



Intergovernmental Transfers and Regional Income Inequalities: An Empirical Analysis of Uruguay*

LEONEL MUINELO-GALLO**

ADRIÁN RODRÍGUEZ-MIRANDA

PABLO CASTRO-SCAVONE

Instituto de Economía de la Universidad de la República - Uruguay

Received: August, 2015

Accepted: December, 2015

Abstract

In this paper we explore the bidirectional relationship between intergovernmental transfers and regional income inequalities in Uruguay. Our study is based on the construction of a simultaneous equations model that is designed to capture the factors that jointly determine these endogenous variables, and employs a panel of departments (regions) over the period 1990-2012. The empirical results show that central government transfers to regional governments do not have a significant impact on regional income inequality levels. In fact, our estimates support the idea that regional inequalities have a significant and negative impact on the allocation to regions of intergovernmental transfers in that the richest regions receive greater transfers per capita. Intergovernmental per capita transfers also are positively determined by past public expenditure executed by regional governments, and negatively affected by the population size of the departments. These results have clear policy implications as they show that the normative scheme governing intergovernmental regional transfers in Uruguay must be revised if the objective is to give the country greater territorial cohesion.

Key words: intergovernmental transfers, regional inequalities, panel data, simultaneous equations, Uruguay.

JEL Classification: C33, H77, R11.

1. Introduction

In this article we analyze the bidirectional relationship between intergovernmental transfers and regional income inequalities in Uruguay over the period 1990-2012.

* *Acknowledgements*

The authors would like to thank the financial support from the project “I+D 2014” of the “Comisión Sectorial de Investigación Científica –Universidad de la República– Uruguay”. The usual disclaimers apply.

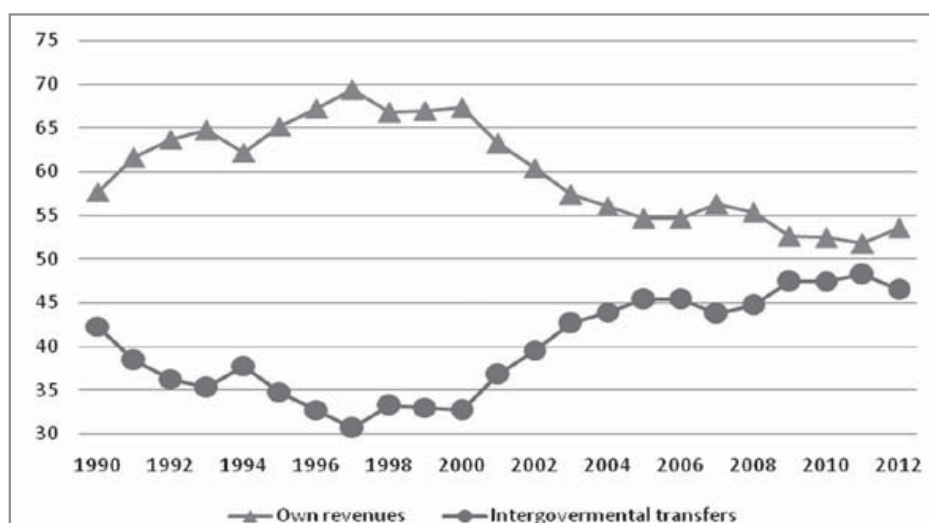
** Reference author: Phone: +598 24000466. Fax: +598 24089586. Address: Joaquín Requena 1375- Montevideo - Uruguay, CP 11200. E-mail: lmuinelo@iecon.ccee.edu.uy

The analysis of the relationship between these two variables is an important matter which has engaged scholars over the years. Intergovernmental transfers are a powerful tool to promote territorial cohesion in developed countries in which the design of the normative scheme governing transfers considers income inequities between regions. The European Union model of territorial cohesion involves a range of fiscal instruments and is a clear example of this (Böhme, 2009 and Böhme *et al.*, 2011). However, a regional transfers scheme that does not clearly and explicitly provide normative territorial convergence criteria probably does not contribute to territorial convergence and could even reinforce existing disparities (Martínez-Vázquez and Sepúlveda, 2011; Alm and Martínez-Vázquez, 2015).

Although in recent years the majority of Latin American Countries (LAC) have implemented major reforms in their public finances at the region or province level¹, almost none have implemented successful intergovernmental transfer systems that explicitly pursue the objective of territorial cohesion. Most of these countries have implemented *revenue sharing* systems, but these have serious design problems since they simultaneously pursue multiple objectives such as, for example, efficiency on the one hand and national standards of utility and equity on the other. These systems have also made the revenue levels of sub-national governments rather volatile because they introduce disincentives for them to collect their own resources, and ignore the differences between sub-central governments' fiscal capacities and their expenditure needs (Martínez-Vázquez and Sepúlveda, 2012).

In a fiscally-centralized country like Uruguay, it is very important to analyze the role of intergovernmental transfers as this is one of the most effective fiscal tools to foster regional convergence. These transfers account for a sizeable percentage of Uruguayan regional government (RG) revenues, and the relative amounts involved have been increasing in recent decades (Figure 1).

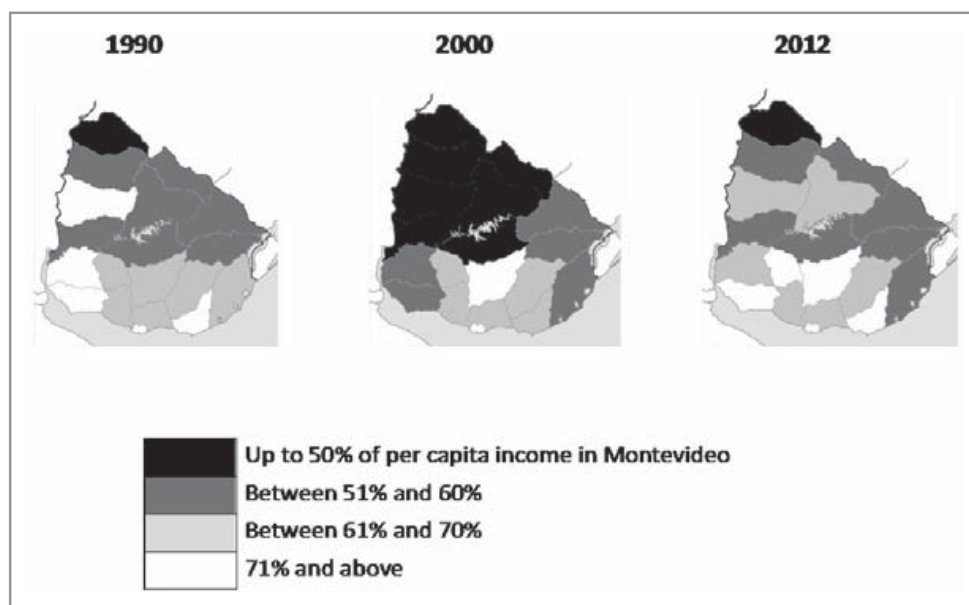
Figure 1. Regional government revenues, by type (1990 - 2012)
As a percentage of total regional governments revenues



Source: Planning and Budget Office - Presidency of the Republic

Even though Uruguay is a small country there are big differences in per capita income levels between its regions². Figure 2 shows this situation considering the relationship between household per capita incomes in each department (region) compared to Montevideo (the most populous and richest department in the country) for the years 1990, 2000 and 2012.

Figure 2. Relationship between household per capita income in each department and the mean value in Montevideo, for selected years



Source: Continuous Household Survey of the National Institute of Statistics of Uruguay

An important feature of the country is how important the capital, Montevideo, is in the national economy. According to data from the Continuous Household Survey of the National Institute of Statistics of Uruguay, over the period 1990 to 2012 household per capita income in Montevideo was between 120 % and 130 % of the national average. Moreover, income per capita levels in the other departments of the country were (and are) not homogeneous. The departments in the north and northeast have lower relative incomes while the departments on the south coast (from Colonia to Maldonado) have higher relative levels.

During the last two decades the country has had five national administrations and the same number of regional administrations in all the departments, and the political parties in power have alternated at both the central and regional levels. In this context, our analysis of the period 1990-2012 enables us to identify regularities and structural relationships between intergovernmental transfers and regional income inequalities.

In this paper we propose to reconsider the relationship between regional inequalities and intergovernmental transfers based on a panel of departments (regions/provinces) in Uruguay over the period 1990 to 2012, and using appropriate estimation techniques to deal with the potential interdependencies in the main variables. Specifically, we consider a simultaneous equation model which enables us to analyze the factors that jointly determine these endog-

enous variables. This approach allows us to obtain more appropriate estimates of the relevant parameters, and ultimately helps us identify the causal relationships between the two variables that we focus on.

Our empirical results show that the central government transfers to regional governments do not have a significant impact on regional income inequality levels. In fact, our estimates support the idea that regional inequalities have a significant and negative impact on intergovernmental transfers. That is to say, the richest departments receive higher transfers per capita. The intergovernmental transfers are also positively determined by the past public expenditure executed by regional governments, and negatively affected by the population size of the departments. The former result could reflect the impact of RGs' fiscal needs, but it could also reflect the negotiating capacity of these RGs when they demand resources from the central government through regional transfers. The negative effect of department population might be a response to the perceived presence of scale economies in the delivery of sub-national public services, or due to the potentially disproportionate lobbying power of smaller sub-national jurisdictions. Note that these empirical results are consistent with the fact that Uruguay's current normative system lacks clear criteria, and sets no clear priorities, when it comes to fostering territorial cohesion. Given this context, our analysis has obvious policy implications: if the objective is to make the Uruguay more territorially cohesive then the country's regional transfer regulatory scheme has to be revised.

This article is structured as follows. In section 2 we review the contributions that explore how the design and implementation of sub-national finances could affect regional inequalities, and how regional inequality levels could affect the allocation of these sub-national finances. In section 3 we analyze the current normative and administration structure of regional public finances in Uruguay. Section 4 describes how we measure our key endogenous variables. Section 5 details the empirical methodology applied. In section 6 we present our empirical findings and some robustness analysis. Lastly, in section 7 we draw conclusions and examine some policy implications.

2. Sub-national finances and regional inequalities in the economic literature

In an effort to elucidate the causal channels between regional inequalities and sub-national finances, we review the economic literature that has analyzed their main determinants.

2.1. The determinants of intergovernmental transfers

Several studies have analyzed the scheme that governs the design of regional intergovernmental transfers which could have important consequences in regional inequalities. Three main strands in the literature consider different factors that may affect the distribution of these transfers (Boex and Martínez-Vázquez, 2005). Firstly, public finance literature pro-

vides normative guidance about how intergovernmental transfers should be distributed in order to improve the efficient, and more specifically the equitable, allocation of resources in a country (Musgrave, 1959; Oates, 1972). In pursuit of the goal of efficiency, the intergovernmental transfers' scheme seeks to correct for under-provision of certain local public services. As a result, in the presence of positive externalities in the delivery of local services, the normative pursuit of economic efficiency would result in the central government providing greater intergovernmental transfers in response to greater local expenditure needs (for example, as reflected by the number of school-age children). The second normative economic objective is to achieve a more equitable distribution of resources across the population. Thus policies that ensure equitable access to public services are often pursued through equalizing intergovernmental transfer schemes.

Secondly, arguments from political economy could also contribute to explaining how governments determine intergovernmental transfers. The proponents of some public choice models argue that political decision-making processes can be "captured" by powerful interest groups, so the distribution of public resources across local government units would be at least partially determined by political and institutional factors (Raimondo, 1983; Grossman, 1994; Atlas *et al.*, 1995). An implication of this literature is that sub-national governments with powerful political interests can be expected to receive larger intergovernmental transfers. For example, local jurisdictions that have disproportionately greater representation on a per capita basis (e.g., regions that have more legislators per capita) might be expected to attract more intergovernmental transfers per capita. In addition, theoretically, elected officials with smaller constituencies have a greater incentive to lobby for greater intergovernmental resources (Weingast, 1979; Atlas *et al.*, 1995; Pereira, 1996; Porto and Sanguinetti, 2001).

Thirdly, a growing body of economy literature has centered on how incumbents use intergovernmental transfers for strategic purposes. The central idea of this approach is that political parties and candidates use redistributive policies as an instrument to maximize their electoral results. These models can be divided into two main groups: "swing voter models" and "core supporter models". The strategy of allocating more transfers to regions with a high proportion of undecided voters is based on the assumption that these marginal transfers could affect voters' decisions about which party to choose (Lindbeck and Weibull, 1987; Dixit and Londregan, 1995 and 1996). On the other hand, there are loyal voter models based on assumptions derived from Cox and McCubbins (1986). These assert that, if politicians are risk averse, funds will be allocated to regions where voters are clearly aligned with the government political party ("core supporters").

2.2. The regional effects of sub-national finances

In the economics literature there have also been analyses of the effects of various sub-national fiscal instruments, including intergovernmental transfers, on regional inequalities.

Firstly, intergovernmental transfers can foster spending on public services that create spillovers effects in the local economy, and thus lead to a reduction in the use of inefficient

local taxes (Dahlby and Wilson, 1994), or they can ensure access to essential public goods throughout the whole economy (Buchanan, 1950). In addition, intergovernmental transfers to poorer regions may foster local production and so reduce inequalities between regions (Limoneiro, 2015).

Secondly, another important factor that may explain reductions in inequalities in regions could be the degree of fiscal autonomy that regional governments have. There are several reasons why fiscal decentralization may reduce inequalities in regions. First, regional governments have more and better information about the needs of their populations and therefore find it easier to adjust their policies to local preferences (Oates, 1972 and 1993). Second, fiscal decentralization can promote inter-jurisdictional competition for scarce fiscal resources, which could generate a penalties system for inefficient local governments, and consequently promote regional convergence (Brennan and Buchanan, 1980; Weingast, 1995; McKinnon, 1997; Qian and Weingast, 1997). However, there are studies that suggest that increasing regional fiscal autonomy could increase regional inequalities. Because fiscal decentralization means taking resources away from the central government, it can weaken the scope of intergovernmental regional transfers (Prud'homme, 1995). Moreover, decentralization can give the sub-national governments of richer regions more power to reduce net outflows of resources, and this might make central government redistributive policies less effective (Rodríguez-Pose and Ezcurra, 2010).

3. Regional public finances: the Uruguayan case

The fiscal revenues of RGs in Uruguay can be classified into two main categories:

- RG's own revenues: local taxes³, or taxes fixed by the central government but collected by RGs⁴.
- Intergovernmental transfers: conditioned and non-conditioned transfers⁵.

The table 1 details the composition of RGs revenues for selected years over the period 1990 – 2012.

Table 1
COMPOSITION OF RGS REVENUES, SELECTED YEARS

	1990	2000	2005	2012	1990-2012
Own revenues	57,70 %	67,31 %	54,67 %	53,55 %	58,31 %
Intergovernmental transfers	42,30 %	32,69 %	45,33 %	46,45 %	41,69 %
Total revenues	100 %	100 %	100 %	100 %	100 %

Note: All values are without Montevideo

Source: Planning and Budget Office - Presidency of the Republic

As pointed in Figure 1, we can observe an increase of the importance of intergovernmental transfers in the last decade as a source of sub-national government's revenues. This increase pattern has been pointed out by the central government as a factor of improvement in regional development (see Rodríguez-Miranda, 2014). However, the consequences in terms of regional inequalities are not clear, aspect that would call into question in our empirical analysis.

Although Uruguay has begun to implement an incipient process of decentralization, based on the constitutional reform of 1996, it is still fiscally-centralized. In the period 1990-2012, more than 93 % of national public expenditure was directly executed by the central government. RGs were responsible for 7 % at most of public spending (Table 2).

Table 2
COMPOSITION OF GENERAL GOVERNMENT EXPENDITURES, SELECTED YEARS

	1990	2000	2005	2012	1990-2012
Central Government	94,04%	93,24%	93,17%	94,19%	93,66%
Regional Governments	5,96%	6,76%	6,83%	5,81%	6,34%
General Government	100%	100%	100%	100%	100%

Note: All values are without Montevideo

Source: Planning and Budget Office - Presidency of the Republic

Note that the powers formally assigned to the RGs, 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.

The traditional powers and responsibilities of the RGs in Uruguay are public services that in other Latin America countries would be assigned to the third level of government (IDB, 2007). 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.

Since the constitutional reform of 1996, RGs have had greater opportunities to become more fiscally autonomous but they have not exploited them. The RGs have taken the traditional and centralist path of demanding more resources from the central government to execute their activities (IDB, 2007 and 2009). One consequence of this is that the RGs have avoided the political costs of implementing new and/or higher local taxes (Arocena, 2008). Moreover, various modifications of the 1996s constitutional reform are decentralization measures with a general and indeterminate nature, who failed to build an strong agreement that favors greater decentralization of powers and resources for RGs (CEDES, 2010).

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 defined four types of intergovernmental transfers. One type is established to contribute to the payment of RGs employer contributions to social security and is distributed proportional to the number of civil servants in each RG. 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 RG to the generation of revenue. 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 fourth type are 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 an RG, a drought or a flood, and frequently these ends up becoming permanent items, as a result of RGs pressure in order to maintain or even increase resources in the next government period (Rodríguez-Miranda, 2014).

In the National Budget Law for the periods 2001-2005 and 2006-2010 were incorporated the reforms of the National Constitution of 1996. It was expected to improve the transfers system and to avoid additional transfers (on *ad hoc* basis) not included in the National Budget Law. The new National Constitution establishes 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 RGs. 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 2006-2012. A main proportion of that aliquot is financed the Programs of Municipal Infrastructure and the maintenance of rural roads (both administered by central government). The remaining funds are distributed between RGs 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 RGs in the previous government period. The final result might arise from some kind of average between the two criteria, but is not so clear. In turn, the percentage of remaining funds (published in the National Budget Laws: N.º 17.296 for 2001-2005 and N.º 17.930 for 2006-2012) arises from political negotiation between the central government and the Congress of Heads of RGs (established by the Constitution of 1996 as a representative council of RGs).

The other article of the National Constitution that regulates intergovernmental transfers is the N.º 298, the Development Fund of the Interior (DFI), which is also defined in the Na-

tional 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 RGs 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, RGs 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 RGs. In practice, once again, the extra items became permanent (Rodríguez-Miranda, 2014).

In sum, over the different government periods 1991-1995 and 1996-2000, and in subsequent 2001-2005 and 2006-2012, 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 negotiation between central and regional governments. At the same time, most of the criteria -such population, surface and even GDP per capita- imply an important component of inertia, besides the explicit consideration of how resources were allocated between RGs in the past government period.

Regional development and equality do not seem to have a strong support on the basis of the intergovernmental transfer's scheme that was described before. Despite the fact pointed out by the increase pattern of intergovernmental transfers over the analysis period, it seems not to be enough evidence that there was an adequate policy to promote regional balanced development of the country.

In the light of this context, in next two sections we detail the data and empirical methodology we have used to explore the bidirectional relationship between intergovernmental transfers and regional income inequalities in Uruguay.

4. Data: endogenous variables

In this section we review the indicators employed to measure regional income inequalities and intergovernmental transfers to regions of the country. We construct an unbalanced panel of 18 departments over the period 1990 to 2012. Our selection is based on the availability, frequency and quality of the data⁶.

In order to measure regional inequalities (RI), we construct an approach to a measure commonly used in the literature that focuses on regional analysis⁷. More specifically, we use a distance measure or coefficient of variation ($CV_{i,t}$) from a reference value or benchmark, which corresponds to the Montevideo value (the department with the highest per capita in-

come over the whole period). We selected Montevideo as a reference value not only because of its situation as the richest region in the country but also because this RG only began to receive transfers from the central government in 2006 (up to that year, 100 % of its income was derived from its own resources). In this context, the regional inequalities indicator takes the following form:

$$CV_{i,t} = \left(\left(\frac{1}{y_{MTV,t}} (y_{MTV,t} - y_{i,t})^2 \right)^{1/2} \right) * 100 \quad (1)$$

where $y_{MTV,t}$ is average per capita income in Montevideo at time t , while $y_{i,t}$ is average per capita income in department i at time t . The CV index basically reflects inequalities between regions in Uruguay. It ranges between 0 (equality) and 1 (maximum inequality).

The intergovernmental transfer index is measured as RG revenues that originate in transfers received from the central government expressed in per capita terms (for similar indexes see, for example, Boex, 2003; Brodjonegoro and Martínez-Vázquez, 2004; Sollé-Ollé and Sorribas-Navarro, 2008).

5. Empirical methodology

Given the potential interdependence between our key variables, it is necessary to apply an empirical method that considers their mutual influence in order to avoid severe specification errors. Consequently we propose to estimate a full system for the joint determination of these important endogenous variables. Specifically, we propose to estimate a simultaneous equation model (SEM) which consists of a series of two equations describing regional inequalities and central government transfers. The proposed model takes the following form:

$$\begin{cases} RI_{it} = \mu_0 + \mu_1 TR_{it} + \mu_2 X_{it} + u_{1,it} \\ TR_{it} = \eta_0 + \eta_1 RI_{it} + \eta_2 Y_{it} + u_{2,it} \end{cases} \quad (2) \quad (3)$$

where RI_{it} , and TR_{it} refer to our dependent variables of regional inequalities and central government transfers, respectively. In turn, $i = 1, \dots, 18$ refers to regional governments, $t = 1, \dots, T$ to years, (μ_0, η_0) are constant terms, (μ_1, η_1) are the coefficients associated with the endogenous variables, (μ_2, η_2) are the coefficient vectors associated with the explanatory or control variables X_{it} and Y_{it} respectively, while $u_{n,it}$ ($n = 1, 2$) refers to the error terms for each of the two equations in the SEM model.

We estimate our model with annual data and in addition with three-year averages of all variables that have been considered. Taking three-year averages will reduce short-run fluc-

tuations and therefore the influence of the economic cycle, thus permitting a focus on the structural relationships.

Finally, in order to exploit efficiency gains from the correlation of error terms across the equations, the full set of equations of the SEM is jointly estimated using full information methods. Thus these methods deal explicitly with the *a priori* interdependence between regional inequalities and central government transfers, and so allows us to obtain more appropriate estimates of the relevant parameters. Moreover, we assume that the disturbances from the different regression equations at a given point in time are correlated, because of common unobservable factors. In order to exploit efficiency gains from the correlation of error terms across equations and the mutual influence of the relevant endogenous variables, the full set of three equations of the SEM will be jointly estimated using system instrumental variables methods (SIV)⁸. More specifically, we use two methods of estimation. First, we estimate the SEM model using three-stage least squares (3SLS) accounting for heteroskedasticity and contemporaneous correlation of the errors across equations. The 3SLS is an IV-GLS estimator which achieves consistency through instrumentation, and efficiency through appropriate weighting⁹. However, because the modern approach to SIV methods is based on the principle of the generalized method of moments (GMM)¹⁰, we also estimate the SEM model using GMM estimators. To be specific, we consider a (two-step) three-stage least squares GMM estimator (3SLS-GMM) with an unadjusted weight matrix¹¹. We should mention that an important feature of GMM estimation is that by selecting different weight matrices we can obtain estimators that can also tolerate heteroskedasticity, autocorrelation, and other features of the error terms. Compared to a single-equation approach, these two system estimation methods are able to spell out feed-back simultaneities among the key endogenous variables, and as a result obtain consistent and more efficient estimates. Moreover, these two estimation methods are appropriate when some of the control variables are endogenous (see Wooldridge, 2010). In this case, and in the presence of significant within variability, we employ lags of the potential endogenous control variables as instruments (see, most notably Barro, 2000)¹².

In every equation, the number of exclusions is sufficient for the order condition of the identification to be satisfied. More specifically, each equation of the system is identified given that at least one control variable actually appears in the other equation but not in the reference equation (see Wooldridge, 2010, Theorem 9.1). The rank condition of every equation of the system (2) to (3) can be safely assumed to hold in a model of this size¹³. The selection of the control variables included in each regression of the system is guided by the need to reduce omitted variable bias. Thus there is the *a priori* expectation that the control variables may be related to the two key variables we scrutinize in this article.

*The control variables*¹⁴

The set of control variables for each equation in the system is based on prior specifications of regional inequalities¹⁵ and government transfer equations¹⁶, and also considers the availability, frequency and quality of the data sources.

In the transfer's equation, we consider that the per capita amount of intergovernmental transfers received by RGs is mainly determined by four factors: an approach to local expenditure needs, a measure of RG revenue capacity, a measure of political factors, and the population size of the different departments in Uruguay.

Since RGs in Uruguay basically provide municipal services (see section 3) we cannot use the age distribution of regions' populations to gauge the fiscal needs of RGs. In fact, the education, health and social security services are the responsibility of central government. As a result, we choose to work with the lagged value of RG expenditures to approach their fiscal needs and also their negotiation capacities to obtain more intergovernmental transfers. Furthermore, in order to take into account the departments' wealth, local revenue capacity and political power, we always control for the GDP per capita of the department. The sign of this last variable is conceptually indeterminate. If equity concerns dominate the allocation of intergovernmental transfers then we should find a negative sign. However, if sub-national wealth is predominantly a reflection of political power, the sign might be expected to be positive. Moreover, according to the political economy literature, a positive relationship should be expected between political factors, such as political alignment between central government and RGs, and the magnitude of intergovernmental transfers. Therefore we have included a dummy variable that tries to capture the political alignment criteria in the allocation of intergovernmental transfers. Finally, we also include, as a control variable, the population size of the departments in Uruguay. The expected sign of this variable is negative (smaller departments receive greater per capita transfers), which may be caused by scale economies or due to the potentially disproportionate lobbying power of smaller sub-national jurisdictions.

In the regional inequalities equation, we consider a variable that measures the degree of regional autonomy or fiscal decentralization in Uruguay. Since, by law, the RGs in Uruguay must fulfill exactly the same functions, we think that the RGs' own revenues in per capita terms are a good indicator of fiscal decentralization. Based on historical evidence we also control using a categorical variable that measures the potential for regional development in Uruguay. More specifically, this variable groups the Uruguayan departments into three main regions (Rodríguez-Miranda, 2006 and 2014; Barrenechea and Troncoso, 2008). The indicator is a categorical variable that takes the values 0, 1 and 2. The value 0 is assigned to departments that have low potential for regional development. In practice, these are departments that in the period 1990-2012 were persistently below the national GDP per capita average. A value of 1 is assigned to departments that have intermediate positions in the national context. The value 2 is assigned to departments that persistently have the best indicators in the national context and are therefore at the top of the ranking¹⁷. In addition, in inequality equations we consider a regional assets inequality indicator which is measured by the Gini index of the average years of education of each department's population. There is also an indicator that measures the distance in kilometres from Montevideo (the main port and biggest domestic consumption market). This is designed to capture the dimension suggested in the New Economic Geography, which postulates that the economies of agglomeration are a factor in territorial inequality. And finally we consider two indicators of department economic activity: the unemployment rate and the activity rate.

6. Results¹⁸

We report our empirical findings in tables 3 and 4. The former contains annual data while the latter uses three year averages. The big difference in the number of observations in each case means that table 4 can be seen as a robustness check on the results based on annual data. Moreover, using three year averages helps us to focus on the structural relationships since it tends to reduce short-run fluctuations due to the business cycle (see also Lessmann, 2009 and 2012; Muinelo-Gallo and Rodríguez-Miranda, 2014; and Kyriacou *et al.*, 2015).

To facilitate the interpretation of the results we will discuss them in the context of the different models we employed (columns 1 to 8). In all cases we report our results considering 3SLS and 3SLS-GMM estimators.

First, we report the estimations of the base model (columns 1 to 4). Columns 1 and 2 report the base model with the regional inequalities indicator (CV index), and columns 3 and 4 consider the log of the departments' GDP per capita as a control variable without including the CV index in transfers equation. It is important to mention that the dependent variable in regional inequality equation (RI) continues to be the CV index. We replace the CV index (as a measure of RI) by the log of regional GDP per capita as an explicative variable, because these variables are highly correlated. In fact, we have not included an equation of real GDP per capita because we focus on regional inequalities and not in richness' or development level of departments in Uruguay.

Second, as an additional robustness check, we report our estimations considering additional control variables (columns 5 to 8). We replace the regional index of potential development in the RI equation by some indicators that reflect its basic underlying pillars. More specifically, we substitute this regional index by the Gini index of average years of education of each department's population. There is also an indicator that measures the distance in kilometres from Montevideo and two indicators of department economic activity: the unemployment rate and the activity rate.

Table 3
SEM MODEL- REGRESSIONS RESULTS (ANNUAL)

	Base model						More control variables					
	Simultaneous equations model			TR= f (GDP pc; X)			Simultaneous equations			TR= f (GDP pc; X)		
	(1)	(2)		(3)	(4)		(5)	(6)		(7)	(8)	
	3SLS	3SLS-GMM		3SLS	3SLS-GMM		3SLS	3SLS-GMM		3SLS	3SLS-GMM	
	RI (CV)	RI (CV)	TR	RI (CV)	RI (CV)	TR	RI (CV)	RI (CV)	TR	RI (CV)	RI (CV)	TR
Regional inequality (RI)	-0.632*	-0.966***	--	--	--	--	-1.199***	-0.966***	--	--	--	--
Intergovernmental Transfers (TR)	-0.051	-0.060	--	-0.065	-0.060	0.511***	-0.010	-0.015	--	-0.013	0.015	0.511***
Log of department GDP pc	--	--	--	0.492***	0.030	-0.050	0.003	-0.078	0.484***	0.029	-0.050	-0.987***
Political Alignment	0.006	-0.078	--	-1.021***	-0.987***	0.150***	-0.561***	-0.510***	-1.015***	-0.987***	0.150***	0.150***
Log of department Population	-0.557***	-0.510***	0.284***	0.055*	0.055*	0.173***	0.173***	0.284***	0.058***	0.058***	0.150***	0.150***
Log of Regional Government expenditure	0.212***	0.284***	0.055*	0.055*	0.055*	0.173***	0.173***	0.284***	0.058***	0.058***	0.150***	0.150***
Fiscal decentralization	-0.031***	-0.029***	-0.029***	-0.029***	-0.028***	-0.028***	-0.034***	-0.034***	-0.038***	-0.034***	-0.034***	-0.034***
Assets Inequality	--	--	--	--	--	--	0.010***	0.008***	0.009***	0.008***	0.008***	0.008***
Unemployment rate	--	--	--	--	--	--	0.002***	0.003***	0.002***	0.003***	0.003***	0.003***
Activity rate	--	--	--	--	--	--	-0.442***	-0.403***	-0.406***	-0.403***	-0.403***	-0.403***
Regional index	-0.078***	-0.081***	-0.082***	-0.082***	-0.081***	-0.081***	--	--	--	--	--	--
Distance index	--	--	--	--	--	--	0.025***	0.028***	0.026***	0.028***	0.028***	0.028***
Temporal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2	0.517	--	--	0.516	--	--	0.656	--	0.657	0.800	--	--
J-test	--	0.0000	0.0000	--	0.0000	0.0000	--	0.0000	--	--	0.0000	0.0000
Observations	378	378	378	378	378	378	378	378	378	378	378	378

Notes: Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. J-test: Hansen test of over-identifying restrictions indicating the validity of the chosen instruments. Included instruments: Lagged values of: Log department GDP per capita, Log of department population, Log regional government expenditure per capita, unemployment rate and fiscal decentralization measure. In this table we present the estimations with one (year) lag.

Table 4
SEM MODEL- REGRESSIONS RESULTS (3 YEARS MEANS)

	Base model				More control variables							
	Simultaneous equations				Simultaneous equations				TR= f (GDP pc; X)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(7)	(8)	(7)	(8)
	3SLS	3SLS-GMM	3SLS	3SLS-GMM	3SLS	3SLS-GMM	3SLS	3SLS-GMM	3SLS	3SLS-GMM	3SLS	3SLS-GMM
	RI (CV)	TR	RI (CV)	TR	RI (CV)	TR	RI (CV)	TR	RI (CV)	TR	RI (CV)	TR
Regional inequality (RI)	-0.225*	-1.430***	--	--	-0.221***	-1.430***	--	--	--	--	--	--
Intergovernmental Transfers (TR)	-0.046	-0.069	-0.045	-0.069	-0.006	-0.018	-0.006	-0.006	0.018	0.347***	0.018	0.347***
Log of department GDP pc	--	--	--	--	--	--	--	--	0.444***	0.444***	--	--
Political Alignment	-0.012	-0.059	--	-0.037	-0.011	-0.059	--	-0.008	-0.008	-0.037	--	-0.037
Log of department Population	-0.562***	-0.518***	--	-0.484***	-0.561***	-0.518***	--	-0.557***	-0.557***	-0.484***	--	-0.484***
Log of Regional Government expenditure	0.193***	0.235***	--	0.214***	0.194***	0.235***	--	0.192***	0.192***	0.214***	--	0.214***
Fiscal decentralization	-0.031***	-0.025**	-0.033***	-0.025**	-0.040***	-0.033***	-0.040***	-0.042***	-0.033***	-0.042***	--	--
Assets Inequality	--	--	--	--	0.010***	0.013***	0.010***	0.010***	0.013***	0.010***	--	--
Unemployment rate	--	--	--	--	0.002	0.002**	0.002	0.002*	0.002**	0.002**	--	--
Activity rate	--	--	--	--	-0.079*	-0.221*	-0.079*	-0.111***	-0.221***	-0.111***	--	--
Regional index	-0.076***	-0.083***	-0.074***	-0.083***	--	--	--	--	--	--	--	--
Distance index	--	--	--	--	0.028***	0.027***	0.028***	0.027***	0.028***	0.027***	--	--
Temporal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2	0.627	--	0.627	--	0.755	--	0.755	0.755	0.934	--	--	--
J-test	--	0.0000	--	0.0000	--	0.0000	--	--	--	0.0000	--	0.0000
Observations	126	126	126	126	126	126	126	126	126	126	126	126

Notes: Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. J-test: Hansen test of over-identifying restrictions indicating the validity of the chosen instruments.

Included instruments: Lagged values of: Log department GDP per capita, Log of department population, Log regional government expenditure per capita, unemployment rate and fiscal decentralization measure. In this table we present the estimations with one period lag (3 years).

Our estimates support the idea that regional inequalities have a significant and negative impact on transfers. That is to say, the further a given department is from the mean value of per capita income in the richest department in the country (Montevideo) the less this department receives per capita in transfers. This result is also reflected by the fact that the value of the department's GDP per capita has a positive and significant effect on intergovernmental transfers. Remember that GDP pc also captures the impact of local revenue capacity on intergovernmental transfers, but mainly this sub-national wealth could be a reflection of the political power of the richest departments in the country. Furthermore, we did not find a significant impact of transfers on regional inequalities. In Uruguay these transfers do not to have a regional equalizer effect. Finally, our results remain the same regardless of the indicators employed or the additional controls included in the regressions.

As regards the control variables in transfer equations, we always find that lagged regional government size (regional government expenditure over department GDP) has a positive and significant impact. In other words, on average, the more RGs spend, the greater the transfers they receive. This relation also holds when we consider tri-annual average data, which means that RG expenditures in the previous three years has a positive impact on the current level of intergovernmental transfers received. This result could reflect the impact of RGs' fiscal needs but it could also reflect these RGs' negotiating capacity when they demand resources from the central government. In fact, the observed dynamic in transfer negotiation between central and regional governments seems to support the idea that RGs validate their spending needs in the past and try to include exceptional spending as part of the permanent transfer scheme. 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. Finally, with regard to the political alignment variable, we never obtain a significant effect. Therefore, as regards how intergovernmental transfers are determined, it cannot be said that there is a logic of reward and punishment depending on whether or not RGs are aligned politically with the party in power in the central government¹⁹.

As regards the control variables in the regional inequality equations, we find that the fiscal decentralization indicator has a significant negative impact (as was shown in Muinelogallo and Rodríguez-Miranda, 2014). Lastly, we find that our indicator of potential regional development has a significant negative impact. So the greater the potential for development, the less regional inequalities are. Furthermore, when we replace this indicator by different variables that might explain its composition (columns 5 to 8 in tables 3 and 4) we get the expected significance and sign for each of these new variables that is included (as basic factors underlying potential regional development). Thus the regional development variable is mainly explained by the unequal assets index (education Gini index), the distance from the capital (in line with the argument of economies of agglomeration) and factors related to regional economic activity (the activity rate and unemployment rate).

7. Conclusions

In this article we have analyzed the bidirectional relationship between intergovernmental transfers and regional inequalities in Uruguay. Our main results indicate that intergovernmental transfers do not play a significant role in reducing income inequalities between regions in the country. Moreover, wealthy RGs and bigger departments in terms of population receive proportionally greater intergovernmental transfers per capita.

This empirical evidence is consistent with the fact that Uruguay's current normative system lacks clear criteria that give priority to promoting territorial cohesion. Although central government aims to promote regional balanced development increasing intergovernmental transfers, the final allocation of these transfers is not in accordance with that objective of balanced development.

The intergovernmental transfer mechanism is not purely discretionary because there are criteria that guide the allocation of resources, although there is not a clear formula. Indeed, between these criteria and the inertia of the past allocation there is margin to negotiate between RGs and central government in order to define the final distribution of intergovernmental transfers. On the other hand, out of the scope of the mechanism defined in each National Budget Law, RGs have opportunities to get and receive more resources as transfers, justified in temporary matters that finally become in permanent items.

Then, it is clear that there is not an intergovernmental transfer mechanism designed to orient resources allocation in favor of regional equality. To have some criteria that seems to follow this goal, as inverse of GDP or unmet needs household, is not enough without clear rules to know in what extent actually these criteria define transfers allocations (effective % of that allocation).

In addition, most RGs in Uruguay are increasingly dependent on intergovernmental transfers. In this context, the current scheme of political negotiations between the central government and RGs may be continuing to operate because apparently it fosters and nourishes rent seeking capabilities via intergovernmental transfers, rather than generating genuine capabilities to develop more sources of revenues. So, if nothing changes, we can expect the RGs to continue using their size, trying to expand their spending needs and pushing for more resources from the national budget. This scenario cannot successfully generate greater regional cohesion or development capabilities.

In this context, it is vitally important to completely revise the normative scheme governing intergovernmental regional transfers in Uruguay so as to achieve greater territorial cohesion. What the intergovernmental transfers system must have is a stable, equitable and efficient allocation mechanism. Furthermore, if Uruguay continues advancing in its decentralization process, this new transfer system will provide support for most of the expected benefits of this process to develop.

Notes

1. For a detailed analysis of these reforms see Brosio and Jiménez (2012).
2. Uruguay is divided in 19 departments which are the second level of government, after central government. For details of the administrative composition of Uruguay see Table A.1 in the Appendix.
3. The main ones 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.
4. The main one is the property tax on rural real assets.
5. More than the 90 % of intergovernmental transfers in Uruguay are non-conditioned transfers. In this paper, we analyze all transfers without the distinction between conditioned and non-conditioned transfers.
6. See Appendix Table A.2 for a list of departments, Table A.3 for variables definitions and data sources and Table A.4 for summary statistics.
7. See Williamson (1965), Ezcurra and Pascual (2008), Lessmann (2009), and Rodríguez-Pose and Ezcurra (2010).
8. See Wooldridge (2010) for a good explanation of these SIV methods. And see Greene (2012), Kmenta (1997), and Zellner and Theil (1962) for references on system estimation methodology. Avery (1977) and Baltagi (1981 and 2008) discuss applications of these methodologies to panel data models.
9. See Zellner and Theil (1962), Kmenta (1997) and Greene (2012) for references on 3SLS estimation methodology. However, see Avery (1977) and Baltagi (1981 and 2008; chapter 7) for applications of 3SLS to an error components model.
10. The GMM estimator is discussed in all the leading textbooks including Cameron and Trivedi (2005 and 2010), Davidson and MacKinnon (2004), Hayashi (2000), and Wooldridge (2010). The collection of papers by Matyas (1999) provides both theoretical and applied aspects of GMM.
11. The 3SLS-GMM estimator is a two-step GMM estimator. In the first step, we do the equivalent of 2SLS on each equation, and then we compute a weight matrix based on the matrix of moment conditions. In this context, the two step 3sls-gmm estimation obtains parameter estimates based on the initial weight matrix; computes a new weight matrix based on those estimates, and then re-estimates the parameters based on that weight matrix (see Hayashi 2000, Chapter 4).
12. In fact, we employ lagged values as instruments for the following control variables: Log department GDP per capita, Log of department population, Log regional government expenditure per capita, unemployment rate and fiscal decentralization measure. All the control variables employed are fully discussed below.
13. For a complete exposition of the identification of equation systems, see Greene (2012), Bjorn and Krishnakumar (2008) or Theil (1971).
14. Table A.3 in the Appendix provides the definitions and sources of all the variables.
15. See, for example, Ezcurra and Pascual (2008), Lessman (2009), Ezcurra and Rodríguez-Pose (2014), and Kyriacou *et al.* (2015).
16. See, for example, Alm and Boex (2001), Porto and Sanguinetti (2001), Boex (2003), Brodjonegoro and Martinez-Vazquez (2004), Sollé-Ollé and Sorribas-Navarro (2008), Curto-Grau, Solé-Ollé and Sorribas-Navarro (2012).
17. The RGs with value 2 are: Canelones, Colonia, Maldonado, and San José. With value 1 are: Florida, Flores, Lavalleja, Paysandú, Río Negro, Rocha, Salto, and Soriano. Finally, with value 0 are: Artigas, Cerro Largo, Durazno, Rivera, Tacuarembó, and Treinta y Tres.
18. In Appendix we report unit root tests for the two main endogenous variables: intergovernmental transfers and regional inequalities.
19. It's really important to mention that we also include department's surface as a control variable, but this variable was not significant in all regressions. So, we exclude these variables from the final regressions of Tables 3 and 4.

References

- Arocena, J. (2008), “Los desafíos de la descentralización y la participación ciudadana en el Uruguay”, en *Cuadernos para el Desarrollo Local. Diálogos por la Descentralización*, año 1, 1: 17-34, PNUD, Programa ART Uruguay.
- Atlas, C. M., Gilligan, T., Hendershott, R. and Zupan, M. (1995), “Slicing the Federal Government Net Spending Pie: Who Wins, Loses, and Why”, *American Economic Review*, 85(3): 624-629.
- Avery, R. (1977), “Error components and seemingly unrelated regressions”, *Econometrica*, 45: 199-209.
- Bahl, R. (1999), “Implementation Rules for Fiscal Decentralization”, *ISP Working Paper Number 99-01*. Andrew Young School of Policy Studies, Georgia State University.
- Baltagi, B. (1981), “Simultaneous equations with error components”, *Journal of Econometrics*, 17: 189-200.
- Baltagi, B. (2008), *Econometric Analysis of Panel Data*, fourth ed., Chichester: Wiley and Sons.
- Barro, R. (2000), “Inequality and growth in a panel of countries”, *Journal of Economic Growth*, 5(1): 5-32.
- Barrenechea, P. and Troncoso, C. (2008), “El índice de competitividad regional. ¿Qué cambios tuvo la competitividad por departamentos en una década?”, *Programa de las Naciones Unidas para el Desarrollo*, Programa de Desarrollo Local ART Uruguay.
- Bjorn, E. and Krishnakumar, J. (2008), “Measurement errors and simultaneity”, in: Mátyás, L., Sevestre, P. (Eds.), *The Econometrics of Panel Data. Fundamentals and Recent Developments in Theory and Practice*, Chapter 10: 323-367.
- Boex, J. (2003), “The incidence of local government allocations in Tanzania”, *Public Administration and Development*, 23(5): 381-391.
- Brodjonegoro, B. and Martínez-Vázquez, J. (2004), “An Analysis of Indonesia’s Transfer System: Recent Performance and Future Prospects”, in: Eds. J. Alm, J. Martínez-Vázquez and Sri Muliani Indrawati (Eds.), *Can Decentralization Help Rebuild Indonesia?*
- Boex, J. and Martínez-Vázquez, J. (2005), “The Determinants of the Incidence of Intergovernmental Grants: A Survey of the International Experience”, *Georgia State University Research Paper Series Working Paper*, 06-52, Andrew Young School of Policy Studies, March.
- Böhme, K. (2009), *The EU Territorial Agenda and its Action Programme: how to reinforce the performance*, Stockholm: Sweco Eurofutures.
- Böhme, K., Doucet, P., Komornicki, T., Zaucha, J. and Świątek, D. (2011), “How to strengthen the territorial dimension of Europe 2020 and the EU Cohesion Policy” (Report based on the *Territorial Agenda 2020*, prepared at the request of the Polish Presidency of the Council of the European Union).
- Brennan, G. and Buchanan, J. (1980), *The power to tax. Analytical foundations of a fiscal constitution*, Cambridge University Press, Cambridge.
- Brosio, G. and Jiménez, J. (2012), “Introduction: approaching recent transformations of intergovernmental relations from multiple profiles” in *Decentralization and Reform in Latin America Improving Intergovernmental Relations*, Edward Elgar Cheltenham: UK, Northampton and MA, USA.

- Buchanan, J. (1950), "Federalism and fiscal equity", *American Economic Review*, 40: 124-138.
- Cameron, A. and Trivedi, P. (2005), *Microeconometrics: Methods and Applications*, New York: Cambridge University Press.
- (2010), *Microeconometrics Using Stata*, Rev. ed. College Station, TX: Stata Press.
- CEDES (2010), "Diseño institucional y descentralización territorial en un país unitario y centralizado como Uruguay", Informe Final. Agenda Nacional de Descentralización, Uruguay Integra, OPP.
- Cox, G. and McCubbins, M. (1986), "Electoral politics as a redistributive game", *The Journal of Politics*, 48: 370-389.
- Curto-Grau, M., Solé-Ollé, A. and Sorribas-Navarro, P. (2012), "Partisan targeting of inter-governmental transfers and state interference in local elections: evidence of Spain", *Documents de Treball de l'IEB* 2012/31.
- Dahlby, B. and Wilson, L. (1994), "Fiscal capacity, tax effort, and optimal equalization grants", *Canadian Journal of Economics*, 337: 657-672.
- Davidson, R. and MacKinnon, J. (2004), *Econometric Theory and Methods*, New York: Oxford University Press.
- Dixit, A. and Londregan, J. (1998), "Fiscal federalism and redistributive politics", *Journal of Public Economics*, 68: 153-180.
- Ezcurra, R. and Pascual, P. (2008), "Fiscal decentralization and regional disparities: Evidence from several European Union countries", *Environment and Planning A*, 40: 1185-1201.
- Ezcurra, R. and Rodríguez-Pose, A. (2014), "Government quality and spatial inequality: A cross-country analysis". *Environment and Planning A*, 46(7): 1732-1753.
- Greene, W. (2012), *Econometric Analysis*, 7th ed., Upper Saddle River, NJ: Prentice Hall.
- Grossman, P. (1994), "A political theory of intergovernmental grants", *Public Choice*, 78: 295-303.
- Hayashi, F. (2000), *Econometrics*, Princeton, NJ: Princeton University Press.
- IDB (2007), *Aportes para el Desarrollo del Sistema Financiero Municipal: El Papel de los Ingresos Propios Municipales*, Estudio para los países del Cono Sur. País: Uruguay. Estudio preparado por: Daniel Sureda, Consultor-Coordenador del Proyecto: Huáscar Eguino.
- (2009), "Finanzas y gestión de los gobiernos subnacionales en Uruguay", *Nota Técnica UR-N1029* Responsable: Huáscar Eguino (FMM) Consultor: Juan Carlos Aguilar.
- Kmenta, J. (1997), *Elements of Econometrics*, Second Edition, Ann Arbor: University of Michigan Press.
- Kyriacou, A., Muinelo-Gallo, L. and Roca-Sagalés, O. (2015), "Fiscal decentralization and regional disparities: The importance of good governance", *Papers in Regional Science*, 94 (1): 89-107.
- Lessmann, C. (2009), "Fiscal decentralization and regional disparity: Evidence from cross section and panel data", *Environment and Planning A*, 41: 2455-73.
- (2012), "Regional inequality and decentralization: an empirical analysis", *Environment and Planning A*, 44: 1363-1388.

- Levin, A., Lin, C. F. and Chu, C. S. J. (2002), “Unit root tests in panel data: Asymptotic and finite-sample properties”, *Journal of Econometrics*, 108: 1-24.
- Limoneiro, D. (2015), “Beyond income transfers: The decline of regional inequality in Brazil during the 2000s”, *Progress in Development Studies*, Jan 2015, 15(1): 6-21.
- Lindbeck, A. and Weibull, J. (1987), “Balanced budget redistribution as the outcome of political competition”, *Public Choice*, 52: 273-297.
- Martínez-Vázquez, J. and Sepúlveda, C. (2011), “Intergovernmental Transfers in Latin America: A Policy Reform Perspective”, *International Center for Public Policy Working Paper Series*, at AYSPS, GSU paper1108, International Center for Public Policy, Andrew Young School of Policy Studies, Georgia State University.
- (2012), “Toward a more general Intergovernmental transfers: a policy reform perspective 289 theory of revenue assignments”, *Working Paper*, International Studies Program, Andrew Young School of Policy Studies, Georgia State University, Atlanta, GA.
- Matyas, L. (1999), *Generalized Method of Moments Estimation*, Cambridge: Cambridge University Press.
- McKinnon, R. (1997), Market-preserving fiscal federalism in the American monetary union, in: Blejer M. and Ter-Minassian T. (eds), *Macroeconomic dimensions of public finance: Essays in honour of Vito Tanzi*: 73-93, London: Routledge.
- Muinelo-Gallo, L. and Rodríguez-Miranda, A. (2014), “Descentralización fiscal, calidad de gestión de gobierno y disparidades regionales en Uruguay”, *Estudios de Economía*, 41(2): 219-250.
- Musgrave, R. (1959), “The Theory of Public Finance”, New York: McGraw-Hill.
- Oates, W. (1972), *Fiscal Federalism*, New York: Harcourt Brace Jovanovich.
- (1993), “Fiscal decentralization and economic development”, *National Tax Journal*, 46(2): 237-243
- Pereira, P. (1996), “A Politic-Economic Approach To Intergovernmental Lump-Sum Grants”, *Public Choice*, 88: 185-201.
- Porto, A. and Sanguinetti, P. (2001), “Political Determinants of Intergovernmental Grants: Evidence from Argentina”, *Economics and Politics*, 13(3): 237-256.
- Qian, Y. and Weingast, B. (1997), “Federalism as a commitment to preserving market incentives”, *Journal of Economic Perspectives*, 11: 83-92.
- Raimondo, H. (1983), “The Political Economy of State Intergovernmental Grants”, *Growth and Change*, 14: 17-23.
- Rodríguez-Miranda, A. (2006), “Desarrollo Económico Territorial Endógeno. Teoría y aplicación al caso uruguayo”, *Serie Documentos de Trabajo*, DT 2/06, Instituto de Economía, Facultad de Ciencias Económicas y Administración, Universidad de la República.
- (2014), “Desarrollo económico y disparidades territoriales en Uruguay”, *Cuadernos sobre Desarrollo Humano* n.º 3, PNUD Uruguay.
- Rodríguez-Pose, A. and Ezcurra, R. (2010), “Does decentralization matter for regional disparities? A cross-country analysis”, *Journal of Economic Geography*, 10: 619-644.

Theil, H. (1971), *Principles of Econometrics*, New York: Wiley.

Weingast, B. (1979), "A Rational Choice Perspective on Congressional Norms", *American Journal of Political Science*, 23(2): 245-262.

— (1995), "The economic role of political institutions: Market-preserving federalism and economic development", *Journal of Law, Economics, and Organization*, 11: 1-31.

Williamson, J. (1965), "Regional inequality and the process of national development: A description of patterns", *Economic Development and Cultural Change*, 13: 3-45.

Wooldridge, J. (2010), *Econometric Analysis of Cross Section and Panel Data*, Second Edition, MIT Press.

Zellner, A. and Theil, H. (1962), "Three-stage least squares: simultaneous estimation of simultaneous equations", *Econometrica*, 30(1): 54-78.

Resumen

Este trabajo explora la relación bidireccional entre las transferencias intergubernamentales y las desigualdades de renta regionales en Uruguay. Nuestro estudio se basa en la construcción de un modelo de ecuaciones simultáneas diseñado para capturar los factores que conjuntamente determinan las variables endógenas. Para ello, se utiliza un panel de datos de los departamentos (regiones) para el período 1990-2012. Los resultados obtenidos muestran que las transferencias del gobierno central hacia las regiones no tienen un impacto significativo sobre los niveles de desigualdad regional. De hecho, nuestras estimaciones avalan la idea de que las desigualdades regionales tienen un impacto significativo y negativo en la asignación de las transferencias hacia las regiones, toda vez que las regiones más ricas reciben mayores recursos per cápita. En términos per cápita, las transferencias intergubernamentales también están positivamente influenciadas por el gasto público regional pasado, y negativamente por el tamaño de la población de los departamentos. Estos resultados tienen claras implicaciones para el diseño de políticas públicas, puesto que muestran que el marco normativo de las transferencias intergubernamentales en Uruguay debe ser revisado si su objetivo es promover la cohesión territorial.

Palabras clave: transferencias intergubernamentales, desigualdad regional, datos de panel, ecuaciones simultáneas, Uruguay.

Clasificación JEL: C33, H77, R11.

Appendix

1. Unit root test

We report unit root test for the main two endogenous variables: regional inequalities and intergovernmental transfers.

- In case of regional inequalities variable (RI), the Levin Lin-Chu (2002) bias-adjusted test statistic $t = -4.03$ is significantly less than zero ($p = 0.00005$), so reject the null hypothesis of a unit-root.

- In case of intergovernmental transfers variable (TR), the Levin Lin-Chu (2002) bias-adjusted test statistic $t = -6.04$ is significantly less than zero ($p = 0.00001$), so reject the null hypothesis of a unit-root.

2. Tables

Table A.1
ADMINISTRATIVE DIVISION OF THE REPÚBLICA ORIENTAL DEL URUGUAY



Table A.2
DEPARTMENTS

Artigas, Canelones, Cerro Largo, Colonia, Durazno, Flores, Florida, Lavalleja, Maldonado, Paysandú, Salto, San José, Soriano, Río Negro, Rivera, Rocha, Tacuarembó, Treinta y Tres, Montevideo (reference department).

Table A.3
DATA DEFINITIONS AND SOURCES

Variable	Definition	Source
Regional inequality (RI)	Coefficient of variation (CV), calculated with average per capita income of households	Continuous Household Survey of the National Institute of Statistics of Uruguay
Intergovernmental Transfers (TR)	Intergovernmental per capita transfers in constant pesos of 2012	Planning and Budget Office- Presidency of the Republic Ministry of Economy and Finance General Accounting Office Social Security Bank

Variable	Definition	Source
Department GDP per cápita	GDP pc of the department in constant pesos of 2012	Central Bank of Uruguay Office of Planning and Budget Office-Presidency of the Republic Economic Institute of UdelaR
Political Alignment	Dummy variable that takes the value 1 if the political party of RG department at time t is the same as the political party that governs the central state and 0 otherwise	Electoral Court of the República Oriental del Uruguay
Department Population	Department population (in thousands)	Continuous Household Survey of the National Institute of Statistics of Uruguay
Regional government expenditure	Regional Government total expenditure over department GDP	Planning and Budget Office - Presidency of the Republic
Fiscal Decentralization	Departmental own revenues in per capita terms in constant pesos of 2012.	Planning and Budget Office-Presidency of the Republic Ministry of Economy and Finance General Accounting Office Social Security Bank
Assets Inequality	Gini index of education: inequality of schooling years of department population	Continuous Household Survey of the National Institute of Statistics of Uruguay
Department Unemployment rate	Percentage of department labour force that is unemployed but actively seeking employment and willing to work	National Institute of Statistics of Uruguay
Department Activity rate	Percentage of the department population, both employed and unemployed, that constitutes the manpower supply of the labour market, regardless of their current labour status.	National Institute of Statistics of Uruguay
Regional index	Categorical variable that takes values 0, 1 and 2. The value 0 is assigned to departments that show a low potential for regional development, in practical terms is defined as persistently departments that in the period 1990-2012 are shown worst positioned relative to national average GDP per capita. A value of 1 is assigned to departments that hold intermediate positions in the national context. The value 2 is assigned to departments that persistently show the best indicators in the national context and, therefore, are at the top of the ranking between Uruguayan departments	Central Bank of Uruguay
Distance index	Categorical variable takes values from 1 (nearest to Montevideo) to 6 (farthest to Montevideo).	National Institute of Statistics of Uruguay

Table A.4
SUMMARY STATISTICS

		Mean	Standard deviation	Minimum	Maximum	Observations
Regional inequality (RI)	Overall	420.836	88.980	44.070	635.422	N = 396
	Between		68.731	288.672	551.539	n = 18
	Within		58.686	124.003	582.173	T = 23
Log of Intergovernmental Transfers pc (TR)	Overall	65.043	0.4703	48.469	75.096	N = 396
	Between		0.4085	53.107	71.267	n = 18
	Within		0.2514	59.360	71.628	T = 23
Log of Department GDP pc	Overall	102.363	0.2699	95.864	110.080	N = 396
	Between		0.2031	97.768	105.484	n = 18
	Within		0.1451	99.115	107.433	T = 23
Political Alignment	Overall	0.0899	0.2865	0	1	N = 396
	Between		0.0514	0.0476	0.1905	n = 18
	Within		0.2821	0	1	T = 23
Log of Department Population	Overall	113.686	0.5720	101.308	131.730	N = 396
	Between		0.5864	101.505	130.681	n = 18
	Within		0.0394	111.723	114.783	T = 23
Regional Government expenditure	Overall	184.774	0.8392	153.668	204.419	N = 396
	Between		0.5374	176.924	198.799	n = 18
	Within		0.6563	158.251	193.731	T = 23
Fiscal Decentralization	Overall	65.780	0.4870	55.404	84.268	N = 396
	Between		0.4531	59.930	81.227	n = 18
	Within		0.2068	58.158	73.960	T = 23
Assets Inequality	Overall	367.411	25.611	283.771	425.625	N = 396
	Between		15.604	332.762	392.486	n = 18
	Within		20.625	318.420	412.813	T = 23
Department Unemployment rate	Overall	109.066	44.435	10.808	255.014	N = 396
	Between		19.939	61.194	145.634	n = 18
	Within		39.975	18.494	249.726	T = 23
Department Activity rate	Overall	114.022	114.022	64.860	179.441	N = 396
	Between		29.647	64.860	179.441	n = 18
	Within		0	114.022	114.022	T = 23
Regional index	Overall	0.8889	0.7380	0	2	N = 396
	Between		0.7584	0	2	n = 18
	Within		0	0.8889	0.8889	T = 23
Distance index	Overall	36.667	15.295	1	6	N = 396
	Between		15.718	1	6	n = 18
	Within		0	36.667	36.667	T = 23

