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Testing regional intergovernmental transfers asymmetries in Uruguay

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Abstract

In this paper we seek to complement the scarce empirical evidence for middle-income countries about the effects of unconditional central government transfers on subnational fiscal behaviour. To this end, we have used an unbalanced panel of 18 Uruguayan regional governments from 1991 to 2016. Our database includes data from the regional budget and other sources of information, which allows us to investigate the role of political economy factors. The application of panel data techniques with the use of instrumental variables highlights the presence of a sizeable flypaper effect and a significant role of variables related with the political economy design of sub-national finances.

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 processes to reallocate political power and fiscal responsibilities from national to subnational governments. The increase in the amount of resources and functions transferred from upper to lower tiers of government has brought important economic consequences. In such a context, the intergovernmental public transfers have come to assume an even more substantial role on the sub-national finances and on the overall fiscal policy of an economy. Although this source of local governments revenues may help attain important policy objectives, it has the potential to alter the budgetary behavior of the recipient and create situations in which their expected benefits could eventually vanish (Oates 2005).

The challenge of fiscal federalism literature is not only how to design suitable decentralizing policies, but also how to make sure that their implementation is successful (Bahl and Martínez-Vázquez 2006). Understanding *how* recipient governments spend intergovernmental transfers is essential for the design of efficient regional fiscal policy. Understanding also *why* governments spend citizens' incomes as they do provide valuable insights as to how citizen preferences are represented in government policies.

One of the most documented empirical regularities in the fiscal federalism literature is the so-called flypaper effect. This effect holds that the propensity of sub-national governmental units to spend out of intergovernmental unconditional transfers is higher than the propensity to spend out of private income. This empirical result has significant implications for regional fiscal policy design due to it could suggests, for example, the presence of sub-national authorities that seek to expand public spending for their own purposes beyond levels desired by the community. In this sense, "it suggests that political competition is insufficient to provide needed fiscal discipline" (Oates 1999). Another important related empirical topic is to determine whether this flypaper effect is

symmetrical by focusing on the effects of transfers variations. An asymmetrical effect exists when the local expense response differs depending on whether grants are increased or decreased (Gamkhar and Oates 1996). In this sense, losses in transfers may be partly compensated by local governments willing to preserve expenditures by raising additional taxes. However, local governments may magnify the spending response to cuts in grants by lowering own revenues as well, which has an impact on the level of expenditure and hence on the quantity and quality of local public services provided.

In Uruguay, the topic of decentralization has acquired importance in view of the increasing level of transfers from the central to the sub-national public sector (regional governments) and the enhanced autonomy that the Constitutional Reform of 1996 has given to sub-national authorities. Despite the increasing role of local decision-making bodies in Uruguay, any attempts have been made so far to understand thoroughly regional governments' expenditure behavior and the way in which it is influenced by intergovernmental transfers. This work seeks to begin to fill this dearth of empirical evidence by focusing on the responsiveness in expenditures of 18 Uruguayan regional governments to central government unconditional transfers over the 1991-2016, period during which there have been significant variations both in the regional local rates applied and their tax bases.

The paper has two major goals. Firstly, determinate the magnitude of the reaction of regional governments budgets to increases in private income as compared to increases in unconditional transfers. Secondly, test if 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 a crucial role in the regional budgeting processes. In this sense, we could observe the importance of the

political alignment between the central and regional government and the condition of being a department that has varied of political party in office during the period (switch department) to receive more regional transfers. Estimations also show 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 negatively 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. Section 6 presents econometric issues. Empirical 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 fiscal federalism literature argues that “finance follows function”. The principle emphasizes that both the amount of revenues required by a sub-national government as well as the adequate choice of its revenue sources depend on the specific characteristics of the assigned expenditure responsibilities’ and the cost of financing them (Bahl 1999; Martinez-Vazquez and Sepulveda 2011).

Although there are many ways to categorize expenditure assignments to sub-national governments, an essential distinction is whether: (i) the assignments correspond to discretionary decisions made by the sub-national government; or (ii) they correspond to responsibilities that have been delegated by the central government, which involve non-discretionary decisions by sub-national governments. In this context, sub-national

autonomy is required if and only if an expenditure function has been assigned as an exclusive or own responsibility to the sub-national level. In contrast, even though delegated functions are implemented by sub-national authorities, the ultimate responsibility over these functions may be interpreted as falling upon the central government. So, discretion, if allowed, could only be exerted within certain limits and controls. Frequent examples of delegated expenditure responsibilities are education and health services. Service delivery in these sectors is normally assigned to sub-national governments, and regardless whether the distinction is made in the law between own and delegated, significant shares of the sub-national education and health budgets are devoted to meet national standards regarding quality and coverage. In contrast, service delivery, for example, for street cleaning and lighting, whether the laws make the distinction between own and delegated responsibilities generally are associated with decisions that are fully discretionary at sub-national level.

A key issue in the design of fiscal federalism policy is the form in which the lower-level governments are financed. If there are no savings, sub-national revenues must be equal to sub-national expenditures. The presence of fiscal vertical imbalance typically implies that sub-national expenditures are larger than sub-national own revenue collections. To eliminate this vertical imbalance, the central government must provide additional resources in the form of intergovernmental transfers. The non-discretionary (delegated) expenditure responsibilities should be primarily 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 intergovernmental transfers are also necessary to finance own sub-national responsibilities'; this financing must be unconditional to allow for discretionary sub-national decisions. Within this framework, the intensification of

decentralization processes in many countries has led to a growing interest of scholars to understand the overall effects of these non-discretionary fiscal transfers (BID 2017).

The effects of non-conditional intergovernmental transfers have traditionally been studied from a welfare economic perspective (Musgrave 1959; Musgrave and Musgrave 1984). Based on the median voter theory, this perspective predicts that an increase in intergovernmental grants will have the same effect on sub-national expenditure adjustments as a change in citizen income. In both cases, sub-national governments are expected to raise expenditures and reduce taxes. More specifically, with perfect information and political competition, the allocative and distributive effects of non-conditional fiscal transfers (grants) to sub-national authorities should not be different from the effects of distributing the lump-sum funds directly to residents. The standard fiscal federalism approach, formalized by Bradford and Oates (1971), predicts that grants to local governments are equivalent to increments of community income. The reason is that money is fungible and thus a local government should have the same propensity to spend out of individual income or lump-sum grants. This result is known as the veil hypothesis because it suggests that intergovernmental transfers are simply a veil for central government's tax rebates (Oates 1999). Nevertheless, a large body of empirical literature has produced results that are at variance with prior predictions. Several analyses have showed that the stimulus to local public expenditure from non-conditional intergovernmental transfers far exceeds the effect of equal increases in local private income. In this sense, one of the most documented empirical regularities in the early fiscal federalism literature is the so-called flypaper effect (Henderson 1968; Gramlich 1969). This effect holds that the propensity of sub-national governmental units to spend out of intergovernmental unconditional transfers is higher than the propensity to spend out of private income. The flypaper expression captures the idea that money sticks where it hits:

money in the private sector (i.e., from private income) tends to be allocated to private consumption rather than being taxed away, while money in the public sector (i.e., from fiscal transfers) tends to be spent by the public sector rather than being rebated back to citizens¹.

Attempts to provide rationality to the so-called flypaper effect can be divided into two broad groups: empirical and theoretical arguments.

The empirical explanations are based on two types of views. Firstly, some scholars argue that non-fungible conditional fiscal transfers could be miss-classified as unconditional ones; grants perceived as unconditional by the researcher may implicitly include some matching elements and thus produce a greater stimulatory impact than pure lump sum transfers (Moffitt 1984; Megdal 1987; Wyckoff 1991; Baker et al. 1999). Secondly, others researchers have interpreted the overreaction of spending to these transfers as an econometric problem resulting from model misspecification. Within this line of reasoning, omitted variables bias could falsely support the flypaper effect if unobserved community characteristics, which affect the technology or effective cost of public spending, were systematically related with citizens' private income (Bruce Hamilton 1983; Jonathan Hamilton 1986; Becker 1996).

Main theoretical explanations of the flypaper effect are based on the incentives and interests of local citizens, politicians and bureaucrats. The explanations based on fiscal illusion of citizens 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

¹ For surveys, see Bailey and Connolly (1998), Gamkhar and Shah (2007), and Inman (2008).

1996). In this sense, the theory of “fiscal illusion” argues that the flypaper effect is a result of voters’ failure to correctly assess the average cost of producing public service when unconditional grants pay for part of the service. If a local government receives an unconditional grant, it can raise the level of public service without raising the tax price voters pay for public service. To voters, this might seem as if the costs of producing public services have been reduced. They may therefore demand more public services than they would have if they had perceived 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; he does not know the level of aid received by the local government. Or even when fully informed, might not behave completely rationally. Hines and Thaler (1995) link aspects of loss of risk aversion and lack of fungibility between different types of local governments’ funds. If 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 politicians' behavior. In a seminal work, McGuire (1975) argued that the politicians seek to perpetuate themselves in the political power thus increasing the level of public spending at the lowest possible political cost. Some scholars have used political science arguments that exploit the role that inefficient political institutions have in revealing citizens' preferences. From this perspective, the flypaper effect is a consequence of an inability of citizens to write complete “political contracts” with their elected officials. The works of Chernick (1979) and Knight (2002) offers specifications of a political contract between a donor central government and a

recipient local government to understand the flypaper effect. Chernick (1979) specifies donor-recipient contracting as an auction. Assuming an exogenous level of central government aid, local governments 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. Local governments with the highest valuations will provide more services and receive more aid. On his side, Knight (2002) specifies and estimates a political contracting model for grants policy that sets both the aggregate size of the aid budget and its allocation. The budget is chosen to ensure its passage and to maximize local constituent net benefits for the central government's agenda-setter. Again, the allocation process is an auction. Legislators bid to be part of the winning coalition by offering to vote for the grants budget in return intergovernmental aid. The agenda-setter picks the smallest 51 percent of the bids. He then sets his own grant award to maximize the net benefits to his own constituents. Those legislators whose state or local governments value the aided local service most highly make the winning offers. The result is again a positive correlation between grants awarded and local spending.

Regional fiscal literature also has argued that local bureaucrats try to maximize their monetary and non-monetary income, giving a novel explanation for the flypaper effect. The main work is the application by King (1994) of the model of bureaucratic behavior of Niskanen (1968). According to King, the public budget is the result of a 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 first seeks to ensure his reelection by maximizing the welfare of the median voter, the second

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) and the bureau to a far higher one. In this vein, 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 ².

Finally, another very important topic in the fiscal federalism literature is the possible existence of an asymmetric response of local governments to the sign of variation of intergovernmental transfers (cuts versus increases). Gramlich (1987) suggests that public expenditure is often related to clientele behavior that makes its reduction problematic. Stine (1994) argues that fiscal illusion, flypaper effects and interest groups might determine an asymmetric response to a change in intergovernmental grants. Borge et al. (2005) and Levaggi and Smith (2005) use costs of adjustment to justify the asymmetric response. In general terms, these scholars have pointed out that losses in transfers 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). In this vein, Volden (2002) and Gamkhar (2002) argued that the probability of detecting fiscal replacement for specific grants and spending programs is higher than in the case of block grants and total expenditures. Alternatively, local governments may magnify the spending response to cuts in grants by lowering own revenues as well: this gives rise to the “fiscal restraint” type of asymmetry, also called super-flypaper effect by Gamkhar

² For more recent explanations of this line of research, see Culis and Jones (2009).

and Oates (1996). Hines and Thaler (1995) suggest that this kind of “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

Numerous studies have investigated the effects of various types of intergovernmental transfers on local government’s fiscal behavior. In a broad sense, these empirical analysis are based on a model with a representative local citizen that maximizes her utility, which depends on private consumption (c) and local government spending (g), subject to her total income, which is the sum of her private income (y) and her share of fiscal transfers (f). In this context, the flypaper effect (FP) can be defined as:

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

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 private income, respectively. Within this empirical literature, only few studies have analyzed asymmetric effects in terms of the sign of variation of intergovernmental transfers. The table 1 lists some of the most commonly cited studies.

<<Table 1 about here>>

An important number of studies have found evidence supporting flypaper effect across time and in different contexts. The empirical literature carried out for developed countries point out that for the United States the rate of change of local expenditures relative to intergovernmental grants ranges from 0.43 (Gramlich and Galper 1973) to more than 1.00 (Case et al. 1993); the corresponding rate of change in individual income is 4 to 6 times smaller. While for the European economies the effect displays even more sensitiveness. This literature shows that while an extra dollar in private income increases public spending by \$0.02 (Levaggi and Zanola 2003), an equivalent increase in fiscal transfers triggers a rise in spending that lies \$2.09 (Tovmo and Falch 2002).

There are only very few studies available for medium income economies like Latin American Countries (LAC). Vegh and Vuletin (2015) have showed that the flypaper effect (between 1.6 to 1.9) should be a decreasing function of the correlation between fiscal transfers and private income for a sample of Argentinean provinces. Espinosa (2011) uses a panel of 31 Mexican states to derive a sizeable flypaper effect. For Colombia, Melo (2002) found evidence of the flypaper effect when sub-national entities are highly dependent on intergovernmental transfers. Moreover, an analysis of asymmetries in response to transfers shows that sub-national authorities try to cover the reduction in transfers when the percentage of transfers into the total current revenues is high.

The empirical test of the second type of asymmetries, evaluated mainly for developed countries, about the reaction to increasing as opposed to decreasing grants has been

mixed. Some studies find support in favor of the 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

Although Uruguay has begun to implement an incipient process of decentralization, based on the constitutional reform of 1996, it is still fiscally-centralized³. In the period 1991-2016, more than 90% of national public expenditure was directly executed by the central government. Regional governments (second level of government) were responsible for 10% at most of public spending (Table 2).

<<Table 2 about here>>

The powers formally assigned to the regional governments, the second level of government, are defined in the Basic Law of Governance and Administration of the Departments (No. 9.515), which has remained unchanged since 1935. In this sense, the traditional powers and responsibilities of these sub-national governments in Uruguay are

³Uruguay is divided into 19 departments that are the second level of government after the Central Government. For a detail of Uruguay's political division, see Figure A.1 in the Annex.

public services that in other Latin America countries would be assigned to the third level of government (BID 2017). The main activities in question are: investment and maintenance of urban equipment, road maintenance, traffic organization, public transport, public area cleaning, public lighting, cemetery services, health control and land use planning.

For their part, fiscal revenues of sub-national governments can be classified into two main categories:

- Own revenues: local taxes, or taxes fixed by the central government but administered and collected by regional governments.
- Intergovernmental transfers: conditioned and non-conditioned transfers. In this sense, more than the 90% of intergovernmental transfers in Uruguay are non-conditioned transfers.

The main local taxes are the property tax on urban and suburban real assets, and vehicle taxes. Next on the list comes the tax on the purchase and sale of live animals. For its part, the main tax fixed by the central government but administered and collected by regional governments is the property tax on rural real assets. Over the analyzed period has been produced significant variations of the regional tax rates and their bases (BID 2009, and Muinelo-Gallo et al. 2017).

As pointed in Figure 1, we can observe an increase of the importance of unconditional intergovernmental transfers in the last decade as a source of sub-national government's revenues.

<<Figure 1 about here>>

The visual inspection of Figure 1 shows that the increase in unconditional transfers from 2003 onwards is more pronounced than the increase in regional governments' own revenues.

The intergovernmental transfers in Uruguay are not clearly formula-based or neither purely on *ad hoc* basis. These transfers are defined in the National Budget Law in each five-year period of government. But it had important changes over the different government periods analyzed. In the first two five-year period of government, 1991-1995 and 1996-2000, the National Budget Law has defined four types of intergovernmental transfers. One type was established to contribute to the payment of regional governments employer contributions to social security and is distributed proportional to the number of civil servants in each regional government. A second type is an aliquot of fuel consumption tax (IMESI) without setting a specific target for funds. These transfers are distributed proportional to the contribution of each regional government to the generation of revenues. A third type is subsidies to finance new infrastructures or maintenance of old ones through a "National Plan of Municipal Infrastructure" administered by the central government. Finally, the four type include subsidies to finance rural roads that are administered also by the central government. The distribution of these last two subsidies linked to infrastructure had an important inertia about the spending on these items in the previous period based on two criteria (50% each): population (quite stable in Uruguay) and surface, allowing some political adjustment to the needs of current period.

However, despite of the fact that intergovernmental transfers are defined in the National Budget Law, during different government periods there are important emerging laws that add supplementary items to intergovernmental transfer legislation. In many cases the additional transfers are justified by particularly circumstances like a financial crisis in a regional government, a drought or a flood, and frequently these ends up becoming permanent items; because of regional government's pressure to maintain or even increase resources in the next government period (Muinelo et al. 2017).

In the National Budget Law for the period 2001-2016 were incorporated the reforms of the National Constitution of 1996. These reforms were expected to improve the transfers system and to avoid additional transfers (on *ad hoc* basis) not included in the National Budget Law. This new National Constitution laws establish two types of mechanisms for transfers (Articles 214 and 298).

The Article 214 stipulates that in each five-year period an aliquot of the total national budget must be distributed among the regional governments. This aliquot was 3,18% in 2001 and progressively increasing to 3,54% in 2005 and was fixed in 3,33% for all over the period 2006-2016. A main proportion of that aliquot is financed the "National Plan of Municipal Infrastructure" and the maintenance of rural roads (both administered by central government). The remaining funds are distributed between regional governments using two criteria. One based on indicators of population, surface, inverse of regional GDP and percentage of households with unfulfilled needs (25% each). The other criteria are based on the percentage distribution among regional governments in the previous government period. The result might arise from average between the two criteria but is not so clear. In turn, the percentage of remaining funds (published in the National Budget Laws: N° 17.296 for 2001-2005 and N° 17.930 for 2006-2016) arises from 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 other article of the National Constitution that regulates intergovernmental transfers is the N° 298, the Development Fund of the Interior (DFI), which is also defined in the National Budget Law. The aims of DFI are local and regional development and decentralization. The DFI is formed by an aliquot (about 11%) of the taxes that the central government collects from the different departments of the country excluding Montevideo. However, only the 33,5% of DFI funding goes directly to the regional governments and the remaining 66,5% is directly executed by the central government.

With the reforms in articles 214 and 298, the central government intends to avoid the logic of negotiations post discussion on National Budget Law. Nevertheless, regional governments continued pushing central government to make extra transfers for items outside the scope of the National Budget Law. As in previous periods, these extra transfers usually are justified as temporary items due to particularly events or circumstances in one or a group of regional governments. In practice, once again, the extra items became permanent (Muinelo-Gallo et al. 2017).

In sum, over the different government periods 1991-1995 and 1996-2000, and in subsequent 2001-2005 and 2006-2016, the allocation of intergovernmental transfers in Uruguay has unclear mechanisms, with some guiding criteria but far away from clearly and technically defined technical formulas and with an implicit degree of political negotiation between central and regional governments.

5. Empirical methodology

The empirical strategy applied to a panel data of 18 departments during the period 1991 to 2016⁴, 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:

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

where i and t capture region (department) and year, respectively. The variables G , Y and F represent regional government spending, regional income (proxy by regional real GDP), and non-conditional fiscal transfers⁵, 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:

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

⁴ The department of Montevideo was not considered because this department only began receiving transfers in 2006. Up to that year all its revenues were based on own sources.

⁵ These kinds of transfers are totally non-earmarked and are hence unconditional.

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 decisions⁶. In this sense, we include regional income inequality measure to control for potential the demand for regional services; and two political economy variables like local governor pre-electoral period, an electoral volatility indicator, and the Pedersen index, which allows us to observe the consequences of the separation in time of the national and departmental (regional) elections⁷. 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).

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 Table A.1 in the Annex details all variables definitions and their sources.

⁷ 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.

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 errors⁸.

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 associated with spending (Johansson 2003). In this paper we take two approaches to deal with the issue. Firstly, we estimate the model instrumenting contemporaneous transfers with lagged values of the same variable. Secondly, we estimate a two-stage model. In a first stage, we estimate intergovernmental transfer equations, and, in a second stage, we take the predicted value of the first stage as the

⁸ Table A.2 in the Annex details summary statistics of all variables.

explanatory variable of the second stage departmental expenditure equation. Also, since regional expenditures are characterized by marked persistency, we check if our empirical evidence is robust to the estimation of a dynamic model by including the first lag of per capita local expenditure in the initial specification and estimating through instrumental variables.

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; regional GDP and the asymmetric term 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 and instrumenting the transfer variable; regional GDP and the asymmetric term with the first lag of the same variable, and estimating the panel using Arellano-Bond and System-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 0.003 to 0.01. However, the stimulative impact of

intergovernmental transfers is much more important ranging from 0.77 to 1.15. 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. 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 negatively 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 with two types of estimation methods.

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, the level of departmental poverty and the population density. 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 switch variable.

We observe that the department's population size is significant and negatively related to per capita transfers. The observed relationship might be driven by a response to the perceived presence of scale economies in the delivery of sub-national public services. Alternatively, the fiscal bias in favor of smaller (less populous) departments may be driven by political motivations, either to secure broad political support from the sub-national government tier (including less populous rural areas) in the vertical power structure, or to secure political support at the national level of actors like senators who have specific regional allegiances. The estimations also support the idea that regional inequalities have a significant and negative impact on transfers, but its absolute value is very small. This result is reflected by the fact that the value of the department's GDP per capita has a negative and significant effect but a very small value on intergovernmental transfers. We also observed a significant and positive effect of population density. Those departments with higher population density receive a higher amount of transfers per capita. Finally, we observe the impact of variables related to the political economy of the allocation of intergovernmental transfers. In relation with the political alignment variable, we obtain a significant and positive effect. Therefore, about how intergovernmental transfers are determined, it can be said that there is logic of reward and punishment depending on whether regional governments are aligned politically with the party in power in the central government. Also, we observe significant and positive effects of switch variable. Those departments that have altered the governing political party during the period under review receive more transfers in per capita terms.

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 0.60-0.76, 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 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>>

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. Also, 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 significant.

9. **Conclusions**

Asymmetries in sub-national government response 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 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, politics factors also are confirmed to play a crucial role in local budgeting processes. In transfers equations we observe the importance of the political alignment between the central and regional government and the condition of being a department that has varied of political party in office during the period (switch department) to receive more regional transfers. Estimations also 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 negatively 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 policymakers and the local 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 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

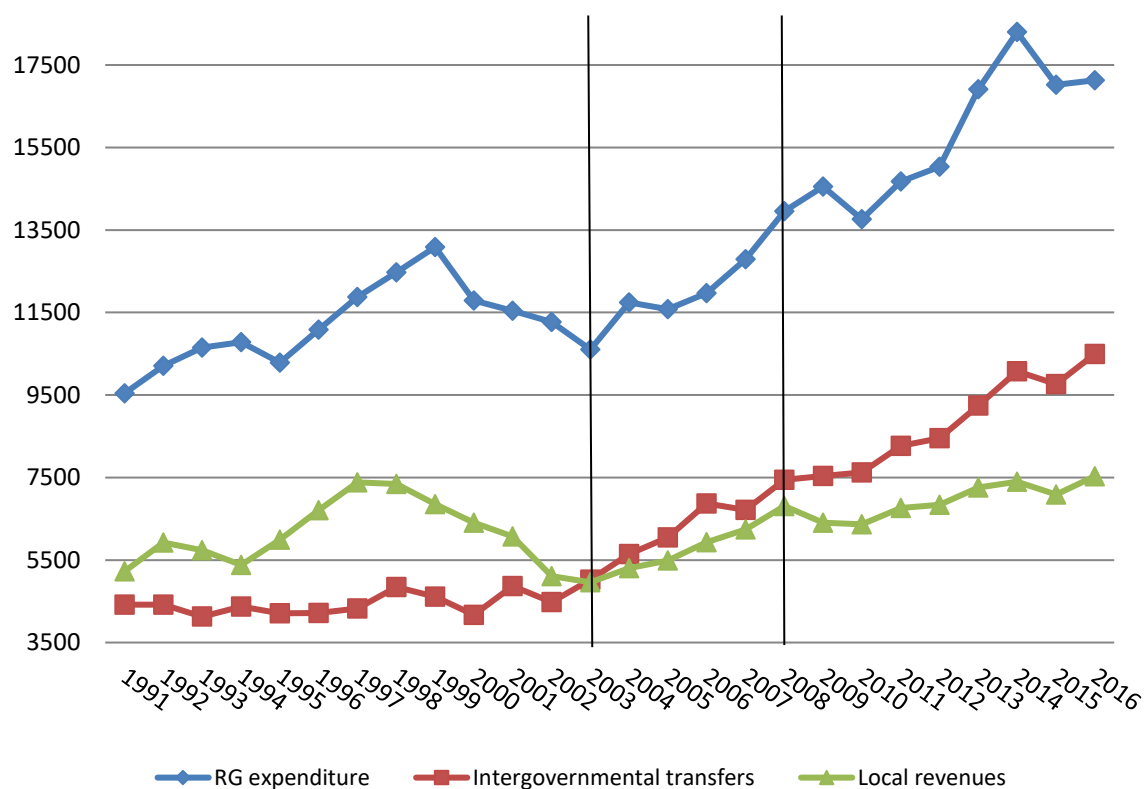
do not similarly treat changes in current and future revenues, then subnational governments could be more likely to expand their budgets with subsidies than with taxes.

Table 1 – Composition of General Government expenditures (1991-2016), selected years

	1991	1995	2000	2005	2010	2016
Central Government	94,04%	94,04%	93,24%	93,17%	94,19%	93,66%
Regional Governments	5,96%	5,96%	6,76%	6,83%	5,81%	6,34%
General Government	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 – 2016)
All variables are expressed in real and per cápita terms



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 spending	--	--	--	--	0.420*** (0.018)	0.387*** (0.039)
β_f	1.056*** (0.086)	1.037*** (0.088)	0.957*** (0.103)	0.929*** (0.105)	0.734*** (0.135)	0.776*** (0.083)
β_y	0.006*** (0.002)	0.006*** (0.002)	0.009*** (0.002)	0.010*** (0.002)	0.006** (0.003)	0.003** (0.001)
Electoral cycle	153.462*** (57.586)	154.029*** (60.262)	160.979*** (58.077)	162.148*** (60.827)	71.118*** (18.361)	81.128** (46.318)
Pedersen index	-64.847*** (17.560)	-65.908*** (18.418)	-57.929*** (18.053)	-57.996*** (18.853)	241.562 (812.248)	-75.382*** (14.425)
Income inequality	135.715* (79.900)	173.082** (85.388)	125.560 (81.091)	161.550* (86.493)	71.685 (57.950)	113.416*** (46.232)
Asymmetry	-0.718 (0.469)	-0.741 (0.503)	-0.648 (0.478)	-0.664 (0.510)	0.225 (0.240)	0.001 (0.306)
<i>Regional effects</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>
<i>Time effects</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
<i>Adjusted R-Squared</i>	<i>0.887</i>	<i>0.614</i>	<i>0.886</i>	<i>0.610</i>	--	--
<i>J-statistic</i>	--	--	--	--	<i>13.961</i>	--
<i>Prob (J-statistic)</i>	--	--	--	--	<i>0.235</i>	--
<i>AR (1)</i>	--	--	--	--	--	<i>0.000</i>
<i>Hansen test</i>	--	--	--	--	--	<i>0.839</i>
Observations	446	446	446	446	428	428

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	-0.309*** (0.034)	--	-0.313*** (0.034)	--	-0.268*** (0.028)	--
Department GDP pc	-0.002** (0.001)	--	-0.002** (0.001)	--	-0.004 (0.008)	--
Poverty	-9.641 (19.631)	--	-12.049 (19.725)	--	26.448 (26.448)	--
Density	1209.673*** (156.955)	--	1220.436*** (155.506)	--	826.089*** (116.797)	--
Political Alignment	--	--	169.514** (96.702)	--	--	--
Switch Department	--	--	--	--	199.075*** (63.486)	--
β_f	--	0.618*** (0.102)	--	0.669*** (0.041)	--	0.771*** (0.145)
β_y	--	0.015*** (0.002)	--	0.021*** (0.002)	--	0.012*** (0.003)
Electoral cycle	--	107.230* (62.687)	--	110.327* (66.600)	--	105.707* (65.254)
Pedersen index	--	-24.876* (17.515)	--	-27.029* (16.011)	--	-46.942** (21.212)
Income inequality	--	181.786** (89.317)	--	201.279** (93.771)	--	194.201** (92.417)
Asymmetry	--	-0.090 (0.478)	--	-0.046 (0.503)	--	-0.121 (0.489)
<i>Department effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Time effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Adjusted R-Squared</i>	<i>91.273</i>	<i>0.880</i>	<i>91.305</i>	<i>0.865</i>	<i>91.304</i>	<i>0.882</i>
<i>Observations</i>	<i>428</i>	<i>428</i>	<i>428</i>	<i>428</i>	<i>428</i>	<i>428</i>

Table 5 – Robustness: Dynamic models

	GMM	SYS-GMM	GMM	SYS-GMM	GMM	SYS-GMM
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged regional spending	0.491*** (0.019)	0.453*** (0.044)	0.535*** (0.022)	0.505*** (0.043)	0.480*** (0.009)	0.454*** (0.043)
β_f	0.781** (0.491)	0.431*** (0.091)	0.245** (0.136)	0.400*** (0.037)	0.784*** (0.230)	0.557*** (0.104)
β_y	0.009*** (0.002)	0.007*** (0.002)	0.013*** (0.004)	0.011*** (0.001)	0.008*** (0.003)	0.005*** (0.002)
Electoral cycle	59.043 (50.931)	18.262 (51.504)	23.122 (32.843)	17.218 (53.187)	56.829** (26.941)	24.182 (50.585)
Pedersen index	55.419 (12.115)	-51.444*** (15.532)	36.664 (12.231)	-18.864* (13.525)	48.382 (863.945)	-65.655*** (16.403)
Income inequality	161.388*** (34.034)	147.937*** (51.258)	155.313*** (43.867)	165.740*** (52.708)	107.319* (67.733)	147.842*** (50.346)
Asymmetry	0.641 (0.635)	0.610 (0.617)	0.776 (0.730)	0.691 (0.626)	0.718 (0.748)	0.593 (0.511)
<i>Department effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Time effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>J-statistic</i>	<i>13.063</i>	<i>--</i>	<i>13.438</i>	<i>--</i>	<i>13.740</i>	<i>--</i>
<i>Prob (J-statistic)</i>	<i>0.289</i>	<i>--</i>	<i>0.266</i>	<i>--</i>	<i>0.318</i>	<i>--</i>
<i>AR (1)</i>	<i>--</i>	<i>0.000</i>	<i>--</i>	<i>0.000</i>	<i>--</i>	<i>0.000</i>
<i>Hansen test</i>	<i>--</i>	<i>0.988</i>	<i>--</i>	<i>0.957</i>	<i>--</i>	<i>0.989</i>
Observations	393	393	393	393	393	393

Annex

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 (TR)	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 per cápita	GDP pc 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
Department Density	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
Asymmetry	Asymmetrical response of regional governments expenditure to variations in transfers (cuts versus increases)	Electoral Court of the República Oriental del Uruguay

Variable	Definition	Source
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 coalition (COMPit), which is an Herfindal 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
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 expenditure	Overall	12.634,9	5.761,547	3.976,575	38.339,52	N=446
	Between		4.851,872	7.053,401	28.398,69	n=18
	Within		3.116,196	1.319,989	29.415,93	T-bar=24,778
Non-conditional transfers	Overall	3.372,8	2.415,724	145,606	12.391,93	N=446
	Between		1.108,971	1.046,612	5.524,909	n=18
	Within		2.172,456	1.563,382	10.239,86	T-bar=24,778
Regional GDP pc	Overall	257.961,1	106.784,500	110.096,300	720.833,900	N=446
	Between		66.934,260	165.765,300	397.363,500	n=18
	Within		84.505,290	69.110,520	581.431,500	T-bar=24,778
Electoral cycle	Overall	3,033	1,538	1	6	N=446
	Between		0,032	1	6	n=18
	Within					T-bar=24,778
Density	Overall	14,373	20,874	4,858	115,793	N=446
	Between		23,371	5,044	104,542	n=18
	Within		2,120	1,661	25,571	T-bar=24,778
Pedersen Index	Overall	9,818	7,561	0,860	19,700	N=446
	Between		1,015	7,321	10,250	n=18
	Within		7,510	0,428	21,509	T-bar=24,778
Income Inequality	Overall	3,888	2,685	0,454	21,704	N=446
	Between		1,966	1,262	9,043	n=18
	Within		1,833	2,446	16,548	T-bar=24,778
Asymmetry	Overall	-115.402	251.266	-1876.714	0	N=446
	Between		45.016	-226.123	-36.716	n=18
	Within		247.219	-1831.102	110.721	T-bar=24,778
Population	Overall	107.061,5	96.266,72	25.683,7	551.681,4	N=446
	Between		98.175,39	25.968,95	481.640,8	n=18
	Within		12.002,82	18.752,62	177.102,1	T-bar=24,778
Political Alignment	Overall	0,400	0,490	0	1	N=446
	Between		0,260	0	1	n=18
	Within					T-bar=24,778
Compact	Overall	0,451	0,115	0,299	0,885	N=446
	Between		0,101	0,339	0,752	n=18
	Within		0,054	0,327	0,622	T-bar=24,778
Re-election	Overall	0,633	0,482	0	1	N=446
	Between		0,235	0	1	n=18
	Within					T-bar=24,778
Local government political orientation	Overall	0,129	0,335	0	1	N=446
	Between		0,157	0	1	n=18
	Within					T-bar=24,778
Switch Department	Overall	1,112	0,879	0	2	N=446
	Between		0,900	0	2	n=18
	Within					T-bar=24,778

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