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Does the system of allocation of intergovernmental transfers in Senegal eliminate politically motivated targeting?

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Abstract

While there is a large body of literature on the determinants of allocation of intergovernmental fiscal transfers in developed countries, this kind of study is still very limited for developing countries, especially Subsaharan countries. Using an original micro-level public finance panel data from Senegal, we address three issues: (1) Does the Senegalese allocation system of fiscal transfers conform to the guidance of normative theory, in particular, to the equity principle? (2) Does this allocation system eliminate politically motivated targeting of transfers? (3) If not, what kind of political factors explain the horizontal allocation of fiscal resources? By rigorously estimating a panel data for 67 local governments ('*communes*') from 1997 to 2009, our results tend to show that equity concerns do not affect the allocation of intergovernmental grants in Senegal, leading to the conclusion that the resources distribution system does not comply with the dictates of normative theory. Moreover, we find evidences that political considerations influence the horizontal allocation of transfers. In particular, our analysis suggests that transfers allocation follows a pattern of tactical redistribution more than patronage, swing *communes* being targeted while partisan *communes* are not.

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Keywords: Intergovernmental transfers, political economy, decentralization, Senegal.

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1 Introduction

While fiscal decentralization has been adopted by a large part of the developing world, there is a broad consensus in the literature that the benefits expected from decentralization will not materialize if the system of intergovernmental fiscal transfers does not rely on an equitable and efficient horizontal allocation mechanism. Although a huge literature on the determinants of allocation of central grants in developed countries exists, this kind of study is still limited for developing countries, especially Subsaharan countries. This paper attempts to fill the gap in the empirical literature by raising the issue of how such transfers are allocated across local governments in a Subsaharan country, Senegal.

The traditional theoretical view on central transfers is that they should be guided by equity and efficiency considerations, a welfare maximizing government wanting to reallocate resources between richer and poorer jurisdictions and to correct for externalities (Buchanan, 1950, Oates, 1972, Gramlich, 1977). Actually, a number of empirical studies have pointed out that political factors are more relevant in explaining the allocation of grants. Beginning with Wright (1974), economic historians examined the question of how transfers were allocated amongst American states during the New Deal in the 1930s and found that political variables explained this allocation considerably better than economic considerations. As Banful (2010) notices, empirical studies have concerned an array of countries like Albania (Case, 2001), Argentina (Porto and Sanguinetti, 2001), Australia (Bungey, Grossman, and Kenyon, 1991, Worthington and Dollery, 1998), Canada (Albouy, 2010), Ghana (Banful, 2010, Miguel and Zaidi, 2003), India (Khemani, 2007, Cole, 2009, Arulampalam et al., 2009), Israel (Alperovich, 1984), Japan (Meyer and Naka, 1999), Portugal (Pereira, 1996, Veiga and Pinho, 2007), Russian Federation (Treisman, 1996), Sweden (Dahlberg and Johansson, 2002), Tanzania (Boex, 2003) and the United States (Anderson and Tollison, 1991, Wallis, 1998). An international comparison of these works shows that, besides local expenditure needs and fiscal capacity, other factors including electoral concerns and political influence play important roles in the horizontal allocation of grants. Central governments appear to be opportunistic, using transfers to maximize their chances of re-election or partisan, allocating grants to further interests of their political support groups (Cox, 1986, Grossman,

1994, Case, 2001, Banful, 2010).

A common view is that basing the allocation of fiscal transfers on a formula limits the discretionary power of politicians in distributing central grants so that this strategy has been widely adopted in the developing world (Banful, 2010). In this paper, we test the effectiveness of formulas in eliminating discretion by analyzing how transfers are allocated across local governments in Senegal where a formula allocation mechanism is employed. More precisely, we intend to tackle the three following issues: (1) Does the Senegalese allocation formula allow a distribution of fiscal transfers that conforms to the dictates of normative theory, in particular, to the equity principle? (2) Is such an allocation system actually sufficient to eliminate politically motivated targeting of grants? (3) If not, what kind of political factors explain the allocation of fiscal resources? This paper adds to the existing empirical literature studying horizontal allocation of transfers and we believe its contribution to be twofold. First, to our knowledge, this is one of the first papers to exploit an original micro-level public finance panel data from a Subsaharan country to test political economy theories of fiscal transfers' allocation. It allows us to see to what extent results obtained for developed countries can be observed for a developing country.[1] Besides, Senegal is a particularly interesting case since a received wisdom says that transfers allocation is determined by political affinity between the central and local governments, as it is the case in many African countries (Banful, 2010), and some mayors deplore a discriminatory and opaque distribution of grants.[2] Second, we employ a consistent econometric method which generates credible empirical results. Indeed, we use the fixed effects vector decomposition (FEVD) estimator developed by Plümper and Troeger (2007) to avoid failure to control for heterogeneity of local governments and inefficiency in estimating the effect of variables that have little within variance, common issues in this kind of study. Moreover, to test whether equity concerns are dominant in the allocation of transfers, we compute an innovative poverty index at local level using the Demographic and Health Survey (DHS) and its geographic data.

After having briefly reviewed the literature on normative and political economy determi-

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[1] The findings of Miguel and Zaidi (2003) concerning Ghana already suggest that in African democracies ruling parties are able to reward their supporters and use the advantages of incumbency to win subsequent elections.

[2] See, for instance, *Le ministre Aliou Sow brocardé par Alioune Sarr, le Pcr de Notto Diobasse*, Le Peuple, October 18th 2010 (http://lepeuple-sn.com) or *Fonds de dotation : Aliou Sow fait la part belle à sa collectivité selon le PCR de Ndindy*, Rewmi, November 2nd 2010 (http://www.rewmi.com/).

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nants of fiscal transfers, we rigorously investigate the empirical importance of such determinants in the distribution of central grants across local governments in Senegal by estimating a panel data for 67 *communes* from 1997 to 2009. (1) Estimation results tend to show that equity concerns do not impact the allocation of intergovernmental grants in Senegal, leading to the conclusion that the resources distribution system does not follow the dictates of the normative theory. (2) We also find evidences of politically motivated targeting of transfers despite the formula-based system. (3) In particular, our results highlight three kinds of political motivation. First, our analysis suggests that transfers allocation follows a tactical redistribution, which consists in targeting swing *communes* to achieve electoral success. Second, local governments which are better represented in parliament seem to receive larger grants, confirming one of the most consistent empirical results in this literature. Third, ethnic fractionalization seems to be positively correlated with per capita transfers which might indicate that the central government uses fiscal resources as a way to pacify potentially troubled areas.

Section 2 offers a brief review of the literature on the determinants of intergovernmental transfers. Section 3 presents the institutional background of transfers in Senegal, the empirical model, strategy and findings. Section 4 concludes with some policy implications.

2 Normative and political economy determinants of intergovernmental fiscal transfers: A literature review

Three stands of the literature consider factors that may influence the distribution of central transfers across local governments (Boex and Martinez-Vazquez, 2005). First, public finance literature provides normative dictates on how intergovernmental transfers should be allocated. Second, voter-choice models in public choice literature explain how electoral concerns could affect the central government's fiscal choices in distributing fiscal resources to local jurisdictions. Third, political economy arguments contribute to understand the allocation of grants by considering non-electoral arguments.

First, there is a consensus in the local public finance literature that a system of fiscal transfers should be designed to achieve equity and efficiency in the allocation of resources

(Buchanan, 1950, Oates, 1972, Gramlich, 1977). The central government is assumed to be a 'benevolent planner', which maximizes social welfare. The rationale behind the equity principle is the need for a reduction in horizontal fiscal imbalances existing between local jurisdictions. Thereby, transfers should compensate the unequal access to local public goods and services generated by the uneven distribution of resources across the country. The pursuit of this objective leads to expect a pro-poor allocation of grants. However, most empirical studies find that wealthier local governments receive greater transfers, indicating that political considerations outweigh those of equity (see Kraemer, 1997, Alm and Boex, 2002, Wallis, 1998, Meyer and Naka, 1999). The economic efficiency objective seeks to correct for externalities and compensate spillover effects among jurisdictions in the provision of some local public services. This incentive objective would result in the central government providing greater grants in response to higher expenditure needs.[3] In empirical studies, local expenditure needs and costs generally have a positive impact on the level of transfers received by a local government. Exceptions include Nigeria (Alm and Boex, 2002) and Mexico (Kraemer, 1997) where expenditure needs have no effect and a negative impact on grants received, respectively.[4]

Second, the literature on targeted redistribution distinguishes between patronage, which consists in rewarding political supporters, and tactical redistribution, which aims at achieving electoral success. Greater political support for the central government in a particular jurisdiction can be rewarded by greater transfers. For instance, Miguel and Zaidi (2003) find evidence from Ghana of core supporters' targeting, districts from where the ruling party won all the parliamentary seats.[5] This patronage can also be tactical, however. Indeed, Cox (1986) argues that the optimal strategy for risk-averse opportunistic candidates is to favor partisan jurisdictions to maintain existing political supports. Similarly, Bungey, Grossman, and Kenyon (1991) and Leyden (1992) show that party closeness between central and local politicians increases returns in term of central government's support, and therefore the level of transfers. Case (2001) interprets empirical findings of greater grants in Albania to juris-

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[3] Moreover, Albouy (2010) shows that providing higher grant levels to jurisdictions that pay higher central taxes is a mechanism for reducing inefficient migration.

[4] We also have to note that transfers pursue a vertical fiscal balance objective, that is, ensure that the revenues and expenditures of each level of government are approximately equal (Weingast, 2009).

[5] Pereira (1996) also finds that intergovernmental grants in Portugal were designed to reward central governments' political support.

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dictions where the President received more votes in the past election as evidence of targeting of fief districts, considered as more 'pivotal'. If the central government can reward its supporters or target it to maintain political support, it can also favor its opponents (Treisman, 1996) or 'swing' jurisdictions, where the distance of vote shares between the largest parties is small. Electoral results in these jurisdictions are assumed to be determined by how much they receive in resource transfers from the center. Arulampalam, Dasgupta, Dhillon, and Dutta (2009) construct a model where the federal government allocates transfers to states that are aligned with the incumbent party but also swing. Using Indian panel data, they validate their theoretical model.[6] In the context of an African country, Banful (2010) also finds evidence that per capita grants are higher in Ghanaian districts where vote margins in the previous presidential election were lower. Following the predictions of the well known model of opportunistic political budgetary cycles provided by Rogoff and Sibert (1988), the central government is also expected to transfer more resources in election years to increase its likelihood of re-election. According to Worthington and Dollery (1998), grants in local election years would be more productive due to a heightened awareness of policies but, in the case of central elections, the returns from purchasing political capital in this manner would be offset by direct political benefits of central direct expenditure so that transfers should decrease.

Third, beyond electoral considerations, political decision-making processes are likely to be captured by powerful interest groups. Assuming that local officials try to extract as much resources as possible from the center, those with higher bargaining power may receive larger grants. The fact that local jurisdictions with higher political representation benefit from greater transfers is one of the most robust empirical findings (Wright, 1974, Porto and Sanguinetti, 2001, Khemani, 2007).[7] Smaller jurisdictions are also expected to receive greater per capita transfers, which may be caused by scale economies or by their potentially higher lobbying power. In particular, this bias may be explained by an urge to secure

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[6] Cole (2009) also finds that state governments in India supply greater subsidized agriculture loans to electoral districts where the ruling party had a narrow margin of victory (or loss) and Johansson (2003) provides theoretical and empirical evidence that swing Swedish municipalities receive larger grants than other groups.

[7] For instance, Atlas (1995) shows that the allocation of per capita federal net spending in the United States from 1972 to 1990 was affected by states' per capita congressional representation and highlights that the institutional basis of political representation affects spending allocations across states.

broad political support.[8] In the context of a developing country, central governments may also use economic means to deal with social conflicts.[9] A common argument in favor of decentralization is that local governments are enabled to allocate public spending in line with the preferences of heterogeneous local communities. However, Tranchant (2010) shows that, while this hypothesis may be relevant for local majorities, it is not the case for local minorities, who are not in a position of strength. In this context, fiscal decentralization can increase local conflicts, marginalized ethnic minorities clashing against powerful local majorities. Hence, the central government may use transfers as an instrument to pacify potentially troubled areas like ethnically fractionalized jurisdictions (Treisman, 1996).[10]

3 The determinants of intergovernmental fiscal transfers in Senegal: Empirical evidence

In this section, we intend to determine whether the Senegalese allocation system conforms to the dictates of the normative theory and if this system eliminates politically motivated targeting of transfers. We first investigate the institutional background of intergovernmental transfers in Senegal, then we specify our econometric model and strategy. Lastly, we present our principal findings resulting from the estimation of a panel data for 67 *communes* from 1997 to 2009.

3.1 Intergovernmental transfers in Senegal: Institutional background

Senegal has shown a remarkable political stability since its independence in 1960, which was strengthened by peaceful presidential transitions. Abdou Diouf served five terms as President. He was defeated in February 2000 by opposition leader Abdoulaye Wade, by direct popular vote in the majority (two-round) system. The regime of Abdoulaye Wade

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[8] Empirical work on lump-sum grants in Portugal (Pereira, 1996) supports the politico-economic hypothesis and rejects the hypothesis that economies of scale are the main explanatory cause for the observed regressivity of per capita transfers. Indeed, he shows that per capita grants decrease with the population size of communities even after controlling for the effect of economies of scale which might be captured by the density variable.

[9] In particular, Senegal has to deal with a violent separatist movement in the southern region of the Casamance.

[10] Note that Montalvo and Reynal-Querol (2005) suggested that ethnic polarization measures are more appropriate than fractionalization indices to capture social conflict.

follows four decades of Socialist Party rule. He was re-elected in February 2007, at the end of the seven-year term.[11] Local governments are directly elected by local population from a list in one round. Local elections occurred, the same day for all *communes,* in March 2002 and 2009.[12] The fact that the voice of the opposition was loudly heard in the latest local elections, including the defeat of Wade's own son, Karim, in Dakar, could be a sign that Senegal's democracy remains relatively strong. Our dataset covers all national and local elections which occurred in the period 1997-2009.

Decentralization has been implemented since the beginning of the independence in 1960 to move government closer to citizens. However, 1990 marked a turning point in the process with the abolition of the tutelary power of the center within the *communes*' executive. The last step is constituted by the adoption in 1996 of the new laws of decentralization: law 96-06 carrying the Local Government Code, law 96-07 defining transferred competencies, and law 96-09 fixing the territorial administration. Senegal is divided into eleven regions (*régions*) which are subdivided into 67 *communes*, 43 *communes d'arrondisements* which are further divided into 320 *communautés rurales*.[13] Local governments are endowed with legal personality and benefit from the administration principle according to which local jurisdictions manage themselves freely by elected councils. The *commune* has to ensure the best living conditions for the whole population.[14] The competencies of Senegalese *communes* range from the maintenance of communal properties or the management of local public works to environmental protection with, for instance, the adoption of measures limiting pollution, and include the management of local employments and assistance to places of worship. Table 1 presents Senegalese *communes'* revenue sources and their evolution. Local own-revenue represents around 85% of local resources and are divided into tax and non-tax own-revenue. The first one is mainly constituted by taxes on property, patent, advertisement, water, electricity and waste removal while the second one is related to the public domains' occupation (markets, car parks, tow pound...) and to some administrative services. Central transfers represent around 10% of the total local resources and have become more important in ab-

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[11] Since 2007, the president is elected for a five-year term renewable once.

[12] Local officials are elected for a six-year mandate but local elections, initially planned for May 2008, were reported in March 2009 due to the modification of the regional administrative zoning.

[13] There is also an administrative level between regions and *communes*: the departments (*départements*) but they are managed by a representative of the central government.

[14] See law 96-06 with the Local Governments Code.

solute terms. One of the main features of fiscal decentralization in Senegal is the increasing level of revenue at local level. However, local resources remain insufficient to provide local basic public services[15] and important inequalities appear between *communes*: the resources of the ten poorest *communes* represent 1 % of the resources of the five richest ones. There is also an important variability across jurisdictions, which stays relatively constant over time. In 2009, *communes* such as Ranerou, Oussouye and Foundiougne received more than four times the national average, while other jurisdictions like Pikine or Bargny received a transfer per capita ten times smaller than that amount.

State subsidies should mitigate the lack of resources and reduce horizontal fiscal imbalances. The design and implementation of transfers deserves serious concern, in particular, in developing countries (see Bird and Smart, 2002, for a survey of central transfers systems adopted in a number of developing countries). Senegal employs a formula-based resources allocation mechanism. Finances law fixes a minimum amount of transfers as an annual percentage of central tax revenue. This then amount depends on a percentage of the Value Added Tax collected for the benefit of central government. Transfers are distributed between local authorities according to criteria annually fixed by decree after consulting the National Council of Development of Local Authorities. This council, in charge of the follow-up of the decentralization process, is constituted by the Senegalese President, the members of the government and representatives of deconcentrated services of the central government and of local governments. The allocation's criteria are twofold. First, there is a compensation criterion: around 80% of the total transfer is distributed according to the cost of local public spending induced by the transfer of competences and responsibilities from the central government to the local authorities. In practice, the central government only considers spending made by the local government the previous year. Second, the rest of the amount is divided into two parts; a first part (70 %) is distributed in equal shares between jurisdictions and a second part (30 %) is distributed towards the demographic importance of each jurisdiction.

Our empirical work will help to determine if these criteria are sufficient to allow an efficient and equitable distribution of resources and to forbid the incentives of politicians to divert resources for personal gain.

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[15] Tax own-revenue of all *communes* represents on average only 6 % of the central tax revenue

3.2   The basic empirical model

To test whether the allocation of transfers is influenced by economic considerations and the presence and the nature of any politically motivated targeting of resource, we use the general empirical framework followed in the literature (Boex and Martinez-Vazquez, 2005). Per capita amounts of transfers received by a local government are regressed upon sets of equity/efficiency and public choice variables that may impact center's fiscal decision.

To determine whether the Senegalese system conforms to the dictates of the normative theory we consider fiscal incapacity and expenditure needs. We first examine the impact of a local government's fiscal incapacity on the size of the transfers it receives by using a DHS poverty index (see the following section 3.3.1). If equity concerns are at play in the allocation of transfers, we should find a positive coefficient associated with fiscal incapacity. Second, we include local expenditure needs and costs in our econometric model (efficiency principle). The variables that are generally used to measure local expenditure needs are demographic variables such as the size of the school-aged population, the economically dependent population, or urbanization (Meyer and Naka, 1999, Wallis, 1998).[16] The population density is also commonly used to measure the per capita cost of providing local public goods.[17] We retain two variables; urbanization rate and population density. While we unambiguously expect a negative coefficient associated with population density, it is not possible to know *a priori* which of rural or urban sets of needs dominate.[18]

We then consider the influence of electoral concerns in the allocation of grants. We introduce a qualitative dummy variable that indicates if the central and local governments are of the same political party. This variable allows us to test the existence of patronage and Cox (1986) model, according to which the optimal strategy of political candidates is to favor their supporters. We also include a variable that measures the difference in vote shares expressed in absolute values between the central government party and its main opponent,

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[16] Generally, instead of using physical infrastructure measures such as hospital beds or the number of schools, it is preferable to measure the number of citizens with a certain need, such as infant mortality or school-aged population, which are free from incentive problems.

[17] Presumably, the lower the population density in a jurisdiction, the higher the unit cost of delivering social services, since the provision of public services increases with a more dispersed population. It may also be more costly to deliver government services across a larger land area.

[18] Indeed, rural areas may suffer from inadequate transport or electrification while urban areas have special needs associated with congestion, pollution or urban blight (Treisman, 1996).

in the last local election in each *commune* (see Case, 2001 and Dahlberg and Johansson, 2002).[19] With this variable, we test the prediction that swing *communes* are targeted by the incumbent party. Moreover, two dummy variables for elections, central and local, are included in order to account for time-periods when ability to purchase political capital may vary from the norm (Veiga and Pinho, 2007). Since elections are held at the beginning of the year, we consider the year before elections. Following the prediction of Worthington and Dollery (1998), local and national election years should exhibit a positive and negative coefficient, respectively.

Lastly, we introduce the number of deputies represented by departments, a local government with larger political representation per capita being expected to extract larger per capita transfer. We also consider the relative population size of the *commune* to test the existence of a bias in favor of smaller jurisdictions. In the particular context of a developing country, central decisions may also concern ethnic fractionalization, transfers being a potential instrument to avoid local conflicts.[20]

Finally, we define the following empirical model:

$$Transfers_{it} = \beta Normative_{it} + \varphi Electoral_{it} + \gamma Political_{it} + \varepsilon_{it}, \tag{1}$$

Indicators used for each category are summarized in Table **2**.

3.3 Econometric framework

Before introducing our econometric strategy, we present our composite measure of local fiscal incapacity, based on a DHS poverty index.

3.3.1 An indicator of local incapacity

Following studies that rely on composite measures of local incapacity, we propose to estimate a poverty index using the 1997 and 2005 DHS with their geographic data.[21] Due to the abundance of household survey data on asset ownership and the considerable biases measurement

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[19] Two main concepts are used in the literature. Swing voters are defined as those with weak party preferences, while swing jurisdictions are those where the distance of vote shares between the central government party and its main opponent is minimal. We focus on the second one.

[20] We also consider ethnic polarization (Montalvo and Reynal-Querol, 2005).

[21] It represents around 8000 representative households for each survey.

error associated with reported income or consumption, a substantial body of literature has developed an asset-based measure of wealth. Filmer and Pritchett (2001) concluded that the DHS wealth index actually performed better than the traditional consumption or expenditure index in explaining differences in economic status. Hence, in the footsteps of Filmer and Pritchett (1999) and Sahn and Stifel (2003), we compute a composite poverty indicator from the DHS surveys.[22] However, since the DHS wealth index has been criticized as being too urban in its construction, we propose, as suggested by Rutstein (2008), to produce a single national-level composite index from wealth indexes that have been separately constructed for the urban and rural areas. Table 3 summarizes the assets included in the Principal Components Analysis (PCA)[23] for each index and their coefficients for the DHS 2005.[24] Conversion adjustments are made to map urban and rural indexes onto the national index.[25] Then, we divide the national index into quintiles of the national household population and determine the percentage of the poor in each department. Table 4 gives the 'profile' of a household that belongs to the first quintile in 2005 and Figures 1 gives the percentage of poor households by region.

3.3.2 Econometric issues and strategy

Our econometric model is quite similar to those considered in the literature and suffers from several defects. We then present our econometric strategy.

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[22] The general methodology used to calculate the wealth index is given in Filmer and Pritchett (2001). The specific approach used in the DHS is described in Rutstein and Johnson (2004).

[23] It is a technique for extracting from a set of variables those few orthogonal linear combinations of the variables that capture the common information most successfully (for a detailed explanation, see Filmer and Pritchett, 2001).

[24] Based on descriptive statistics, we thought that possession of most livestock would be exclusively rural and some other items such as computer or internet access would be exclusively urban. The construction of the national index uses the set of indicator variables that the rural and urban areas have in common and is restricted to those that correlate with wealth in the same direction

[25] The level and distribution adjustment values are found by regressing the value of each household's area-specific index scores onto its national index score. For instance, with the DHS 2005, we have:

$$Urban \quad : \quad WIn = 0.24 + 0.41 WIu \tag{2}$$

$$Rural \quad : \quad WIn = -1.09 + 0.37 WIr \tag{3}$$

where $WIn, WIu,$ and WIr are the national, urban-specific, and rural-specific wealth index scores, respectively. We also use a quadratic form of the regressions since it improves the fit a little.

Econometric issues   First, we correct for all time-invariant community characteristics, observed or unobserved, and all 'year effects'.[26] Local governments differ in ways that are captured only imperfectly by our economic and political variables and these persistent differences may produce significant differences in transfers. So, we include a *commune*-specific effect, α_i. Then, omitted variables that vary over time but are constant between *communes* can influence the amount of transfers available and received and, at the same time, the fiscal capacities of *communes*. By introducing time dummies (T_t) we correct this potential endogeneity bias due to omitted variables. We should limit the artificial positive correlation between the fiscal capacity and transfers, both increasing because of their common correlation with a third variable, for instance, the national economic conjuncture.[27] Second, we consider endogeneity bias due to reverse causality. This turns out to be important for a number of variables, especially for fiscal incapacity. Indeed, local spending, in part financed by central transfers, may reduce local poverty. Hence, if jurisdictions with higher transfers tend to have higher fiscal capacity, then, estimates will show that jurisdictions with higher fiscal capacity receive larger transfers. However, in our case, the fiscal incapacity index represents a more permanent status than does either income or consumption so that transfers at time t probably cannot affect the level of wealth at time t. If doubts remain, we propose to use the lagged value of fiscal incapacity indicator to test the robustness of our estimations. Concerning political variables, if we believe that politicians use public resources to buy support, we must also believe that transfers have an effect on electoral results. However, since we use values of electoral outcomes that are determined before the start of a fiscal year, transfers are unable to affect past results so that the coefficient of political affiliation variable should not be biased. We could also consider the possibility of a 'vote with feet', where people are encouraged to migrate when they perceive situations to be better in another jurisdiction, such as a higher level of transfers. However, we think that this potential bias is limited since Tiebout's model rests on assumptions of perfect mobility and information, which are seldom found in developing countries (Bardhan, 2002). Finally, since we regress central transfers on explanatory variables of which some are observed on a more aggregate level, we introduce

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[26] Fiscal transfers have an important characteristic to lead a relevant statistical analysis: their amount varies significantly over time, allowing the use of panel econometric methods.

[27] When we introduce dummy variables for election years we cannot introduce time dummies, so we will add T_t, a trend variable which accounts for the common trend in local governments' transfers.

department cluster (Moulton, 1990).

Econometric strategy   A panel data approach allows us to control for the potentially large number of unmeasured explanatory variables by estimating a 'fixed-effects' (FE) model. However, the FE model does not allow the estimation of time-invariant variables and results from its inefficiency in estimating the effect of variables that have little within variance (Baltagi, 2001, Wooldridge, 2002, Hsiao, 2003).[28]   In order to assess coefficients of time-constant or rarely changing variables, and to control for *commune* specific effects, we propose to use the FEVD estimator developed by Plümper and Troeger (2007).[29]   This estimator, based on a three-step procedure, allows a decomposition of the unit fixed effect (α_i) into two parts; a part explained by the time-invariant variables and an unexplained part, $\widehat{h_i}$.[30] Regression (1) becomes:

$$Transfers_{it} = \beta Normative_{it} + \varphi Electoral_{it} + \gamma Political_{it} + T_t + \widehat{h_i} + \varepsilon_{it}, \qquad (4)$$

Based on Monte Carlo simulations, Plümper and Troeger (2007) find that the vector decomposition model performs far better than pooled OLS, Random-Effect (RE), and the Hausman-Taylor procedure.[31]

To capture the potential persistency in central transfers, we also consider the dynamic version of our model by introducing the lagged dependent variable. This yields the inconsistency of fixed-effect estimators (see Nickell, 1981) so that we use the GMM-System estimator (Blundell and Bond, 1998).

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[28] In our case, for instance, ethnic variables, which are time-invariant variables, are dropped in the fixed effect model so that it is impossible to determinate whether these variables affect the allocation of fiscal transfers.

[29] Rarely changing variables are defined as having a low within variance. Our variables of political and ethnic factors, fiscal capacity, urbanization rate and population are rarely changing variables with a little within variance.

[30] A formal explanation of this estimator is given in Plümper and Troeger (2007).

[31] An alternative answer to assess coefficients of time-constant variables and to control for *commune*-specific effects is to use a RE model. However, this estimator implies orthogonality between explanatory variables and the error term, a hypothesis that does not seems to be relevant in our case. The Hausman test actually confirms that we should use FE estimators.

3.4 Data and estimation results

Data for this study come from a variety of sources. Data on fiscal transfers are drawn from the *Municipal Development Partnership*, and local characteristics like population, area, urbanization rate and ethnic composition come from the *General Population and Housing Census* and from the *National Institute of Statistics and Demography* of the *Ministry of the Economy and Finance* of Senegal. The results of legislative elections come from the *National Assembly* and the results of local elections come from the *Independent National Electoral Committee.* We constructed a panel data for 67 *communes* from 1997 to 2009.[32]

Table 5 gives estimation results. First, we test the static model with the FEVD estimator. To test the robustness of our estimations, we introduce progressively a trend (2) and a department cluster (3), we use alternative indicators (4),[33] the lagged value of the fiscal incapacity indicator (5) and year dummies instead of the trend variable (6). Then, we estimate the dynamic model with one-step robust GMM-System estimator (7).[34]

Does the central government assist jurisdictions with poor tax bases and greater socio-economic needs as it should according to normative guidance? Equity concerns seem not to be at play in determining the allocation of fiscal transfers. Indeed, we find a negative and significant coefficient associated with our indicator of fiscal incapacity indicating that poorer local governments receive smaller intergovernmental transfers. This result is consistent with most empirical studies (Kraemer, 1997, Alm and Boex, 2002, Wallis, 1998, Meyer and Naka, 1999). Estimation results support the hypothesis that expenditure needs have an effect on transfer allocation. Indeed, the urbanization rate is negatively correlated with fiscal transfers suggesting that transfers alleviate special rural problems. However, population density, used to measure the per capita cost of providing local public goods, seems to be positively correlated with fiscal transfers, probably capturing urban needs since a higher

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[32] Note that, when we introduce the number of representatives in parliament, the panel data include data for 67 *communes* from 1998 to 2009 since we only have results of legislative elections since 1998. When we consider political affiliation variables, the panel data include data from 2002 to 2009 since we have local election results for 2002 and 2009.

[33] We consider PS_{it}, the score of the president in office at the previous local election instead of PA_{it} and ethnic polarization, EP_{it}, instead of EF_{it} (see Table 3).

[34] We assume the weak exogeneity of the lagged dependant variable and the strict exogeneity of other explanatory variables. The lagged levels of variables are instruments in regressions in level as well as in regressions in difference. Following Roodman (2009) we collapse instruments and limit their number to avoid non optimal weight matrix, biased standard errors, and incorrect overidentification tests. With the Hansen test and AR(2) test, we conclude that orthogonality conditions are respected.

degree of urbanization is generally associated with higher population density.

Is the allocation of fiscal transfers also guided by political logic despite the formula-based system? Our results actually suggest that normative guidance is not the only motivation that determines the distribution of grants across *communes*. First, as regards electoral concerns, while supporter *communes* do not appear to receive more transfers, greater resources seem to be provided to local governments that are more swing. Indeed, coefficient associated with our proxy for swing *communes* is always negative and significant at 1% level. Contrary to the findings of Case (2001) and Miguel and Zaidi (2003), the center does not seem to target more resources to its supporters. Transfers are not targeted to areas in which political support is concentrated to maximize return in terms of votes, as predicted by Cox (1986). Our result is closer to Cole (2009), who finds that politicians, who care about winning election, target swing jurisdictions. It also reinforces the findings of Banful (2010) suggesting that swing districts can be targeted in an African context. We cannot clearly confirm the predictions of Worthington and Dollery (1998). Indeed, the year before national election is negatively but not always significantly correlated with grants and coefficient associated with the year before local elections is positive but rarely significant. Second, other political and ethnic considerations play important roles in the distribution of per capita transfers across *communes*. This last point is confirmed by the positive association between transfers and political economy determinants such as representatives in parliament, population and ethnic fractionalization. Indeed, greater representation per voter seems actually to result in greater per capita transfers, which is consistent with empirical findings in the literature (Wright, 1974, Porto and Sanguinetti, 2001, Khemani, 2007). Population is generally negatively and significantly correlated with fiscal transfers, probably denoting a disproportionate lobbying power of smaller *communes*. Beyond the effect of political considerations, ethnic fractionalization is positively correlated with per capita fiscal transfers. It indicates that the central government may use transfers as a pacification instrument as Treisman (1996) suggested.

Our results are robust to the introduction of a trend variable, a cluster department and year dummies. Moreover, the impact of fiscal incapacity remains negative when we correct for potential simultaneity bias and our conclusions do not change when we use alternative indicators of political affiliation and ethnic fractionalization. Finally, our findings are similar

when we consider the dynamic model even if the lagged dependant variable appears to be not significant, which is not surprising in a context of developing country where central transfers are instable.

4   Conclusion

This paper exploits an original public finance panel data allowing us to test political economy theories of fiscal transfers for a developing country, Senegal. The estimation of a panel data for 67 *communes* from 1997 to 2009 suggests that the allocation system in Senegal does not conform to the dictates of normative theory. In particular, equity concerns do not appear to affect the allocation of intergovernmental fiscal transfers. On the contrary, wealthier local governments seem to receive greater intergovernmental transfers. Moreover, our results tend to show that the allocation of transfers follows a tactical redistribution by targeting swing *communes* and to confirm that local governments with more political power receive larger transfers. The Senegalese case also emphasizes the importance of ethnic considerations and the fact that the central government may use transfers as a tactical instrument to pacify fractionalized areas. Our findings are consistent with those observed in other countries. Indeed, intergovernmental transfers are generally allocated in a needs-equalizing way but are counter-equalizing when it comes to fiscal capacity, and political economy factors are consistently a driving force in determining the distribution of intergovernmental fiscal transfers.

Our work adds to empirical evidence from around the world that has shown several instances in which politicians in central government make fiscal decisions by optimizing their electoral objectives and being influenced by political factors beyond economic considerations. It shows that results found for developed countries can actually be observed for a developing country. This study also highlights that an allocation system based on a formula can be insufficient to eliminate politically motivated allocation of transfers. Eliminating discretion seems to require more than a formula. Delegating responsibility for the distribution of resources across local governments to an independent agency could help to mitigate such distortions (Khemani, 2007).

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Figure 1 : Percentage of poor households by region
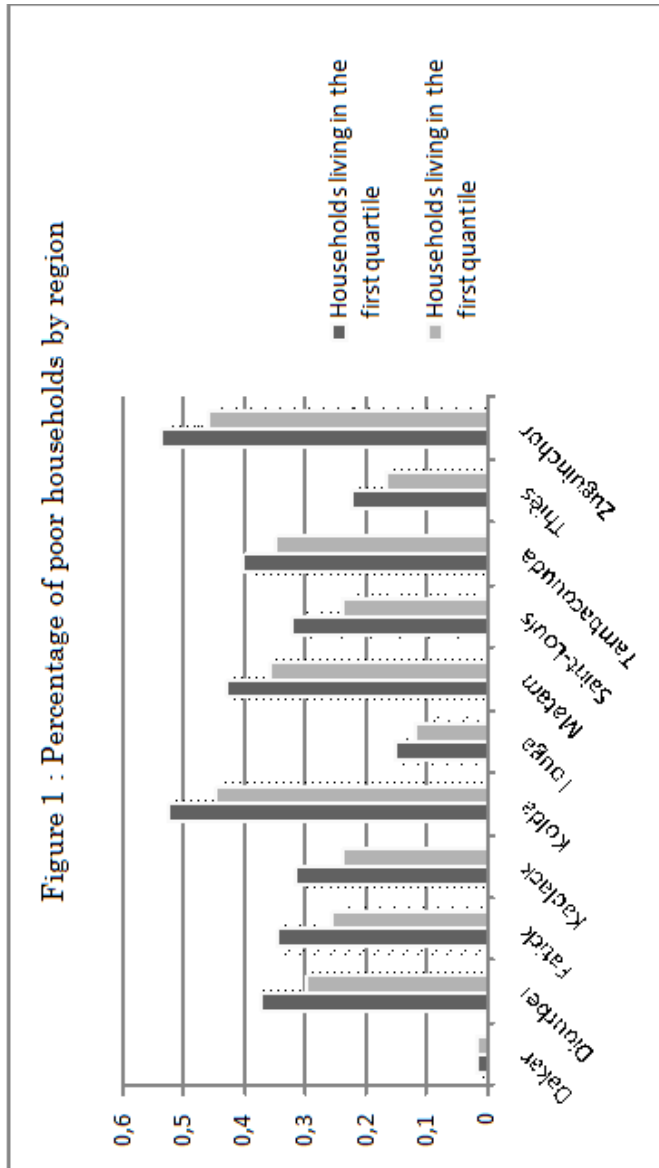
Table 1: Local revenue of Senegalese *communes* (thousand FCFA)

Years	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Global local revenue	18,732	14,662	36,736	21,189	26,000	27,885	35,419	37,982	43,601	47,443	44,629,219	49,422,824
Local non-tax own-revenue	3,758	4,791	6,361	3,018	4,223	4,919	7,690	5,899	6,429	6,551	4,532,498	4,632,061
% of global local revenue	0.20	0.33	0.17	0.14	0.16	0.18	0.22	0.16	0.15	0.14	0.10	0.09
Local tax own-revenue	11,975	7,157	24,249	13,799	17,066	17,516	21,100	23,182	29,131	30,218	32,404,777	28,507,351
% of global local revenue	0.64	0.49	0.66	0.65	0.66	0.63	0.60	0.61	0.67	0.64	0.73	0.58
Total transfers	2,736	2,119	4,539	2,799	3,051	3,120	3,465	5,466	4,307	4,939	5,162,657	5,548,490
% of global local revenue	0.15	0.14	0.12	0.13	0.12	0.11	0.10	0.14	0.10	0.10	0.12	0.11
including central transfers	2,733	2,073	3,549	1,935	2,763	2,705	2,647	4,711	3,525	4,092	4,263,776	4,916,264
% of global local revenue	0.14	0.14	0.10	0.09	0.11	0.10	0.07	0.12	0.08	0.09	0.10	0.10
Other resources	263	594	1,585	1,571	1,658	2,329	3,163	3,433	3,732	5,733	2,529,285	10,734,921
% of global local revenue	0.01	0.04	0.05	0.08	0.06	0.08	0.08	0.09	0.08	0.12	0.05	0.21

Table 2: Determinants of the horizontal allocation of per capita local government transfers

Variables	Indicator used
Central transfers	T_{it} , per capita amount of transfers received by a *commune* i on year t.
Normative factors	
Fiscal incapacity	We evaluate the revenue incapacity, RI_{dt} , using the DHS Wealth Index (see section 3.3.1) in department d on year t.
Expenditure needs	U_{dt} , the urbanization rate in department d on year t, defined as the percentage of population living in urban area,
	D_{it} , the population density in *commune* i on year t.
Electoral concerns	
Patronage	PA_{it} , a dummy variable which takes the value one if *commune* i has the same political affiliation as the president in office.
	We consider alternately PS_{it}, the score of the president in office at the previous local election.
Tactical distribution	DV_{it} measures the difference in vote shares expressed in absolute values between the central government party and its
	main opponent, in the last local election in each *commune*.
Opportunistic cycles	EN_{t-1} and EL_{t-1} are dummy variables, which take the value one the year before of national and local election, respectively.
Other political factors	
Political representation	N_{it}, the number of representatives in parliament by department d on year t.
Population size	P_{it} , the population size of the jurisdiction i on year t.
Ethnical factors	EF_{it} , the ethnic fractionalization in *communes* i on year t defined as the probability that two individuals randomly drawn from a jurisdiction
	are from different ethnic group. We also consider alternative indicator by using ethnic polarization, EP_{it}.

Table 3: The DHS Wealth Index : rural (ru), urban (urb) and national (na) indexes

Only rural	ru	Only urban	urb	Both but different effects	ru	urb	Both and similar effects	ru	urb	na
Plough	+0.30	Refrigerator	+0.28	Sheep	+0.29	-0.09	Radio	+0.20	+0.11	+0.12
Horse	+0.33	Telephone	+0.25	Poultry	+0.15	-0.003	Television	+0.21	+0.09	+0.34
Cow	+0.25	Antenne 5 tv	+0.27	Bicycle	+0.04	-0.04	Cell phone	+0.21	+0.22	+0.28
Donkey	+0.27	Canal tv	+0.04				Cooker	+0.07	+0.14	+0.19
Hand cart	+0.40	Washing machine	+0.26				Motorcycle /scooter	+0.13	+0.04	+0.07
		Video	+0.12				Car /truck	+0.14	+0.18	+0.17
		Air-conditioner	+0.14				Commercial van/truck	+0.08	+0.05	+0.05
		Computer	+0.06				Boat	-0.04	-0.003	-0.01
		Internet access	+0.03				Source of drinking water	-0.03	-0.18	-0.26
							Time to get to drinking water	-0.001	-0.06	-0.07
							Type of toilet facility	-0.08	-0.20	-0.29
							Has electricity	+0.12	+0.29	+0.37
							Share toilet with others	-0.05	-0.07	-0.04
							Means of sewage disposal	-0.03	-0.22	-0.29
							Means of disposing of water	-0.005	-0.21	-0.24
							Frequency of water outages	+0.03	+0.10	+0.17
							Duration of water outages	+0.02	+0.07	+0.12
							Main material of the floor	+0.14	+0.17	+0.30
							Type of cooking fuel	-0.07	-0.10	-0.07
							Have bednet for sleeping	+0.02	+0.06	+0.03
							Place for hand washing	-0.04	-0.07	-0.10
							Items present : water tap	+0.10	+0.15	+0.19
							Items present : soap	+0.08	+0.14	+0.22
							Items present : basin	+0.08	+0.01	+0.04
							Number of rooms for sleeping	+0.32	+0.12	+0.04

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Table 4: Profile of a household who belongs to the first quintile in 2005

	Mean		Mean
Plough	0.09	Motorcycle /scooter	0.01
Horse	0.07	Car /truck	0.001
Cow	0.11	Commercial van/truck	0.002
Donkey	0.13	Boat	0.04
Hand cart	0.04	Source of drinking water	20.39
Refrigerator	0.01	Time to get to drinking water	49.92
Telephone	0.01	Type of toilet facility	25.24
Antenne 5 tv	0.001	Has electricity	0.07
Canal tv	0.001	Share toilet with others	0.22
Washing machine	0.001	Means of sewage disposal	4.15
Video	0.003	Means of disposing of water	6.92
Air-conditioner	0.002	Frequency of water outages	0.84
Computer	0.003	Duration of water outages	0.41
Internet access	0	Main material of the floor	18.10
Sheep	0.41	Type of cooking fuel	9.27
Poultry	0.59	Have bednet for sleeping	0.41
Bicycle	0.15	Place for hand washing	1.31
Radio	0.71	Items present : water tap	0.50
Television	0.03	Items present : soap	0.28
Cell phone	0.06	Items present : basin	0.55
Cooker	0.11	Number of rooms for sleeping	2.61

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Table 5: Estimation results - Fixed effects vector decomposition and GMM-System

Dep. var.: Per cap. transfers		(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Lagged dependant variable							0.060
								(0.04)
Normative factors	Urbanization rate, U_{dt}	-0.025***	-0.017***	-0.017***	-0.010**	-0.015***	-0.016***	-0.014***
		(0.006)	(0.001)	(0.003)	(0.004)	(0.004)	(0.001)	(0.004)
	Population density, D_{it}	0.539**	0.177*	0.177**	0.180**	0.162**	0.045	0.194*
		(0.19)	(0.11)	(0.06)	(0.07)	(0.07)	(0.04)	(0.10)
	Revenue incapacity, RI_{dt}	-3.185***	-1.287***	-1.287**	-0.853*	-0.732*	-0.314*	-1.771**
		(0.81)	(0.46)	(0.52)	(0.46)	(0.24)	(0.21)	(0.89)
Electoral concerns	Political affiliation, PA_{it}	0.139	0.065	0.065	0.001	0.015	0.116	0.364
		(0.15)	(0.11)	(0.06)	(0.01)	(0.08)	(0.08)	(0.23)
	Difference in vote shares, DV_{it}	-1.526***	-1.390***	-1.390***	-1.531***	-1.522***	-1.134***	-1.721***
		(0.27)	(0.21)	(0.11)	(0.10)	(0.16)	(0.26)	(0.70)
	National elections, EN_{t-1}	-2.161	-3.166	-3.166***	-3.166***	-3.174***	-	-3.243***
		(3.46)	(2.23)	(0.45)	(0.45)	(0.50)		(0.13)
	Local elections, EL_{t-1}	1.540	0.268	0.268	0.268	0.377	-	0.459**
		(3.75)	(0.64)	(0.37)	(0.37)	(0.38)		(0.19)
Other political factors	Representatives, N_{it}	2.234***	1.057**	1.057***	1.079***	0.971**	0.372***	1.406***
		(0.58)	(0.38)	(0.39)	(0.40)	(0.38)	(0.06)	(0.24)
	Population size, P_{it}	-0.283***	-0.172**	-0.172***	-0.177***	-0.160***	-0.046	-0.309***
		(0.07)	(0.05)	(0.04)	(0.03)	(0.04)	(0.04)	(0.08)
	Ethnic fract., EF_{it}	2.429***	1.913***	1.915***	2.420***	1.927***	1.818***	1.674*
		(0.37)	(0.44)	(0.34)	(0.72)	(0.32)	(0.31)	(1.07)
	Trend variable T_t	-	1.339***	1.339***	1.339***	1.385***	-	1.360***
			(0.49)	(0.12)	(0.12)	(0.13)		(0.04)
	Residual of the 2nd stage	1.397**	1.000***	1.000***	1.00***	1.00***	1.00***	-
		(0.39)	(0.19)	(0.20)	(0.19)	(0.20)	(0.05)	
	Constant	-2.910	-11.14***	-11.14***	-12.61***	-11.72***	-	-11.316***
		(2.56)	(2.11)	(0.96)	(1.41)	(1.06)		(1.23)
	Number of observations	351	351	351	351	331	351	283
	Adjusted R^2 [AR(2) test for (7)]	0.70	0.80	0.80	0.80	0.80	0.96	0.430
	F-Statistic [Hansen test for (7)]	34.82	50.73	140.07	281.39	6473.35	968.43	0.890
	Cluster	no	no	yes	yes	yes	yes	yes
	Years dummies	no	no	no	no	no	yes	no

Controls for serial correlation of the error term, ar1 Cocchrane-Orcutt transformation. Robust standard errors are in brackets.***: coefficient significant at 1 % level, **: at 5 % level, *: at 10 % level