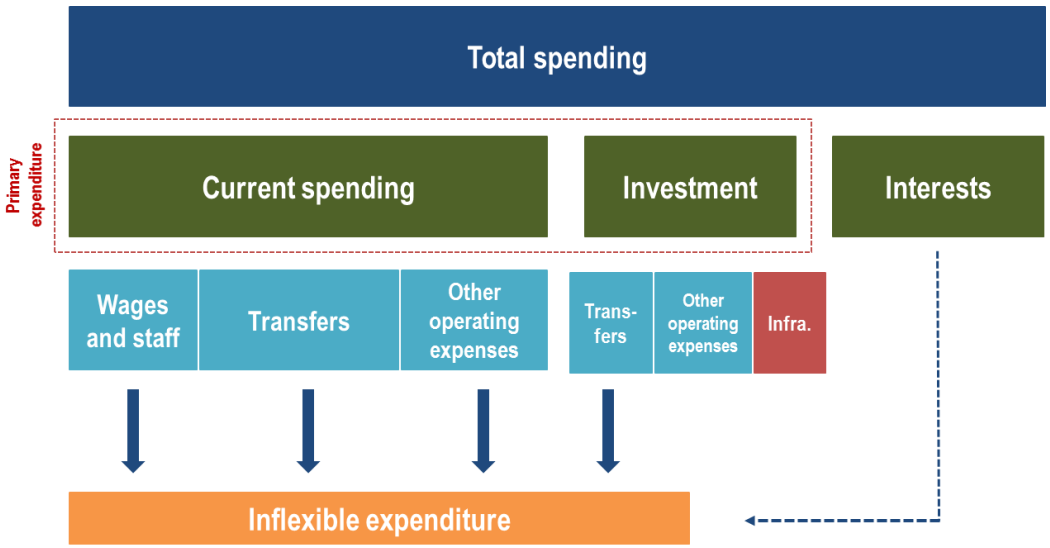
In this sense, the interpretation of budgetary inflexibility found in the literature is usually seen from a perspective of budgetary capacity. Inflexibility depends on the capacity of the executive power to channel resources throughout the budget, which are calculated based on the level of budgetary appropriation approved annually by the Congress. Based on this approach, the levels of budgetary inflexibility previously calculated for Colombia reach levels of 94%, where the inflexibility level for operational spending is 97% and the inflexibility level for investment spending is 67% (Cárdenas et al., 2006). Iregui, et al. (2006) estimate that between 2000 and 2006 the average inflexibility of resources for investment was of 66%.

In this paper, inflexibility is calculated by analyzing the monthly execution of the budget between 2000 and 2017, having thus to classify some 2 million items of the budget. We made a detailed calculation of the budgetary inflexibility, considering that the execution of the budget depends on economic factors and fiscal targets set by the government. Our approach builds on the one developed by Echeverry et al. (2004), who consider that any component of the budget is "inflexible" when its incorporation into the budget is not subject to the discretion of policymakers in the short term (one fiscal year). We consider inflexible any spending that has to be executed regardless of the economic or political circumstances.

Our measure of inflexible spending is described easily following the outline shown in Figure 2. The main sources of inflexibility in the budget of operations are represented by payroll expenses and expenses for the payment of public utilities, transfers comprised of resources channeled to subnational governments through the General Transfer System, pension payments, payments from judicial rulings and settlements, resources targeted for victims of the armed conflict, resources for the system of higher education, and the expenditures required for the health sector. Regarding the sources of inflexibility from investment spending, we mainly considered subsidies to energy, early childhood care, and the program of conditional cash transfers "Familias en Acción". Although future budget appropriations represent an inflexibility that constrain the budget capacity of the executive branch, their execution might vary depending on the amounts commited and the completion of the programs they were created for. This reason explains why they were excluded from inflexible spending in the analysis presented herein. Similarly, earmarked revenues are not assumed to be inflexible, since their level of execution varies depending on the changes observed in the level of output.

With respect to flexible operational spending, they are essentially assumed to be the payments made on service provision contracts, general expenditures to acquire goods, and expenditures for commercial operation. Inflexible spending is any expenditure related to market or productive investment projects or to market related projects.

Figure 2. Description of Inflexible Budget Spending



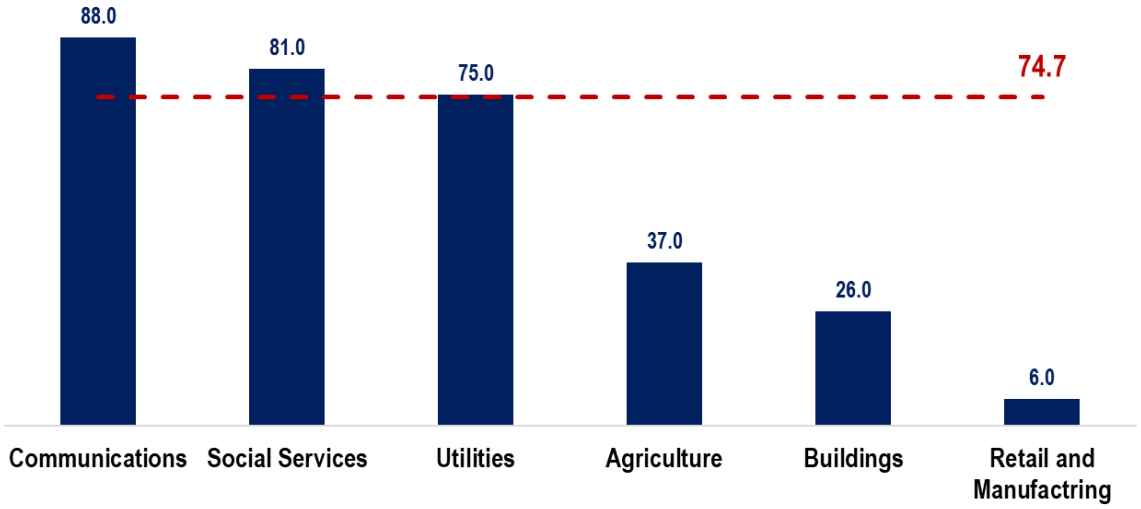
Source: Prepared by the authors following the framework defined by Moody's (2017).

Figure 3 shows the average percentage of budget inflexibility by sector[5]. The red line represents the average level of total inflexible spending for the period 2000-2017. In average, 75% of the effective quarterly expenditures in the National Budget is inflexible, which is within the range reported by previous studies on Colombia.

Social services is the sector that weights more in total spending, nearing 86.6% of the total quarterly resources executed. Spending in this sector included salaries, pensions, and a large portion of the resources for the General Transfer System, explaining its high level of inflexibility (81%). Following is the Construction Sector, having a weight of 6% in the quarterly execution. The resources of this sector are used for the construction of roads and to provide direct subsides for priority interest housing and low income housing. Its inflexibility level is 74%. The grade of inflexibility of resources to agriculture is 37%. Their share in the quarterly execution is 2.3%, and its spending is mainly allocated to the financing of irrigation and agricultural productive projects througout the country.

[5] The description of the homologation of budget spending to the sectors determined in the national accounts is shown in Appendix A.

Figure 3. Average Budgetary Inflexibility by Sector, 2000 – 2017 (% of total expenditure)



Source: Prepared by the authors based on the nation´s execution reports generated by the Integrated Financial Information System (SIIF).

4. Methodological Strategy and Estimation of Multipliers.

a. Methodological Strategy

The empirical strategy is based on the estimation of several models taking into account the interactions of the fiscal variables and the degree of the budget inflexbility. First, we estimate the following regression model:

$$\frac{y_{it}-y_{it-4}}{y_{it}} = \beta \frac{g_{it}-g_{it-4}}{g_{it}} + \alpha_j \sum_j x_{i,t} + v_i + \varepsilon_{it} \qquad [1]$$

where y_{it} and g_{it} represent, respectively, the aggregate value and the total spending for sector *i* in period t. They are measured as the annualized value at constant prices of 2005. The composite error, $v_i + \varepsilon_{it}$, represents the remaining sources of GDP fluctuations, such as specific sectoral policies, changes in productivity, and other factors that affect the dynamics of each sector individually. Even though the composite errors described previously are included in all the specifications, individual sector and time effects are included in the remaining specifications $x_{i,t}$, where different control variables are added for robustness purposes. Under this methodology, the parameter of interest is β, a

parameter capturing the contemporaneous effect of variations in spending on the sectoral aggregate value, herein called the fiscal multiplier.

The second step of the empirical strategy consists of estimating the following two models to analyze the effect of budget flexibility and inflexibility on the fiscal multiplier:

$$\frac{y_{it}-y_{it-4}}{y_{it}} = \beta \frac{g_{it}-g_{it-4}}{g_{it}} + \mu DI_{it} + \alpha_1 \left(\frac{g_{it}-g_{it-4}}{g_{it}} \times DI_{it} \right) + \alpha_j \sum_j x_{i,t} + v_i + \varepsilon_{it} \quad [2]$$

$$\frac{y_{it}-y_{it-4}}{y_{it}} = \beta \frac{g_{it}-g_{it-4}}{g_{it}} + \mu DF_{it} + \alpha_2 \left(\frac{g_{it}-g_{it-4}}{g_{it}} \times DF_{it} \right) + \alpha_j \sum_j x_{i,t} + v_i + \varepsilon_{it} \quad [3]$$

Where *DI* is a dummy variable that takes on the value of 1 when the percentage of spending inflexibility for sector *i* in period *t* is larger than the average percentage of inflexibility observed for the entire sample in this same sector. *DF* is a binary variable that takes on the value of 1 if the percentage of flexibility of the spending for sector *i* in period *t* is larger than the average percentage of flexibility observed in the entire sample for this same sector. In the empirical defined in equation [2] the parameter of interest is $\gamma_1 = \beta + \alpha_1$, which captures the contemporaneous effect of spending variations on the sectoral aggregate value in those periods in which inflexible spending represent above-average levels. Regarding the model defined in equation [3], the parameter of interest is $\gamma_2 = \beta + \alpha_2$, which captures the contemporaneous effect of spending variations on the sectoral aggregate value in those periods of highest flexible spending.

A third model is estimated to capture the individual sectoral effect of budget inflexibility:

$$\frac{y_{it}-y_{it-4}}{y_{it}} = \beta \frac{g_{it}-g_{it-4}}{g_{it}} + \mu (DI_{it} \times IE_{it}) + \alpha_3 \left(\frac{g_{it}-g_{it-4}}{g_{it}} \times DI_{it} \times IE_{it} \right) + \alpha_j \sum_j x_{i,t} + v_i + \varepsilon_{it} \quad [4]$$

where *IE* is the percentage of inflexibility calculated for sector *i* in period *t*. Here the parameter or interest is $\gamma_3 = \beta + \alpha_3 \times \overline{IE_i}$, which, taking into account the average inflexibility level of sector *i*, captures the contemporaneous effect of the spending variations on the aggregate value of sector *i*.

- **Identification strategy**

Estimation of the relevant parameters (β, γ_1, γ_2 and γ_3) faces the challenge that changes in the sectoral budget spending might be correlated to contemporaneous shocks on output captured by the error terms. On the one hand, if government spending is procyclical, a sudden decrease of GDP would be accompanied by a decrease in spending, and thus the multiplier would be biased upward. On the other hand, if fiscal spending is acyclical, an increase in spending to offset sudden output shortfalls would bias the multiplier downwards.

We deal with this endogeneity problem by following an instrumental variable approach. Specifically, we use sectoral public spending changes on inflexible expenditures as percentage of GDP **(**budget cuts or increments - $\Delta BC_{i,t}$) as an instrumental variable. The existence of budget inflexibilities is frequently justified by the need of the government to protect some items of government spending that require stability (Cárdenas et al., 2006). Thus, based on economic and social stability mandates, the main source of budget inflexibilities in Colombia come from the legislation, which ensures that the execution of this type of resources does not depend on the state of the economy in the short term. Validity of this variable as an instrument of public expenditure hinges in the assumption that inflexible expenditure is exogenous due to its rules of execution defined by legislation. Furthermore, political decisions increase or decrease inflexible expenditure. Figure 4 presents several examples of variation in the inflexible expenditures that correspond to military, health, and education expenditures.

In the case of military and defense expenditure, two laws (863/2003 and 1111/2006) set a net worth tax on income households and firms to finance expenditure in defense. At the time the tax reform was implemented, there were considerable variations in the resources executed to the defense sector. A similar case happens with health and educational expenses. The law 715/2001 changes the sharing rules of the transfers to the subnational governments.

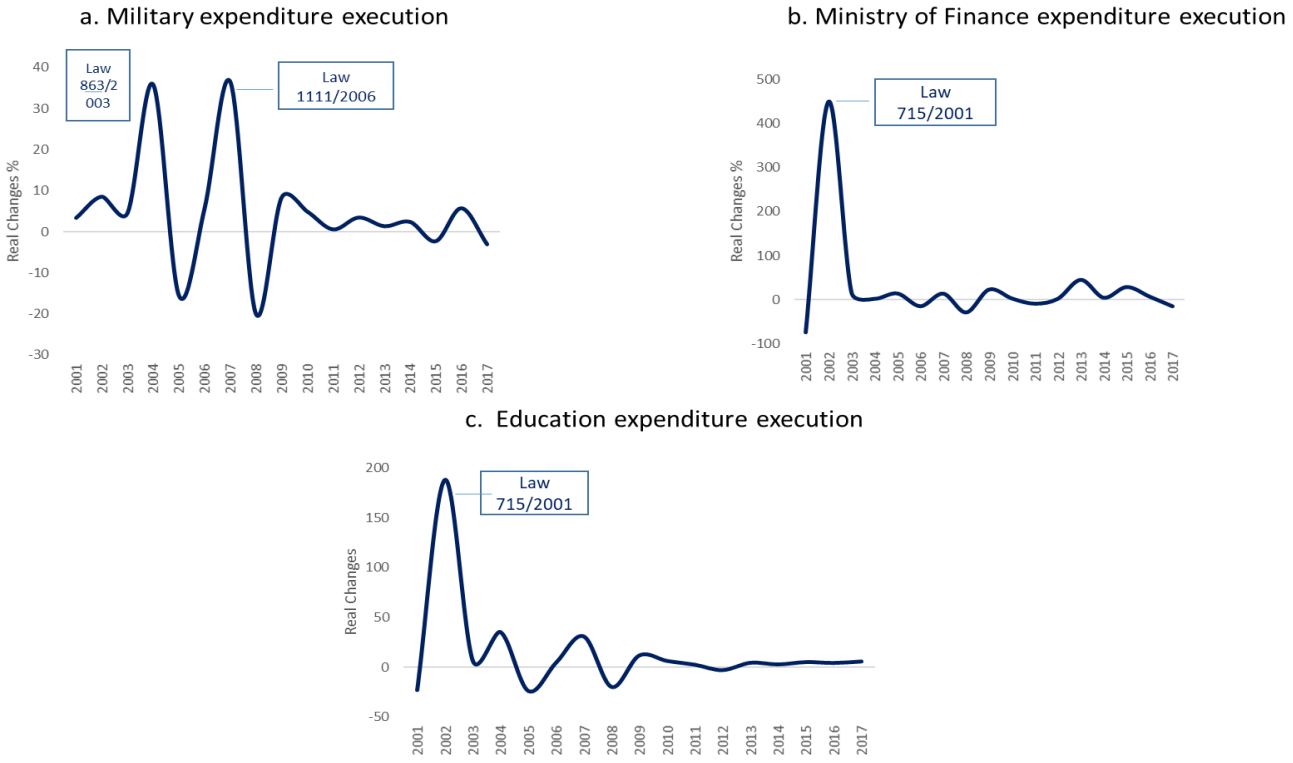
We do not find an empirical correlation between the instrument and variations of the sectoral output controlling for inflation, employment, and investment levels (Table 1). These instruments are similar to those used in empirical studies of the fiscal multiplier at the aggregate level. For example, Ramey (2011) and Sheremirov and Sprivoka (2019) use military spending as an exogenous covariate that is not correlated with economic activity. Moreover, Clemens and Miran (2012) and Serrato and Windenger (2011) identify the fiscal multiplier from changes in spending due to fiscal institutions (balanced budget requirements, expenditure limitations). They distinguish expenditure variations by changes in the rules of distributions from federal resources.

Table 1. Instrument Validity- Test (2000 – 2017)

Dependent variable: ΔY		
	(1)	(2)
ΔBC	0.0003	0.0007
	(0.000)	(0.0005)
Controls		YES
N	366	366

Note: Robust Standard Errors are displayed in parenthesis and * p < 0.01; ** p<0.05 and *** p < 0.10.
Source: Prepared by the authors.

Figure 4. Examples of budget execution by sector, 2000 – 2017 (constant prices, 2005)



Source: Authors´ calculations based on Colombian National budget execution data (SIIF-Nation 2).

We use instrumental variables with fixed effects estimation to identify fiscal multipliers. The estimation strategy is the following:

First stage: We regress the changes in the government expenditure by sector

$$\Delta\widehat{TE}_{i,t} = \beta_0 + \beta_1 \Delta BC_{i,t} + \beta_j \sum_j x_{i,t}$$

Second stage:

$$\Delta Y_{i,t} = \widehat{\alpha_1} + \widehat{\alpha_2}\Delta\widehat{TE}_{i,t} + \widehat{\alpha_j} \sum_j x_{i,t}$$

The estimator is:

$$\hat{\alpha}_{FE-IV} = [W'Z(Z'Z)^{-1}Z'W]^{-1}W'Z(Z'Z)^{-1}Z'\Delta Y$$

where:

W = Initial exogenous variables from model 1, 2 and 3

Z = Instrumental variables

- **Microsimulation procedure**

The microsimulation exercise analyzes how the fiscal multiplier is affected when resources in sectors with the lowest fiscal multipliers are reallocated to sectors with the highest fiscal multipliers. The procedure is described by the following steps:

1. For every single period, we subtract randomly a specific percentage of total expenditure from those sectors with the lowest fiscal multipliers (e.g., social services, communications, and utilities).
2. We randomly add the percentage subtracted in step one to those sectors with the highest fiscal multiplier (e.g., retail and manufacturing, agriculture and construction).
3. We estimate the fiscal multiplier with the instrumental variable approach [$\Delta BC_{i,t}$] taking into account its relevance and exogeneity.
4. We repeat these three steps 1.000 thousand times and obtain the mean of the fiscal multipliers.

b. Estimation of the Fiscal Multiplier

The estimates of the fiscal multipier are reported in Table 2, using the empirical models described by equations [1], [2] and [3]. The columns show the estimated values for the parameters of interest, β, $\gamma_1 = \beta + \alpha_1$, $\gamma_2 = \beta + \alpha_2$ under a Linear Least Squares method (LLS), and a Linear Least Squares method in two Stages (IV). The estimates of the multipliers are also shown with an without estimation controls.

Table 2. General estimates of the fiscal multiplier of sectoral government spending in Colombia

	LLS	LLS	LLS	LLS	IV[b]	IV[b]	IV[b]	IV[b]
Model 1: β	0.012	0.002			0.03**	0.024*		
Model 0 2: β+α₁[c]			0,01				0.01**	
Model 3: β+α₂[d]				0.00				0,032**
Controls[a]		Yes	Yes	Yes		Yes	Yes	Yes
F-test for the IV[e]					22.55*	26.52*	(12,14*) (28,65*)	(22,17*) (28,65*)

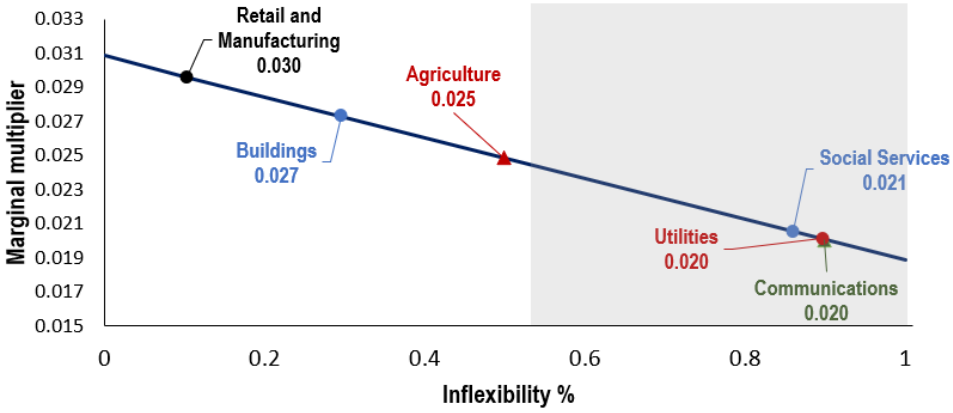
Notes; Estimates are obtained with robust standard errors (HAC). * p<0.01;** p<0.05 y *** p<0.10 A) Controls include gross capital formation, inflation, employment, and a quarterly categorical variable of fixed time effects. B) Instrumental variables are the annual budget haircuts as a percentage of the GDP, and the quarterly percentage of inflexibility. C) Represents the multiplier for those periods when inflexibility is higher than the average of the sample. D) Representes the Kleibergen-Paap F-statistic for the instruments excluded from the estimation.

Results reported in Table 2 show that the values of the fiscal multiplier estimated by LLS are statistically insignificant. However, as mentioned above, these results may be biased due to endogeneity issues. On contrast, the estimates of the fiscal multiplier obtained by the Least Minimum Squares method in two Stages (IV) are all positive and statistically significant. In fact, under Model [1], the fiscal multiplier (β) without control variables is of 0.03, decreasing to 0.024 when control variables are included. Note that in the periods when the highest level of inflexible resources are executed a lower fiscal multiplier is obtained (0.01), while in the periods when a higher level of flexible resources is executed, the multiplier increases to 0.032. These multipliers are statistically significant at the 5% level. Moreover, our results indicate that the fiscal multiplier decreases as the level of inflexibility in public spending increases.

The fiscal multiplier by sector defined by $\gamma_3 = \beta + \alpha_3 \times \overline{IE_\iota}$ is shown in Figure 5. The shaded region shows the inflexibility levels for which the multiplier is not statistically significant. Thus, under this methodology, even though the sectors of social services, energy, gas and water, and communications showed a positive fiscal multiplier, they are not

statistically significant. Meanwhile, the budget resources devoted to the agricultural, construction, and industry and trade sectors exhibit positive multipliers that are statistically significant.

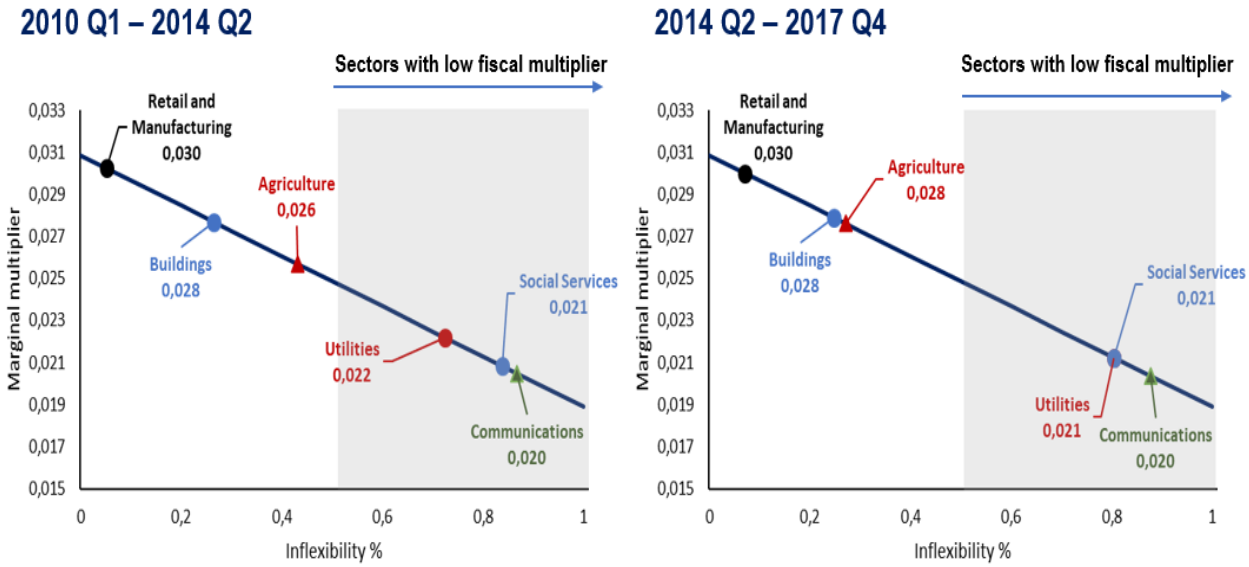
Figure 5. Sectoral Fiscal Multipliers (2000Q1 – 2017Q4)



Notes: Marginal mulitpliers estimation: fom eqution [4]: $\frac{\partial\left(\frac{y_{it}-y_{it-4}}{y_{it}}\right)}{\partial\left(\frac{g_{it}-g_{it-4}}{g_{it}}\right)} = \beta + \alpha_3(DI_{it} \times IE_{it})$

For the purpose of robustness, we estimated two samples controlling for the periods of the fall in oil prices (Figure 5). The steep reduction in oil prices produced a reallocation of resources between sectors. Some sectors, such as construction and agriculture, which are capital intensive, presented higher fiscal multipliers after the shock. The fiscal multiplier for the rest of the inflexible sectors remained statistically insignificant.

Figure 6. Sectoral Fiscal Multipliers and oil price shock



Note: The shaded area shows the interval where fiscal multipliers are not statiscally different from zero. Standard errors and statistial confidence intervals are calculated using the Delta Method.

c. Microsimulation estimations

Using the four steps described in the methodological section, spending in the sectors having the lowest multipliers were redistributed randomly to sectors having the highest multipliers. Results from reallocating 1% of total spending from the most innefficient sectors to the most efficient ones is shown in Table 3. This reallocation would be equivalent to reallocating 0.2% of GDP from the sectors with inflexible spending to those with flexible spending. The second column of the table shows the average level of inflexibility for those periods when inflexible spending had a higher weight than flexible spending, while the third and fourth columns show the fiscal multiplier before and after the above mentioned reallocation. Reallocating 1% of spending would have a positive effect of about 17% on the total fiscal multiplier, and would improve the fiscal multiplier of sectoral spending individually.

Table 3. Effects of a 1% reallocation of spending on the sectoral and total fiscal multipliers

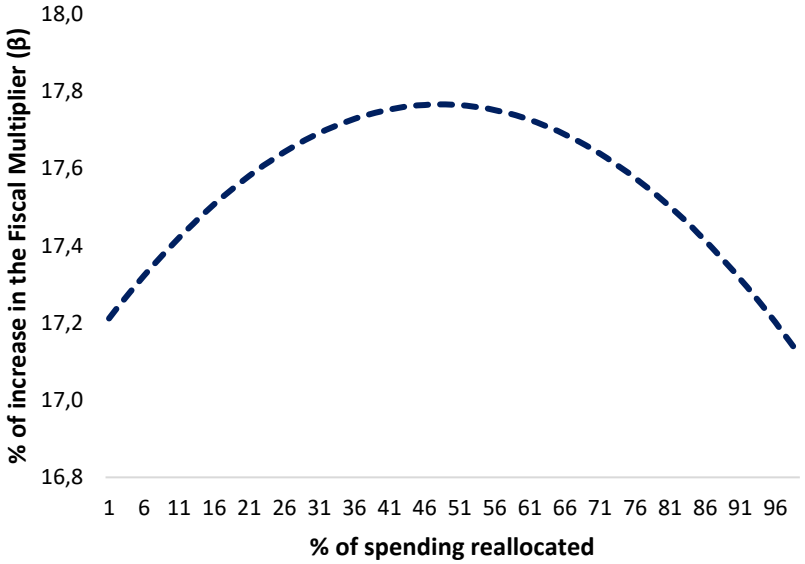
Sector	Inflexible%	Initial Fiscal Multiplier	Fiscal Multiplier (reallocation 1%)	Δ
Agriculture	49.7	0.025	0.034	0.009
Industry and trade	10.3	0.030	0.045	0.015
Communications	89.8	0.020	0.022	0.002
EGA (Energy-Gas-Water)	89.6	0.020	0.022	0.002
Social Services	86.0	0.021	0.023	0.003
Construction	29.6	0.027	0.039	0.012
Total Spending	**80.2**	**0.024**	**0.028**	**0.004**

Note: The simulations to calculate the effect of the multipliers for each sector are estimated using model [2] $(\gamma_1 = \beta + \alpha_1)$; for total spending, the simulations are done using model [1] (β).

We now analyze the marginal impact of the multiplier given variations in the level of expenditure reallocation. We vary the level of redistribution from inflexible towards flexible expenditure and compute the fiscal multiplier following the microsimulation procedure (Figure 6). The multiplier is monotonically increasing, achieving a peak of 17.8%, with a level of reallocation of 46%. Subsequently, the return of the multiplier is marginally decreasing.

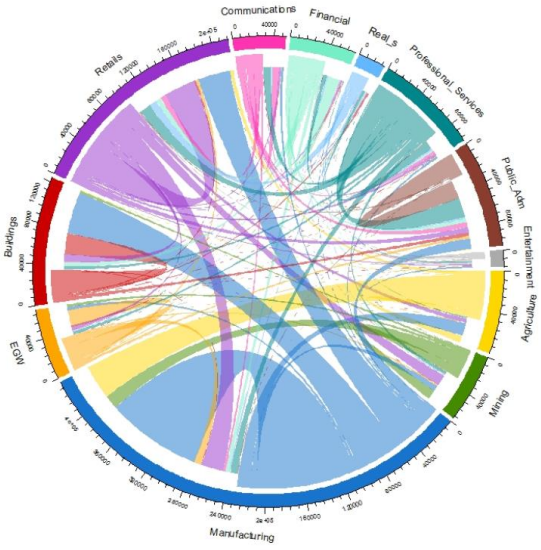
In terms of magnitude, the expected gain is equivalent to an additional increase of 2 percentage points of public investment at the central government level. This result shows the limited impact of reallocation, as the fiscal multiplier is low. A possible reason for this low level is the absence of highly integrated value chains. Sectoral linkages of the input-output matrix for the Colombian economy in 2015 are shown in Figure 8. The chord diagram shows the flows of added value provided by different sectors. The arcs represent each sector, and their size shows the relative share to the other sectors.

Figure 7. Additional percentage variation in the total fiscal multiplier from resource reallocation.



The flows between sectors characterize input-output relationships. The diagram highlights the contribution of manufacturing to other sectors (blue flows). The public administration sector is relatively small, and the flows are highly concentrated in the same sector (brown linkages).

Figure 8. Chord Diagram of the intersectoral-linkages. Input-Output Matrix, 2015



Source: Authors' calculations based on DANE – National Accounts.

5. Concluding Remarks

This paper estimates fiscal sector multipliers for Colombia, an emerging economy with a high degree of budget inflexibility. We find that the lowest fiscal multipliers are found in those sectors with the highest degree of inflexibility. Additionally, we show that there are efficiency gains in reallocating public resources from sectors with a higher degree of inflexibility towards more flexible sectors. The marginal effect for the Colombian economy of reallocating 1% of the expenditure, equivalent to 0.2% of GDP, is an increase of approximately 17% of the fiscal multiplier.

We provide empirical evidence showing that the reallocation effect across sectors on the fiscal multiplier has an inverted U-shape. This result implies that, as the public budget is directed toward more flexible sectors, the fiscal multiplier increases. However, the marginal return of an additional unit of invested resources is decreasing. This may be explained by the fact that the low level of investment limits the impact of the fiscal multiplier.

APPENDIX A1

The distribution of the National Budget (PGN) into the different branches of productive activity is based on an analysis of the expenditures that comprise the sectors of the budget into which the National Budget is classified. For this purpose we performed a detailed analysis of the budget execution reports, the Law of the National Budget (PGN), the Decree by means of which the National Budget is liquidated, and itemized the different appropriations to determine the areas of economic activity towards which the resources of were channelled to, reviewing the expenditure on operations and investment separately. This is how we determined which sectors of the productive activity received the largest portion of the operation and investment spending of each budgetary sector. This resulted in the distribution shown in Table A1, which specifies the sectorial classification used in this document.

The spending accounts were classified into two branches of productive activity simultaneously for some sectors of the budget after observing they covered many expenditures corresponding to both branches, and that it was not possible to classify them into only one.

Table A1: Distribution of the resources of the National Budget (PGN) into productive activity branches

Sector of the National Budget (PGN)	Operations	Investment
Agriculture and Livestock	Agriculture and Livestock	Agriculture and Livestock
Environment	Agriculture and Livestock	Agriculture and Livestock
Science and technology	Social Services	Social Services
Trade, industry and tourism	Social Services	Social Services
Communications	Communications	Communications
Congress	Social Services	Trade
Cultural	Social Services	Construction
Defense	Social Services	Industry
Sports	Social Services	Buildings
Education	Social Services	Social Services
Employment	Social Services	Social Services
Attorney General´s Office	Social Services	Communications
Ministry of Finance	Social Services	Construction
Social inclusion	Social Services	Social Services
Statistic information	Social Services	Social Services
Intelligence	Social Services	Constructions
Interior	Social Services	Social Services
Justice-Law	Social Services	Construction
Mines and energy	Social Services	EGA (Energy-Gas-Water)
Control agencies	Social Services	Communications

Sector of the National Budget (PGN)	Operations	Investment
Planning	Social Services	Social Services
Presidency	Social Services	Social Services
Judicial branch	Social Services	Communications
Registry	Social Services	Commercial
Foreign relations	Social Services	
Health	Social Services	Social Services
Labor	Social Services	Social Services
Transportation	Social Services	Construction
Housing	EGA (Energy- Gas-Water)	Construction

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