Testing regional intergovernmental transfers effects in Uruguay

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Abstract

Using an unbalanced panel of 18 Uruguayan regional governments from 1991 to 2017, we explore the hypothesis of flypaper and asymmetrical effects on the regional public expenditures. The application of panel data techniques with the use of instrumental variables highlights the presence of sizeable flypaper effect but not asymmetry ones. Our estimations also identify that political economy factors play an important role in the regional budgeting processes in Uruguay. This paper contributes to the scarce empirical evidence about the effects of unconditional central government transfers on subnational finances for middle-income countries.

Keywords: Fiscal federalism, Intergovernmental transfers, Flypaper effect, Endogeneity, Uruguay

JEL Classification: D72, H30, H72, H77

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1. Introduction

In recent decades' numerous countries have been engaged in the reallocation of political power and fiscal responsibilities from national to sub-national governments. The increase in the amount of functions and resources transferred from upper to lower government tiers has brought important economic consequences (i.e. long-run macroeconomic performance, government efficiency, development of social capital, and effectiveness of tax assignment), but also political implications (better governance, corruption, party systems, and so on)[1].

The role of intergovernmental public transfers on the sub-national finances and the overall fiscal policy has become much more relevant in the new setting. However, their effects are far from clear. While the expanded resources may help local government attaining important policy objectives (i.e. by reducing regional fiscal disparities), they would also alter the fiscal behavior of the recipient creating situations in which the expected benefits might even vanish (Oates 2005). This could be the case of the so-called flypaper effect, one of the most documented regularities in the fiscal federalism literature (Hinges and Thales 1995; Inman 2008). This empirical observation reflects the propensity of sub-national governmental units to spend intergovernmental unconditional transfers is higher than the propensity to spend on the demand for regional public services by local private agents. The effect of an exogenous grant might push sub-national authorities to expand public spending beyond what the community would desire. Thus, under a setting of political competition the effect would conspire against the implementation of any fiscal discipline rule (Oates 1999). Besides, the response of the recipient governments might be asymmetrical whenever it differs depending on whether grants are increased or decreased

[1] For a survey, see Lago-Peñas (2011).

(Gamkhar and Oates 1996). For example, local governments might raise taxes in order to preserve the expenditure level after transfer losses. But they might as well cut the level of public expenditure and magnify the response by lowering their own revenues, thus reinforcing the negative impact on the quantity and quality of the local provision of public services.

In Uruguay, the policy interest in fiscal federalism has followed from the increasing level of transfers from the central to the sub-national entities (regional governments) and the enhanced autonomy that the Constitutional Reform of 1996 has granted to sub-national authorities[2]. However, null attention has been paid to the empirical research seeking to understand thoroughly regional government expenditures and the way in which they are influenced by intergovernmental transfers. This work seeks to contribute to this discussion by exploring these effects in 18 Uruguayan regional finances over 1991-2017, a period of significant variations in the local taxation policy, both in rates and in tax-base levels (BID 2009; Muinelo-Gallo et al. 2016). It is important to point out that the aim of the work is to carry out a long-term analysis. Because of this, it was decided not to include the department of Montevideo in the analysis, since because he starts to count with regional public finance data from 2006 onwards.

The paper has two major goals: first, to identify the magnitude of the response of regional government expenditures to a change in private income and compare it to the reaction to unconditional transfers. Secondly, to test whether the effect is symmetrical by focusing on the sign of the variation in transfers (cuts versus increases).

Empirical results show a significant and sizeable flypaper effect but not asymmetry effects. Our estimations also identify that political economy factors play an important role

[2] Uruguay is divided in 19 departments (regions) which are the second level of government, after central government. For details of the administrative composition of Uruguay see Figure A.1 in the Appendix.

in the regional budgeting processes. In this sense, we could observe that local spending is subject to electoral cycles, and that the increase of votes intra-cyclical volatility (passage of votes from one party to another between national and regional elections) has positively impacted the level of regional spending.

The paper is organized as follows. Section 2 reviews economic literature devoted to the analysis of asymmetrical effects of regional intergovernmental transfers. Section 3 presents the empirical background, while section 4 describes the regional public finances of Uruguay. Section 5 details the methodology and section 6 describes the empirical approach. Results are presented in section 7 and robustness exercises in section 8. Section 9 concludes.

2. Sub-national public finances and the flypaper effect

A widely accepted economic principle of the fiscal federalism literature argues that "finance follows function". The principle emphasizes that both the amount of revenues a sub-national government needs as well as its optimal choice of financing sources depend on the specific expenditure responsibilities assigned to the regional entities and their cost (Bahl 1999).

Although there are many ways to classify expenditure assignments to sub-national governments, an essential distinction is based on their discretional nature. Expenditure allocations might be used by the local governments according to their discretionary decisions or might be compromised beforehand to fulfill the responsibilities delegated by the central government, which involve non-discretionary decisions. Sub-national autonomy is required if and only if an expenditure function has been assigned as an exclusive responsibility to the sub-national level. In contrast, when the delegated

functions are just implemented by sub-national authorities, the ultimate responsibility over these functions still falls upon the central government. So, discretion, if allowed, could only be exerted within certain limits and controls. Frequent examples of delegated (non-discretionary) expenditure responsibilities are education and health services. In this latter case, significant shares of the sub-national education and health budgets are devoted to meet national standards regarding quality and coverage under the ultimate responsibility of the central government. Conversely, service delivery of street cleaning and lighting are generally associated to fully discretionary decisions at the sub-national level (Martinez-Vazquez and Sepulveda 2011).

A key issue for the fiscal federalism policy design is how lower-level governments are financed. The presence of fiscal vertical imbalances typically implies that sub-national expenditures are larger than their revenue collections. To eliminate this vertical imbalance, the central government must provide additional resources in the form of intergovernmental transfers. Under these conditions, there is a range of non-discretionary (delegated) expenditure responsibilities that should be financed by conditional intergovernmental transfers. If the central government is committed with achieving certain national standards, then it should provide the funds required to ensure that those standards are met nationwide. But, also a very significant percentage of the intergovernmental transfers are devoted to finance the sub-national government own responsibilities. This financing must be unconditional to allow for discretionary sub-national decisions. The recent diffusion of decentralization processes in many countries has eventually led to a growing academic interest to understand the overall effects of these non-conditional fiscal transfers (BID 2017).

Traditionally, the effects of unconditional transfers have been studied from the welfare state perspective (Musgrave 1959; Musgrave and Musgrave 1984). Based on the median

voter theory, this perspective holds that an increase in unconditional transfers will have the same effect on the demand for public services as a change in the local private incomes. More specifically, with perfect information and political competition, the distributive and allocative effects of unconditional fiscal transfers should not be different from the direct distributive and allocative effects of local residents' private resources. In the same context, the standard fiscal federalism approach formalized by Bradford and Oates (1971), predicts that non-conditional fiscal transfers to local governments (grants) are equivalent to expansions in the local community private income. The reason is that as money is fungible a local government should have the same propensity to spend out of individual income or out of lump-sum grants. This result is known as the "veil hypothesis" because it suggests that intergovernmental transfers are simply a veil for central government tax rebates (Oates 1999).

Nevertheless, a large body of empirical literature has produced results that are at variance with prior predictions. The analyses have shown that non-conditional intergovernmental transfers stimulate more local public expenditure than equal increases in local private income. This result is known as "flypaper effect", one of the most documented empirical regularities in the early fiscal federalism literature (Henderson 1968; Gramlich 1969). The term summarizes the fact that a lump-sum grant has a larger effect on public spending than an increase in personal income (Dahlby 2011). In other words, the idea is that "money sticks where it hits": just as private income tends to be allocated to private consumption, the recipient government will spend fiscal transfers rather than rebate it back to citizens[3].

[3]For surveys, see Bailey and Connolly (1998), Gamkhar and Shah (2007) and Inman (2008).

Attempts to provide rationality to the so-called flypaper effect can be divided into empirical and theoretical arguments. The empirical explanations are based on two types of views. Some scholars argue that there might be data problems. Researchers might miss-classify non-fungible conditional fiscal transfers as grants though they include some matching elements leading to a greater stimulatory impact than pure lump sum transfers (Moffitt 1984; Megdal 1987; Wyckoff 1991; Baker et al. 1999). The alternatively view focuses on possible econometric model miss-specification. Omitted variables biases could falsely support the flypaper effect if unobserved community characteristics, influencing the technology or the effective cost of public spending, were systematically related with citizen private income (Hamilton 1983; Hamilton 1986; Becker 1996).

The strand of theoretical explanations is based on the incentives and interests of local citizens, politicians and bureaucrats. The fiscal illusion argument holds that the choice model of the representative citizen might be misspecified because the local citizen confuses the income effect generated by intergovernmental transfers with a price effect that reduces the average effective cost of local public spending (Gramlich 1977; Courant et al. 1979; Dollery and Worthington 1996). Under this theory, the flypaper effect results from the voters' failure to correctly assess the average cost of producing a public service when it is partially paid by unconditional grants. When local governments receive a grant, they can raise the level of public services, keeping the tax price voters pay unchanged. To voters, it might seem as if the costs of producing public services had been reduced so that they could expand their demand of public services more than they would have if perceiving the actual service costs correctly. Related arguments hold that the local citizen is not fully informed and fails to see the local public budget. Filimon et al. (1982) considers that the representative voter fails to see through "the veil of government budgets", for she does not know about the aid received by the local government. In fact,

even when fully informed, she might not behave completely rationally. Hines and Thaler (1995) refer to the loss of risk aversion and lack of fungibility between different types of local government funds. Whenever the contributors are more sensitive to declines than to increases in their welfare, and do not handle changes in current income similarly to changes in future income, then sub-national governments are more likely to expand their expenditures by financing themselves with transfers than with their own revenues.

Another line of arguments is based on the politician behavior. McGuire (1975) argued that seeking to stay in power the politicians increase the level of public spending at the lowest possible political cost. Other scholars exploit the role that inefficient political institutions have in revealing citizen preferences. From this perspective, the flypaper effect is a consequence of an inability of citizens to write complete "political contracts" with their elected officials. Chernick (1979) specifies donor-recipient contracting as an auction. Assuming an exogenous level of central government aid, local governments would bid for the right to provide aided services by offering to share the costs of provision. Beginning with the highest offer price, the central government selects recipient governments until its grants budget is exhausted. The resulting allocation will equalize the marginal contribution of each local government to the incremental benefits from the provision of the local service. In Knight (2002) the model for grant policy sets both the aggregate size of the aid budget and its allocation. The budget is chosen to ensure its passing and to maximize local constituent net benefits for the central government agenda-setter. Again, the allocation process is an auction. Those legislators whose state or local governments value the aided local service most highly make the winning offers. In both cases, the result is a positive correlation between grants awarded and local public spending.

The regional fiscal literature has provided a novel explanation for the flypaper effect based on the role of local bureaucrats who try to maximize their monetary and non-monetary income. King (1994) follows the model of bureaucratic behavior of Niskanen (1968) and takes the public budget as a result of the negotiation between the representatives of the median voter (the sponsor) and the members of the bureaucracy (the bureau). The sponsor and the bureau have conflicting interests: the former seeks to ensure his reelection by maximizing the welfare of the median voter, the latter tries to maximize the public budget because his pay, power and prestige increase with it. In other words, the sponsor desires a production of public goods as close as possible to the one demanded by the median voter (exactly what is predicted by the classical model) while the bureau wants a far higher one. Besides, the higher is the bureaucratic complexity of a local government, the higher the cost to supervise its activity in terms of other actors (politicians and/or voters), and then the higher the autonomy of the local bureaucrats in the definition of the local public spending. Since local bureaucrats have preferences for a higher expenditure level than the other actors, this should lead to a larger flypaper effect in the granted local governments with a higher bureaucratic complexity[4].

Together with the arguments behind the flypaper effect, another important discussion takes place around the asymmetric response of local governments to the sign of the variation of intergovernmental transfers (cuts versus increases). Overall, scholars observe that transfer losses may be partly compensated by local governments willing to preserve expenditures by raising additional taxes: this is the "fiscal replacement" effect pointed out by Gramlich (1987). Alternatively, local governments may magnify the spending response to cuts in grants by lowering their own revenues as well: this gives rise to the "fiscal restraint" type of asymmetry, also called super-flypaper effect by Gamkhar and

[4] For more recent explanations of this line of research, see Culis and Jones (2009).

Oates (1996). The rationale behind this response could be varied. Gramlich (1987) suggests that public expenditure is often related to clientele behavior that makes its reduction problematic. Stine (1994) argues that asymmetry depends on the interaction of fiscal illusion, flypaper effects and interest groups. Borge et al. (2005) and Levaggi and Smith (2005) use costs of adjustment to justify the asymmetric response. Hines and Thaler (1995) suggest that the ‘‘super-flypaper effect’’ could be explained by assuming that taxpayers are loss averse (e.g., much more sensitive to decreases in their welfare than to increases) and that they do not treat funds as fungible.

3. Empirical background

The effects of intergovernmental transfers on local government fiscal behavior are generally analyzed with models where a representative local citizen maximizes her utility depending on private consumption and local government spending (g) subject to her total income. This, in turn, is defined as the sum of her private income (y) and her share of fiscal transfers (f). In this setting, the flypaper effect (FP) can be defined as in equation (1):

$$FP = \Delta g_f - \Delta g_y \qquad (1)$$

where Δg_f and Δg_y denote the change in government spending in response to an increase of one monetary unit in fiscal transfers or in private income, respectively.

A wide range of studies provide evidence about the flypaper effect across time and countries for developed economies with varied results. A review of the available estimates shows that the ratio of local expenditures to intergovernmental grants in United States ranges from a 0.43 (Gramlich and Galper 1973) to more than 1.00 (Case et al. 1993) while the ratio for individual income is 4- 6 times smaller. European countries seem to be even more sensitive. While an extra dollar in private income raises public spending by $0.02 (Levaggi and Zanola 2003), an increase in fiscal transfers results in $2.09 in public outlays (Tovmo and Falch 2002).

The available evidence for medium income economies, like Latin American countries (LAC), is rather scarce. Vegh and Vuletin (2015) find a flypaper effect of 1.6-1.9 for Argentinean provinces, which behaves as a decreasing function of the correlation between fiscal transfers and private income. Espinosa (2011) uses a panel of Mexican states to derive a sizeable flypaper effect and Melo (2002) finds also evidence for Colombia, where sub-national entities are highly dependent on intergovernmental transfers.

Few studies have analyzed the sign of variation of intergovernmental transfers. Table 1 lists some of the most commonly cited studies.

<<Table 1 about here>>

The empirical test of the asymmetric reaction to grants depending on their expansion or reduction has been mixed. Mainly evaluated in developed countries, some studies find support in favor of the asymmetry hypothesis (Heyndels 2001; Deller and Maher 2006; Lago-Peñas 2008) whereas others do not (Gamkhar and Oates 1996; Gennari and Messina 2014).

4. Regional public finances: The Uruguayan case

Uruguay is divided into 19 departments (regions) representing the "second level" of government following the central government. Although it has been implementing an incipient process of decentralization (after the Constitutional Reform of 1996), the country is still fiscally-centralized. Over the period 1991-2017, more than 90 percent of the national public expenditure was directly executed by the central government (Table 2)[5].

<<Table 2 about here>>

The powers formally assigned to the regional governments are defined in the Basic Law of Governance and Administration of the Departments (No. 9.515), which has remained unchanged since 1935. The traditional powers and responsibilities of these sub-national governments refer to public services that in other LAC countries would correspond to the third level of government (BID 2017). They comprise activities like investment and maintenance of the urban equipment, road maintenance, traffic organization, public transport, public area cleaning and lighting, cemetery services, health control and land use planning.

On the financing side, over the last decade unconditional intergovernmental transfers have expanded as a source of sub-national government revenues (Figure 1). Unconditional transfers make up more than 90 percent of the current intergovernmental transfers. Since 2004, the gap between local revenues and average unconditional transfers

[5] If the department of Montevideo is also considered, the average size of the 19 sub-national governments during the period 2006-2017 is 11.2 percent.

has narrowed significantly. At the same time, both increases in local revenues and unconditional transfers have led to a persistent and significant increase in real local public expenditure expressed in per capita terms.

As for the local revenues, unconditional transfers represent most that 40 percent of total local revenues (Muinelo et al. 2016). The main local taxes are on urban and suburban property of real assets and on vehicles. Next on the list comes the tax on purchase and sale of live animals. The property tax on rural real assets is the principal tax fixed by the central government but administered and collected by the regional governments.

<<Figure 1 about here>>

The intergovernmental transfers in the country are not clearly formula-based either purely or on an *ad-hoc* basis. They are stipulated in the National Budget Law every five-year period of government. However, they have experienced important changes over the last years. During the government periods started in 1990 and 1995, the National Budget Law established four types of intergovernmental transfers: one devoted to assist the regional government in their pay of the employer contribution to social security. They are distributed as a proportion of the number of civil servants in each regional government. A second type comprised an aliquot of the fuel consumption tax (IMESI) without setting a specific target. These are distributed according to the contribution of each regional government to the revenue generation. A third type of transfers were included in the "National Plan of Municipal Infrastructure" -administered by the central government and directed to finance new infrastructures or maintain the old ones. The forth type was meant to finance rural roads under the administration of the central government. The last two

subsidies were distributed with great inertia respect to the previous infrastructure spending for the criteria considered population (quite stable in Uruguay) and surface in equal parts, though allowing for some political adjustment according to the current needs.

Despite being broadly defined at the National Budget Law level, important emerging laws have added supplementary items to the intergovernmental transfer legislation. Sometimes, these are justified by particular circumstances like a financial local or regional crisis, a drought or a flood. However, these transfers very often end up becoming permanent items because of the pressure exercised by the regional government to keep or even expand those resources in the next government period (Muinelo et al. 2016).

During the period 2001-2017 the National Budget Law included the reforms of the National Constitution of 1996. The new Constitutional provisions (Articles 214 and 298) were expected to improve the transfer system and to avoid any *ad-hoc* additional transfer not included in the National Budget Law.

The Article 214, mainly concerns unconditional transfers, stipulates that every five-year period regional governments must receive an aliquot of the national budget. The aliquot was 3.18 percent in 2001, 3.54 percent in 2005 and then fixed in 3.33 percent for the period 2006-2017. A large part of these funds are devoted to the "National Plan of Municipal Infrastructure" and to the preservation of rural roads (both administered by central government). The remaining funds are distributed among the regional governments based on 2 conditions: first, the local population, surface, inverse of regional GDP and percentage of households with unfulfilled needs (25 percent each). Secondly, the share of the total funds received in the previous government period. The resulting transfer might arise from an average of the two criteria but it is not so clear. In turn, the remaining funds (published in the National Budget Laws: Nº 17.296 for 2001-2005 and Nº 17.930 for 2006-2017) stem from a political negotiation between the central

government and the Congress of Heads of regional governments (established by the Constitution of 1996 as a representative council of regional governments).

The Article 298, referred exclusively to conditional transfers, regulates the so-called "Development Fund of Departments" (DFD), aiming at local and regional development and decentralization. The DFD is formed by an aliquot of the taxes the central government collects from all the departments except Montevideo (about 11 percent). However, only the 33.5 percent of DFD funding goes directly to the regional governments: the largest share is directly executed by the central government.

Articles 214 and 298 seek to ameliorate the regular logic of political negotiations with regional authorities after the discussion of every National Budget Law. Nevertheless, regional governments continued pushing central government to make extra transfers beyond the scope of the National Budget Law. As in previous periods, these extra transfers are usually justified as temporary items due to particularly events or circumstances and finally become permanent (Muinelo et al. 2016).

To sum up, the allocation of intergovernmental transfers in Uruguay has followed unclear mechanisms over the different government periods from 1991 to 2017. Though there have been some guiding criteria, they are still very far from any clearly and technically defined formula and allows an implicit degree of political negotiation between central and regional governments. In this context, in this paper we focus on the explicit analysis of unconditional intergovernmental transfers mainly included in Article 214 of the National Constitution and other lesser unconditional items[6].

[6] These minor unconditional items include two types of resources: constitutionally provided national resources ("unspecified article"); and resources established by other provisions ("Municipal Government Incentive Fund", and "unopened resources").

5. Empirical methodology

The empirical strategy applied to an unbalanced panel data of 18 departments during the period 1991 to 2017, is aimed at evaluating the sensitiveness of regional budgets to transfers by measuring two types of asymmetries. The first one concerns the magnitude of the reaction to increases in private income as compared to increases in unconditional transfers (the standard flypaper effect); the second type of asymmetry is related to the sign of the variation in transfers (cuts versus increases). We assume that decision-makers are subject to a revenue constraint and discretionary set the level of expenditures (and own revenue) to appeal to a utility maximizing median voter. For the sake of comparison, we follow previous works in the literature, and estimate a reduced form equation on the expenditure side, which can be derived from the analytical framework:

$$G_{it} = \beta_0 + \beta_Y Y_{it} + \beta_F F_{it} + \beta_A A_{it} + \sum_h \beta_h X_{it}^h + \varepsilon_{it} \qquad (2)$$

where i and t capture region (department) and year, respectively. The variables G, Y and F represent regional government spending, regional income (we use as a proxy of the median voter's gross income the regional real GDP per cápita), and non-conditional fiscal transfers[7], respectively, all expressed in real per cápita terms. While the variable A is introduced to capture another possible asymmetrical response of regional government's expenditure to variations in transfers:

[7] These kinds of transfers, covered mainly by Article 214, are totally non-earmarked and are hence unconditional.

$$A_{it} = D_t\left(F_t - F_{t-1}\right)$$

where D_t is a dummy equal to 1 when transfers are decreasing and 0 otherwise. A rejection of the null hypothesis of symmetry (i.e., $H_0 : \beta_A = 0$) implies that β_F is the expenditure response to increasing grants, while $\beta_F + \beta_A$ is the coefficient on declining grants; in this case $\beta_A < 0$ means that we are in presence of a fiscal replacement type of asymmetry while $\beta_A > 0$ reveals a super flypaper effect.

We use the vector X to denote social and political economy determinants of expenditure decisions[8]. In this sense, we include regional income inequality measure to control for potential the demand for regional services, a variable that considers the number of civil servants of the regional government in order to control for the autonomy of the local bureaucrats in the definition of the regional public spending, and two political economy variables like local governor pre-electoral period, an electoral volatility indicator (Pedersen index) which allows us to observe the consequences of the separation in time of the national and departmental (regional) elections[9]. Volatility reflects the percentage of voters who varied their vote between the national and regional elections, being an indicator of the stability of the system of winning parties. In this case it is considered as the passage of the vote from one electoral party to another between national and regional elections within the same electoral cycle (intra-cyclical volatility).

[8] Table A.1 in the Appendix details all variables definitions and their sources.

[9] It is important to point out that since 2004 the sub-national authorities' elections in Uruguay have been separated from the national elections that up to that moment were carried out jointly.

Most estimations include regional and time effects. Residuals are calculated using robust variances and relaxing the assumption of independence within groups by allowing the presence of error autocorrelation within departments.

6. Econometric issues

The estimation of the equation (2) is potentially affected by some relevant econometric problems. A first issue is represented by the possible presence of unobserved heterogeneity which, if it is correlated with regressors, leads to inconsistent estimates. To help solving this problem, the inclusion of a large set of controls may sometimes be the right choice, but in many cases, it is not enough. To solve this problem our baseline model for per capita total expenditures was estimated with fixed and random effects using the whole set of controls and with panel-robust standard errors[10]. A second estimation issue is the possible endogeneity of the variable representing transfers from central government. When investigating the effects of intergovernmental transfers on the behavior of lower-level governments, it is hard to defend the handling of these transfers as an exogenous factor. Central governments often set transfers based on characteristics and performance of decentralized governments. If transfers to sub-national governments are set simultaneously with local expenditures, then these can have an impact on transfers, creating an endogeneity problem which should be treated properly to get consistent parameter estimates. This would be the case for instance with specific programs where lobbying can be at work to get the related financing (Knight 2002), or when the design of the transfers system is done based on economic and political features, which are also

[10] Table A.2 in the Annex details summary statistics of all variables.

associated with spending (Johansson 2003). In this sense, we estimate the empirical model instrumenting contemporaneous transfers with lagged values of the same variable. Finally, we consider the persistence of local public expenditure by estimating dynamic expenditure equations.

7. Empirical results: baseline models

Table 3 reports our baseline regressions results. The first two columns present the results of OLS estimations with fixed (column 1) and random (column 2) effects models. In columns 3 and 4 to deal with endogeneity problem, we estimate the panel using two-stage least squares (with fixed and random effects model, respectively), and instrumenting the transfer variable with the first lag of the same variable. Finally, in columns 5 and 6, we add dynamics to the model including the first lag of the dependent variable, by instrumenting the transfer variable with the first lag of the same variable, and estimating the panel using Arellano and Bond (1991) GMM-First Difference (GMM-FD) estimators and, also Arellano and Bover (1995) System-GMM (SYS-GMM) panel data estimators.

<<Table 3 about here>>

Our results show that the sensitivity of total regional governments spending to variations in regional GDP ranges from 0.026 to 0.032. However, the stimulative impact of intergovernmental transfers is much more important ranging from 0.64 to 1.11. In turn, the coefficient on asymmetry is not significant in all baseline specifications of table 3.

The magnitude and sign of the control variables is consistent among all the specifications. Regional spending is positively influenced by income inequality. This could be explained by the fact inequities may boost the demand for regional services. On the other hand, we did not observe a significant effect of the variable related to the number of public officials in local government. In relation with political variables we have very interesting insights. First, regional spending is undoubtedly subject to electoral cycles, since regional expenditures soar as local elections approach. The empirical evidence also shows a significant effect in relation with the congruence in voting between national and regional elections. This volatility, measured through the Pedersen index, indicates the net changes in the percentage of votes that each party wins or loses between national and regional elections. In this sense, the increase in intra-cyclical volatility (passage of votes from one party to another between national and regional elections) has positively impacted the level of local spending.

Overall, the empirical evidence shows the presence for Uruguayan regional governments of a strong flypaper effect, which is present even controlling for social, economic and political factors, and when they are considered fixed and temporal effects.

8. Robustness

In this section we test the robustness of our main results by modifying some important aspects of the estimated baseline regressions. First, we begin by testing if the coefficients of all variables are sensitive to the inclusion of new control variables. In this sense, we include three additional political variables. Firstly, we add a dummy variable representing the possibility for the major to be re-elected in the following regional election, equal to 1 if the mayor is at the second term and thus cannot be re-elected: the coefficient should

have a negative sign. However, we not observe a significant impact of this variable in all baseline specifications. Secondly, we also introduce in all models an index of compactness of the government coalition, which is a Herfindahl index of the share of each political party in regional governments: in this case the variable should have a negative sign in our regressions. Also, we not observe a significant effect of this variable. Finally, we add a dummy variable for the political orientation of local bodies, which takes the value of 1 for centre-left majorities for the common view that left wing governments tend to increase the role of public intervention in the economy, and then spend more than right wing ones. Also, in this case we cannot observe a significant impact of this variable. Finally, we estimate all regressions with these three political variables at the same time, and we did not obtain significant results for any of them. In all these cases, the rest of the explanatory variables did not change their sign, significance and magnitude. These results are not reported for space reasons but are available upon request.

Second, to fathom whether the results are being driven by one regional government in our sample, we repeat the regressions of table 3 after removing each regional government one at time. The results are stable indicating that no single one is driving our results. Again, these results are not reported for space reasons but are available upon request.

Finally, we deal more deeply with the possible endogeneity of the variable representing intergovernmental fiscal transfers. Here, we follow a two-step procedure, in which we first estimate a transfer equation (first stage). Then we use the estimation of the transfer variable as the explanatory variable in the expenditure equation (second stage). In this two-stage scenario we perform two types of exercises. In a first instance, we estimate static expenditure models, and, in the second place, we estimate dynamic expenditure equations by two types of GMM estimation methods (GMM-FD and SYS-GMM).

8.1 Static models

Table 4 shows the first and second stage instrumental variables regressions. The columns 1, 3 and 5 shows the results from the first stage regressions (i.e., the dependent variable is unconditional intergovernmental transfers in real and per capita terms) and columns 2, 4 and 6 ones from the second stage (i.e., the dependent variable is real government spending per capita).

<<Table 4 about here>>

In the estimation of the transfer equations, in the first instance, we consider the elements that should be considered strictly by norm in the allocation of transfers (see section 4). Thus, the following variables are included as explanatory variables: the population of the department, the departmental real GDP per cápita and the level of departmental poverty. Then, due to the intuition that different elements of political negotiation may be influencing the allocation of these transfers, we include variables that attempt to capture the influence of these aspects, like political alignment between regional and central governments and a department electoral switch variable.

We observe that the population size of the department is not significant. Estimates show that poverty levels have a negative effect on the level of transfers, so it can be inferred that these transfers are not designed to diminish these social problems. The estimates also support the idea that regional income have a significant impact on transfers. This result is reflected in the fact that the value of the department's GDP per capita has a positive and significant effect, so it can be deduced that these types of transfers do not have a regional

equalizing effect in Uruguay[11]. Finally, we analyze the impact of variables related to the political economy of the allocation of intergovernmental transfers. In relation to the political alignment variable, there is no significant effect. There are also non-significant effects of the variable referring to the change of the political party in the government during the period under analysis (switch department).

In relation with the second stage equations, the estimations of table 4 allow us to ratify the results in terms of significance and sign of all the relationships found. In this case the magnitude of the flypaper varies between 0.29-0.31, and we do not observe significant effects in the case of the asymmetry variable.

8.2 Dynamic models

Table 5 presents the estimates of dynamic models through two estimation methods (GMM-FD and SYS-GMM). The fitted values of transfers of first stage of table 4 are used as explanatory variables over different dynamic regional expenditure equations of table 5. In this sense, the fitted value of transfers of column 1 of the table 4 is considered in estimations of columns 1 and 2 of table 5; the estimation of transfers of column 3 of table 4 is used as explanatory variable of columns 3 and 4 of table 5; and, finally, the predicted value of transfers of column 5 of table 4 is used as explanatory variable of regressions of columns 5 and 6 of table 5.

<<Table 5 about here>>

[11] For similar results see BID (2017, chapter 11) and Muinelo et al. (2016).

It is important to note that despite observing significant effects of persistence in per capita expenditure levels in all these equations of the table 5, we also observe an important and significant flypaper effect from 0.29 to 0.31. As well, it is important to point out that in the latter case of dynamic models; we not find a conclusive evidence of an asymmetrical reaction of regional expenditures with respect to the sign of transfers' changes. The coefficients of asymmetry are not significant.

9. Conclusions

The analysis about the responses in terms of expenses of sub-national governments to transfers from central government is one of the most popular and documented subjects in the fiscal federalism literature. Despite a widespread success overseas, in Uruguay null empirical research has been done on this matter. Our work has started to fill this gap, by investigating the extent to which spending decisions by regional governments are influenced by changes in upper tier unconditional transfers.

Empirical results have highlighted a remarkable standard flypaper effect for local authorities, mostly in line with previous studies for European and LAC countries. However, it was not finding evidence on the asymmetric behavior of expenditures with respect to the direction of changes in transfers (cuts versus increases).

Conventional demographic, social, and institutional controls have mostly the expected sign. But, most important, some politics factors also are confirmed to play an important role in local budgeting processes. Estimations show that local spending is subject to electoral cycles, while the increase of voters' intra-cyclical volatility (passage of votes from one party to another between national and regional elections) has positively impacted the level of regional spending.

Due to the list of variables used in the different expenditures estimates we could argue that the presence and size of the flypaper effect does not seem to be entirely attributable to a mismatch between local bureaucracy, policymakers and population. Demand-side factors, such as the fiscal illusion, or behavioral phenomena as aversion to losses, appear to be determinant in the case of Uruguay. Due to local taxes are property-based, it is likely that only property owners will correctly receive the price of local taxes. However, tenants may not face the full price of taxes or may have less accurate information on the prices of the taxes they face, and therefore vote in favor of higher expenditures (Goetz, 1977). Further, if local taxpayers are more sensitive to decreases than increases in their welfare, and if they do not similarly treat changes in current and future revenues, then subnational governments could be more likely to expand their budgets with subsidies than with taxes.

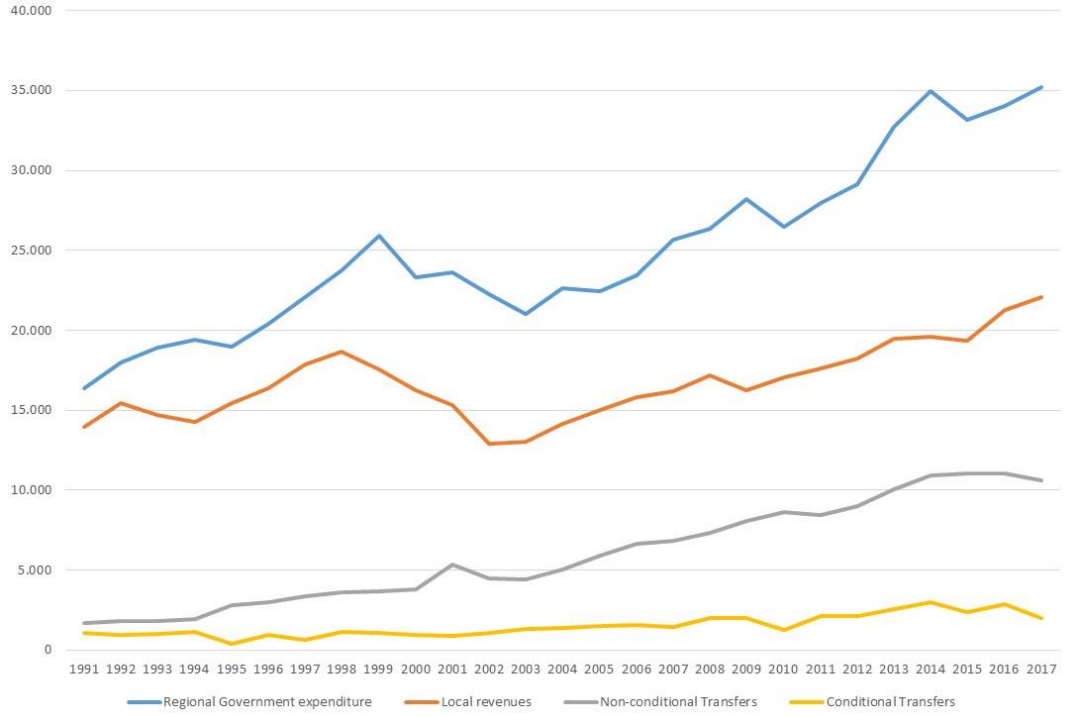
Against this backdrop, two important policy recommendations emerge in order to offset the adverse effects of the increase in unconditional intergovernmental transfers. Firstly, local public budgets be made more transparent so that local citizens are better informed about the cost of providing the local public services. Secondly, it is considered pertinent to elaborate fiscal rules at the sub-national level in order to contain exaggerated variations in local public spending. In the latter case, the following rules could be good examples: structural budget equilibrium objectives (revenues and expenditure), and/or local indebtedness rules.

Table 1 – Composition of General Government expenditures (1991-2017), selected years (in percentages)

	1991	1995	2000	2005	2010	2017	Average 1991-2017
Central Government	93.1	92.7	92.3	92.2	93.3	93.5	**92.7**
Regional Governments	6.9	7.3	7.7	7.8	6.7	6.5	**7.3**
General Government	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Ministry of Economy and Planning and Budget Office - Presidency of the Republic

Figure 1 – Evolution of Regional Governments finances in Uruguay (1991 – 2017)
All variables are expressed in real and per cápita terms
(Average Regional Government)



Note: All values are without Montevideo department.
Source: Planning and Budget Office - Presidency of the Republic**.**

Table 2 - Estimates of the flypaper and asymmetry effects

Author	Data	Sample	Δg_f	Δg_y	Flypaper effect	Asymmetry effects
High income countries						
Gramlich and Galper (1973)	Aggregate US state and local government data (quarterly)	1954-1972	0.43	0.10	0.33	--
Case et al. (1993)	48 US states	1970-1985	0.65-1.02	0.11-0.17	0.54-0.85	--
Gamkhar and Oates (1996)	Aggregate US state and local government data (annual)	1953-1991	0.62-0.73	0.11-0.28	0.51-0.45	Not significant
Heyndels (2001)	308 Flemish municipalities	1989-1996	1.03-1.13	0.04-0.05	0.99-1.08	Significant (fiscal replacement)
Gemmell et al. (2002)	54 English and Welsh counties	1991-1994	0.70-0.75	0.10-0.22	0.60-0.53	--
Tovmo and Falch (2002)	605 Norwegian rural municipalities	1934-1935	1.31-2.09	0.07-0.10	1.24-1.99	--
Levaggi and Zanola (2003)	18 Italian regions	1989-1993	0.56-0.84	0.01-0.02	0.55-0.82	Significant (Super flypaper effect)
Deller and Maher (2006)	US Wisconsin municipalities'	1990 -2000	5.838	0.046	5.792	Significant (fiscal replacement)
Lago-Peñas (2008)	313 Galician municipalities Spain	1985-1995	0.88-0.96	0.001-0.009	0.87-0.96	Significant (fiscal replacement)
Genari and Messina (2014)	8.000 Italian municipalities	1999-2006	0.79-1.43	0.02-0.06	0.77-1.43	Not significant
Middle income countries						
Melo (2002)	32 Colombian regional governments	1980-1997	1.13	0.11	0.40	Not significant
Espinosa (2011)	31 Mexican states	1993-2003	1.563	0.082	1.481	--
Vegh and Vuletin (2015)	23 Argentinian provinces	1972-2006	1.69-1.95	0.063-0.065	1.63-1.90	--

Table 3 – Baseline regressions results

	OLS		2SLS		GMM	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	FE	**RE**	**FE**	**RE**	**GMM-FD**	**SYS-GMM**
Lagged regional government expenditure	--	--	--	--	0.072** (0.043)	0.066* (0.043)
β_f	0.683*** (0.156)	0.720*** (0.138)	1.117*** (0.253)	1.100*** (0.190)	0.639*** (0.121)	0.661*** (0.121)
β_y	0.026*** (0.002)	0.026*** (0.002)	0.032*** (0.002)	0.032*** (0.002)	0.025*** (0.002)	0.025*** (0.002)
Electoral cycle	1103.028*** (93.129)	1111.756*** (106.559)	1041.647*** (84.024)	1050.954*** (90.928)	1025.712*** (150.851)	1032.100*** (150.576)
Pedersen index	86.465*** (15.811)	92.610*** (16.217)	76.898*** (13.795)	81.952*** (12.990)	64.315** (30.584)	66.261** (30.509)
Local bureaucracy	0.470 (1.403)	0.157 (0.197)	0.059 (1.388)	0.123 (0.146)	2.282* (1.331)	1.846 (1.293)
Income inequality	201.081*** (68.118)	93.113* (55.453)	157.621** (72.461)	72.383 (53.874)	224.285*** (91.369)	224.883*** (90.736)
Asymmetry	-0.257* (0.128)	-0.291*** (0.112)	1.263*** (0.277)	1.240*** (0.216)	-0.111 (0.167)	-0.131 (0.167)
Regional effects	*Yes*	*No*	*Yes*	*No*	*Yes*	*Yes*
Time effects	*No*	*No*	*No*	*No*	*No*	*No*
Adjusted R-Squared	*0.494*	*0.504*	*0.495*	*0.505*	--	--
Wald chi2	--	--	--	--	*429.810*	--
Prob (chi2)	--	--	--	--	*0.000*	--
AR (1)	--	--	--	--	--	*0.000*
Hansen test	--	--	--	--	--	*0.471*
Observations	***469***	***469***	***450***	***450***	***450***	***450***

Table 4 – Robustness: Static models

	2SLS		2SLS		2SLS	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	IV: First stage	**IV: Second stage**	**IV: First stage**	**IV: Second stage**	**IV: First stage**	**IV: Second stage**
	Regional transfers	**Regional spending**	**Regional transfers**	**Regional spending**	**Regional transfers**	**Regional spending**
Department Population	-0.271 (0.264)	--	0.120 (0.429)	--	-0.174 (0.375)	--
Regional GDP	0.015*** (0.001)	--	0.015*** (0.001)	--	0.015*** (0.000)	--
Poverty	-18.564*** (6.554)	--	-18.552*** (6.952)	--	-18.373*** (6.852)	--
Political Alignment	--	--	-234.681 (154.878)	--	--	--
Switch Department	--	--	--	--	-32.635 (80.970)	--
β_f	--	0.323** (0.156)	--	0.335** (0.158)	--	0.328** (0.163)
β_y	--	0.029*** (0.002)	--	0.028*** (0.002)	--	0.028*** (0.002)
Electoral cycle	--	1097.923*** (82.947)	--	1097.350*** (82.945)	--	1098.207*** (84.339)
Pedersen index	--	90.061*** (11.336)	--	90.061*** (11.345)	--	89.804*** (11.325)
Local bureaucracy	--	0.524 (1.416)	--	-0.029 (0.093)	--	0.531 (1.417)
Income inequality	--	204.238*** (66.784)	--	203.588*** (66.445)	--	205.019*** (66.905)
Asymmetry	--	-0.026 (0.093)	--	-0.029 (0.093)	--	-0.028 (0.093)
Department effects	*No*	*Yes*	*No*	*Yes*	*No*	*No*
Time effects	*Yes*	*No*	*Yes*	*No*	*Yes*	*Yes*
Adjusted R-Squared	*0.659*	*0.459*	*0.661*	*0.459*	*0.649*	*0.458*
Observations	***469***	***469***	***469***	***469***	***469***	***469***

Table 5 – Robustness: Dynamic models

	GMM-FD	SYS-GMM	GMM-FD	SYS-GMM	GMM-FD	SYS-GMM
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Lagged regional government expenditure	0.110*** (0.044)	0.103** (0.044)	0.109*** (0.044)	0.104** (0.044)	0.110*** (0.045)	0.104** (0.044)
β_f	0.316** (0.173)	0.326** (0.172)	0.325** (0.173)	0.333** (0.173)	0.316** (0.180)	0.328** (0.180)
β_y	0.027*** (0.003)	0.027*** (0.003)	0.027*** (0.003)	0.027*** (0.003)	0.027*** (0.003)	0.027*** (0.003)
Electoral cycle	970.479*** (153.383)	977.081*** (156.193)	970.206*** (156.378)	976.794*** (156.190)	971.968*** (157.285)	977.944*** (157.094)
Pedersen index	58.940** (31.563)	61.910** (31.510)	58.931* (31.566)	61.955*** (31.512)	58.390** (31.774)	51.569** (31.722)
Local bureaucracy	2.424* (1.374)	1.890 (1.341)	2.431* (1.374)	1.885 (1.341)	2.435* (1.380)	1.891 (1.347)
Income inequality	219.712** (94.847)	213.957** (94.234)	219.472** (94.852)	213.492** (94.241)	220.648** (95.141)	214.863** (94.522)
Asymmetry	0.180 (0.162)	0.163 (0.161)	0.178 (0.162)	0.161 (0.161)	0.178 (0.162)	0.161 (0.161)
Department effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Time effects	*No*	*No*	*No*	*No*	*No*	*No*
Wald chi2	*380.330*	--	*380.460*	--	*376.120*	--
Prob (chi2)	*0.000*	--	*0.000*	--	*0.000*	--
AR (1)	--	*0.000*	--	*0.000*	--	*0.000*
Hansen test	--	*0.830*	--	*0.830*	--	*0.826*
Observations	***450***	***450***	***450***	***450***	***450***	***450***

Appendix

Figure A. 1. - Administrative division of the República Oriental del Uruguay

Source: National Civil Service Office of the Presidency of the Republic, Uruguay.

Table A.1 - Data definitions and sources

Variable	Definition	Source
Regional Government expenditure	Regional Government total expenditure per capita in constant pesos of 2017	Planning and Budget Office - Presidency of the Republic Ministry of Economy and Finance General Accounting Office Social Security Bank
Non-conditional Transfers	Non-conditional Intergovernmental per capita transfers in constant pesos of 2017	Planning and Budget Office - Presidency of the Republic Ministry of Economy and Finance General Accounting Office Social Security Bank
Regional GDP	GDP per cápita of the department in constant pesos of 2017	Central Bank of Uruguay Office of Planning and Budget Office - Presidency of the Republic
Electoral Cycle	Categorical variable from 1 to 5, which take the value of 5 in the election year.	Electoral Court of the República Oriental del Uruguay
Density	Department number of inhabitants per square kilometre	Continuous Household Survey of the National Institute of Statistics of Uruguay
Pedersen Index	Index that considers the percentage of voters who varied the political party of their vote between the national and regional election	Electoral Court of the República Oriental del Uruguay
Income inequality	Regional Gini index	Continuous Household Survey of the National Institute of Statistics of Uruguay
Local bureaucracy	Local public officials per 1000 inhabitants	Office of Planning and Budget Office - Presidency of the Republic

Variable	Definition	Source
Asymmetry	Asymmetrical response of regional governments expenditure to variations in transfers (cuts versus increases)	Electoral Court of the República Oriental del Uruguay
Department Population	Department population	Continuous Household Survey of the National Institute of Statistics of Uruguay
Political Alignment	Dummy variable that takes the value 1 if the political party of the local government at time t is not the same as the political party that governs the central state and 0 otherwise.	Electoral Court of the República Oriental del Uruguay
Compact	Index of compactness of the governing coalitions which is an Herfindahl index of the share of each party sitting in local governments.	Electoral Court of the República Oriental del Uruguay
Re-election	Dummy variable equal to 1 if the mayor is at the second term and thus cannot be re-elected	Electoral Court of the República Oriental del Uruguay
Poverty	The proportion of population below national poverty line at the department level.	Continuous Household Survey of the National Institute of Statistics of Uruguay
Local government political orientation	Dummy variable equal to 1 for centre-left majorities	Electoral Court of the República Oriental del Uruguay
Switch Department	Categorical variable which takes the value 2 if the department has varied the government party two or more times during the analysis period, take the value 1 if varied one time, and 0 otherwise	Electoral Court of the República Oriental del Uruguay

Table A.2 - Summary statistics

Variable		Mean	Standard deviation	Minimum	Maximum	Observations
Regional Government expenditure	Overall	14000.920	6143.269	4710.510	40724.070	N = 469
	Between		1355.310	12205.490	16907.130	n = 18
	Within		6000.301	4731.719	39970.920	T-bar = 26.056
Non-conditional transfers	Overall	3745.426	2392.556	356.615	11545.450	N = 469
	Between		660.741	2772.589	4645.332	n = 18
	Within		2304.514	257.322	10965.350	T-bar = 26.056
Regional GDP	Overall	305552.400	111578.800	122619.200	707875.800	N = 469
	Between		26057.360	269992.000	347270.100	n = 18
	Within		108657.300	142885.700	736113.100	T-bar = 26.056
Electoral cycle	Overall	3.113	1.503	1	6	N = 469
	Between		0.010	1	6	n = 18
	Within					T-bar = 26.056
Density	Overall	15.685	24.342	4.873	128.208	N = 469
	Between		24.908	5.058	111.229	n = 18
	Within		2.533	3.337	32.665	T-bar = 26.056
Pedersen Index	Overall	11.303	7.278	0.860	19.700	N = 469
	Between		0.090	10.943	11.325	n = 18
	Within		7.278	0.838	20.060	T-bar = 26.056
Income Inequality	Overall	38.724	3.196	30.533	52.751	N = 469
	Between		1.950	35.393	41.371	n = 18
	Within		2.570	31.846	51.091	T-bar = 26.056
Local bureaucracy	Overall	1585.921	897.680	314.000	5270.283	N = 469
	Between		894.225	624.057	4521.796	n = 18
	Within		224.895	186.125	3535.649	T-bar = 26.056
Asymmetry	Overall	-1448.448	1756.399	-7498.917	0	N = 469
	Between		176.735	-1760.504	-1011.676	n = 18
	Within		1747.977	-7398.049	-312.055	T-bar = 26.056
Department Population	Overall	109484	101286.600	25683.700	581531.700	N = 469
	Between		103511.200	26062.530	504532.500	n = 18
	Within		11723.950	23200.380	186483.200	T-bar = 26.056
Political Alignment	Overall	0.367	0.482	0	1	N = 469
	Between		0.294	0	1	n = 18
	Within					T-bar = 26.056
Compact	Overall	0.455	0.112	0.299	0.885	N = 469
	Between		0.099	0.341	0.756	n = 18
	Within		0.057	0.318	0.613	T-bar = 26.056
Re-election	Overall	0.616	0.487	0	1	N = 469
	Between		0.223	0	1	n = 18
	Within					T-bar = 26.056
Poverty	Overall	22.735	13.141	13.886	57.716	N = 469
	Between		7.088	11.378	38.307	n = 18
	Within		11.168	12.806	54.094	T-bar = 26.056
Local government political orientation	Overall	0.149	0.357	0	1	N = 469
	Between		0.181	0	1	n = 18
	Within					T-bar = 26.056
Switch Department	Overall	1.118	0.876	0	2	N = 469
	Between		0.900	0	2	n = 18
	Within					T-bar = 26.056

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