

# Local electoral rules and public expenditure composition: The case of Italian regions

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Using a panel of Italian regions over the period 1986-2004, the purpose of the paper is to analyse the effects produced by local electoral systems on expenditure composition. In line with the theoretical predictions, the estimation results show a robust and significant cut in broad-based regional current transfers expenditure when the regional electoral system moves from being proportional to mixed. Analogous evidence is found for the share of regional current transfers spending distributed to local interest groups, such as households and firms. Although not particularly robust across different empirical specifications, an increase in the regional expenditure on local public goods is found when the regional electoral system becomes mixed.

**Keywords:** local institutional design; public expenditure composition; regional government

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## 1. Introduction

The theoretical literature has shown that electoral rules play a significant role in the composition of public expenditure (Persson and Tabellini, 1999, 2000; Lizzeri and Persico 2001; Milesi-Ferretti et al., 2002, Ticchi and Vindigni 2010). A common prediction of the theoretical models is that, when an electoral system moves from being purely proportional towards purely majoritarian, one may expect an expansion of expenditure targeted on specific interests groups in the geographical constituency to the detriment of broad-based expenditure devoted to satisfying a general interest in the population. A growing number of empirical studies have tested this theoretical prediction by analysing the effects of *national* electoral rules (Persson and Tabellini, 1999, 2001; Milesi-Ferretti et al., 2002; Shelton, 2007, Baraldi, 2008; Gagliarducci et al., 2011). Most of them have used aggregate cross-countries data. Little attention has been paid to the analysis of the local dimension in order to test the theoretical prediction. However, the effects produced by *local* electoral rules on the expenditure composition of sub-national governments may have stronger implications because of the smaller distance between local government and voters, which may exacerbate political competition, making the effects of the local electoral system on regional expenditure composition more pronounced. Moreover, analysis of the local context may be more accurate in testing the theory because of the homogeneity of within-country data in terms of the institutional setting, socio-economic and fiscal aspects. The within-country data on public expenditure are also more detailed, and this allows for better identification of the targetable nature of expenditure and a more truthful empirical test.

The paper contributes to the current empirical literature by investigating the effects produced by regional electoral rules on expenditure composition of Italian regions. Moreover, it contributes to study the effects produced by a mixed-electoral system based on

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proportional system accompanied to a majority bonus. In 1995<sup>1</sup> this electoral rule was introduced in each 'Ordinary Statute Region' and in 2001<sup>2</sup> in the 'Special Statute Regions' of Friuli Venezia-Giulia, Sardinia and Sicily.<sup>3</sup> About 1/5 of the Italian regional seats were distributed according to a majoritarian bonus whereas the remaining 4/5 of regional seats were distributed according to a proportional rule. Although the shift from the proportional system towards majoritarian system is only partial, the majority bonus would be fairly incisive in the regional votes-seats distribution, guaranteeing larger majorities and the long-term stability of the regional governments. In other words, the majority bonus makes the difference in the political set-up of Italian regional governments. Therefore, in spite of its hybrid nature and complex architecture, the Italian regional mixed-electoral system represents an original and interesting case study for examining the theoretical prediction. The paper also provides a useful comparison between the indirect effects produced by both national and regional electoral rules on the categories of regional public expenditure that most likely reflect geographically-targeted and broad-based spending at regional level, such as current expenditure on local public goods and current transfers expenditure, respectively. This comparison should throw light on the degree of spending targetability across multi-level structures of government. A previous study by Baraldi (2008) has been focused on the indirect effects produced by the *national electoral system* on Italian regional public consumption expenditure. Overall, Italy is a good case with which to test the theory because, in the 1990s, the electoral system moved from a proportional system towards a mixed-member system across different levels of government. The introduction of a new set of electoral rules at the national level of government in 1993<sup>4</sup> was in concurrence with the notorious 'Tangentopoli' scandal, when many Italian parliamentarians were investigated for alleged involvement in bribery. The scandal changed the Italian political scenario and important changes were made to the rules regulating the election of Italian members of parliament. By contrast, reforms in the electoral system of Italian regions were mainly motivated by the intent to obtain larger majorities and greater stability of regional governments.

There are valid reasons for exploring the Italian regional context to test the theory. It enables analysis of the effects produced by the national electoral system on regional public expenditure composition. In particular, a part of regional transfers spending is allocated to the implementation of specific policies enacted by the central government at the local level. It is therefore likely that the implementation of national policies via the distribution of regional transfers is also affected by the national electoral system, and not only by the regional one. A further reason is that the regional mixed-electoral system has made Italian regional elections more competitive (Persson and Tabellini, 1999), exacerbating political competition at local level. Furthermore, the direct election of the President of the regional executive committee<sup>5</sup> has made regional governments more accountable to voters in terms of fiscal policies implementation. It is likely that both aspects have reinforced the effects of local electoral rules

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<sup>1</sup> Law 43/1995.

<sup>2</sup> Constitutional Law 2/2001.

<sup>3</sup> Italian regions are known as the 'Ordinary Statute Regions' (OSRs) whereas the regions of Friuli Venezia-Giulia, Sardinia, Sicily, Trentino Alto-Adige and Valle D'Aosta are known as the 'Special Statute Regions'. The institution of the 'Special Statute Regions' (SSRs) was due to the presence of ethno-linguistic differences, geographical border problems and/or secessionist movements. By virtue of their special statutes, these regions have greater autonomy than the 'Ordinary Statute Regions' in terms of legislative and fiscal powers.

<sup>4</sup> Laws 276/1993, 277/1993.

<sup>5</sup> Constitutional laws 1/1999 and 2/2001 have introduced the direct election of the President of the regional government who has greater responsibility for executive policy decisions as well as the power to appoint and to remove members of the executive committee.

on regional public expenditure, making the Italian regional context an interesting case study. Secondly, Finally, the fiscal reforms introduced in the 1990s and in 2000<sup>6</sup> have gradually made regional governments more fiscally autonomous<sup>7</sup>, suggesting that the rules of local electoral competition may have played a significant role in the performance of Italian regional fiscal policies.

In line with the theoretical predictions, the static panel data analysis shows a significant change in the regional expenditure composition when the regional electoral system becomes mixed. Basically, I found a shift towards the regional current expenditure on local public goods and away from the regional current transfers expenditure under a regional mixed-electoral system. An increase in the degree of votes-seats disproportionality of the regional electoral rule and/or in the percentage of seats assigned under the regional majoritarian rule produces similar evidence. The national electoral rule impacts significantly on the regional current transfers expenditure distributed to households and firms. In particular, this category of the regional current expenditure tends to grow faster when the national votes-seats disproportionality increases. The mixed results produced by the regional and national votes-seats disproportionality on the regional current transfers expenditure distributed to households and firms may be consistent with a different degree of regional spending targetability across levels of governments. On estimating a dynamic panel data specification, the effects produced by electoral rules remain robust only for the regional current transfers expenditure (to households and firms).

The rest of the paper is organized as follows. Section 2 illustrates the literature background. Sections 3 describes data and variables. Section 4 presents empirical models and results. Section 5 concludes.

## 2. The literature background

According to Persson and Tabellini's (1999) model, the architecture of the electoral system makes a difference in how political parties compete in electoral districts in order to gain voters' consensus. Basically, a majoritarian system is characterized by a large number of single-member voting districts where one candidate is elected according to the plurality rule. Persson and Tabellini (1999) show that this electoral system design induces a political party to compete only in certain 'key-marginal' districts made up of voters who are ideologically neutral (i.e., 'swing voters') and therefore easily inclined to switch their votes towards the more attractive electoral promises. To win the election, the party only needs to gain votes in

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<sup>6</sup> Starting from the 1990s financial autonomy of Italian regions, and in particular of the OSRs, has increased significantly (L. 158/1990). Different regional taxes (*addizionale regionale all'imposta erariale di trascrizione, addizionale regionale all'accisa sul gas naturale, imposta regionale sulla benzina per autotrazione*) were introduced by D.Lgs. 398/1990. In 1994 the regional tax on energy and gas for domestic uses (*imposta regionale sull'erogazione del gas e dell'energia elettrica per usi domestici*) was introduced (L. 421/1992). Measures to simplify local public finance were imposed by national law 549/1995. Some of them provided to the introduction of additional regional taxes (*tassa regionale per il diritto allo studio universitario, tributo speciale per il deposito in discarica dei rifiuti solidi*) and of an equalization fund without destination aims. A further acceleration towards regional financial autonomy was obtained by the introduction of a regional flat-tax rate on productive activities (*imposta regionale sulle attività produttive*) and of a regional income tax (*addizionale regionale all'imposta sul reddito delle persone fisiche*) by D.Lgs. 446/1997. Dispositions of D.Lgs 56/2000 imposed that State revenue transfers to the OSRs have been partially replaced by regional own tax revenues in order to fund regional expenditure.

<sup>7</sup> Using ISTAT (*Istituto Nazionale di Statistica*) data, I find that the share of the Italian regional own tax revenue on the sum of the State revenue contributions (including tax revenues from the State and State revenue transfers in lieu of tax revenues) and the regional own tax revenue is about 15% in 1995, 39% in 2000, and 44% in 2004. This picture fits well with the case of the OSRs, but it is quite different for the SSRs which have a higher degree of financial autonomy than the OSRs and about 44% in 1995, 47% in 2000, and 60% in 2004.

the key-marginal districts because it has a high probability of winning seats in the single-member districts already aligned with its ideology. The party's strategy implemented to capture the swing voters' consensus and win the election is to target transfer payments on the swing voters' preferences in the marginal voting district. Political party competition becomes less intense under a proportional system because it is spanned in one large district rather than concentrated in few key-marginal districts. The party needs to please a larger number of voters in the population to win election or, similarly, it needs to obtain more than of 50% of the total votes for being elected. Therefore, under a proportional system, the party captures a broad electoral consensus by providing a larger share of the so called 'universal' public good expenditure to voters in the population. Persson and Tabellini (1999) show that, in equilibrium, the 'universal' public good expenditure is higher under the proportional system than under the majoritarian one. Lizzeri and Persico (2001) obtain a similar result on comparing the provision of public good and monetary transfers under the 'winner-takes-all' rule and a proportional representation rule. In their model, the public good cannot be targeted on groups of voters' preferences contrarily to monetary transfers. Their model predicts that, in the unique equilibrium, the probability that the public good is provided under a proportional rule is higher than under the 'winner-takes-all' rule when the public good is particularly desirable. Finally, the theoretical model developed by Milesi-Ferretti et al. (2002) shows that in a majoritarian the median voter maximizes his utility by distorting the expenditure decisions of the government in favour of his own public goods. He makes this by electing representatives of the government who exhibit stronger preferences for higher spending on his own local public goods rather than for broad transfers spending. On the other hand, in a proportional system, the median voter prefers to elect representatives with higher preferences for broadly targeted transfers expenditure. Briefly speaking, this model predicts that expenditure on local public goods and services is higher (lower) than the broad transfers spending under majoritarian (proportional) system.

Contrary to Persson and Tabellini (1999) and Lizzeri and Persico (2001), Milesi-Ferretti et al. (2002) assume that all expenditure categories in the model are targetable to voters preferences. In particular, they assume that transfers spending (e.g. unemployment subsidies, pensions) is targetable on broad interests in the population, and public goods and services spending is targetable on geographical and narrow interest groups (e.g. local public investments, local public services). However, the identification of targetable expenditure on broad or narrow programmes is not a trivial empirical issue. In past empirical analyses, in fact, the main difficulty encountered in testing the theory has been the measurement of broadly and geographically targeted spending. Persson and Tabellini (1999) measure the broad type of expenditure as the sum of expenditure on order and safety, transportation and education as a percentage of gross domestic product (GDP). They show, on a sample of about 50 countries, that expenditure on broad programs decreases significantly under a majoritarian system. Although Persson and Tabellini's findings are consistent with their theoretical predictions, they recognize that the "predictions from our models regarding public goods should thus be investigated further, perhaps with better measures of public good provision" (p. 732). In a subsequent study (Persson and Tabellini, 2001) on 61 democracies from 1960 to 1998, they use as their indicator the share of central government expenditure on social security and welfare as a percentage of GDP and of central government current expenditure on goods and services. According to the authors, this indicator is better suited to measuring expenditure on broad-based policies: "the presumption is that broad transfer programs, like pensions and unemployment insurance, are much harder to target towards narrow geographic constituencies compared to spending on goods and services" (Persson and Tabellini, 2001, p.

12). The use of the more refined indicator also confirms the theoretical prediction that social transfers from central government are smaller under a majoritarian system. Milesi-Ferretti et al. (2002) use as their indicator of expenditure on broad programs the share of central government transfers expenditure on social security benefits for households and subsidies to firms as a percentage of GDP. The ‘broad’ nature of this kind of expenditure resides in the fact that the distribution of transfers from the central government to households and firms is made according to general eligibility criteria. All households in the country that meet these criteria will benefit from the central government transfers, as well as firms which carry out their activities in the country. The central government transfers are tailored to a generic profile of households and firms, providing a wider distribution of them across the country. By contrast, as an indicator of the geographically targetable expenditure, Milesi-Ferretti et al. (2002) use the sum of central government current and capital expenditure on goods and services as a percentage of GDP. They stress the local nature of the purchase of goods and services because citizens and firms in specific regions will be the main beneficiaries of this kind of spending. Using a sample of 20 OECD and 20 Latin American countries, they find results consistent with their theoretical model. In particular, they observe a significant increase in transfers spending due to an increase in the average district magnitude. Shelton (2007) makes use of different categories of public expenditure (education, healthcare, social security, transport, defence, transfers, government consumption, etc.) on a sample of 100 countries from 1970 to 2000. Moreover, Shelton uses the same indicator as Persson and Tabellini (1999) to define the ‘universal’ public goods spending. He finds that the majoritarian system is generally associated with a lower level of central government expenditure overall, concluding that: “Majoritarian governments do not display a clear bias towards or against any type of spending: they simply correlate with reduced expenditure across the board” (p. 2231). These studies have tested the theory using cross-country aggregate data in their empirical analysis. A different empirical strategy is implemented by Gagliarducci et al. (2011), who perform a regression discontinuity design with individual-level data on elections to the Italian House of Representatives. Their analysis shows that the representatives elected in the majoritarian system tend to target more bills on their constituency. Using Italian regional data, Baraldi (2008) shows a significant and negative relationship between the regional public consumption expenditure and the degree of votes-seats disproportionality in the national electoral system.<sup>8</sup> As additional evidence, she finds that the categories of regional consumption expenditure related to health, housing and culture tend to grow faster when disproportionality increases in votes-seats distribution at national governmental level, whereas spending on general services diminishes significantly. A recent empirical study on Swiss state and local governments conducted by Funk and Gathmann (2010) on historical data from 1890 to 2005 shows that the cantons significantly increase their welfare and education expenditure targeted on broad social groups (mainly elderly and young people) in the population after the adoption of the proportional rule at the canton level, whereas the cantons significantly reduce their transfers expenditure on roads and agricultural subsidies targeted on local and narrower interest groups.

Table 1 sums up the above empirical evidence, illustrating the indicators of expenditure composition and electoral rules employed and the main results.

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<sup>8</sup> A higher degree of votes-seats disproportionality is associated with mixed-electoral and majoritarian systems.

Tab. 1 Empirical evidence on the effects of the electoral system on expenditure composition

Author	Sample	Expenditure composition indicator	Electoral system	Electoral system indicator	Main results
Persson and Tabellini (1999)	54 countries, 1988-1992	The sum of central government expenditure on order and safety, transportation, education (and health as a broader measure) as a percentage of GDP.	National	Dummy variable (1= majoritarian system; 0= proportional system); $\{1/(\text{average district magnitude})\} \in [0, 1]$ .	More majoritarian system, lower central government expenditure.
Persson and Tabellini (2001)	64 democratic countries, 1960-1998	Central government expenditure on social security and welfare as a percentage of GDP.	National	Dummy variable (1= majority or plurality rule; 0= otherwise).	More majoritarian system, lower central government expenditure on social security and welfare.
Milesi-Ferretti, Perotti & Rostagno (2002)	20 OECD countries for the period 1960-1995; 20 Latin American countries for the period 1991-1994	The sum of general government social security benefits to households and other transfers to households as a percentage of GDP; the sum of general government consumption and government investment, net of depreciation, as a percentage of GDP.	National	Average standardized district magnitude (SM); Average district magnitude (AM); The average deviation from proportionality (RAE).	More proportional system, higher transfers expenditure.
Shelton (2007)	44 (full sample: 101) countries, from 1970-2000	The sum of central government expenditure on order and safety, transportation, education in percentage of GDP (Persson and Tabellini, 1999); other categories of central government expenditure (consumption; wages and salaries; transfers; defence, general public services, healthcare).	National	Dummy variable (1= majoritarian system; 0= proportional system) (Persson & Tabellini, 1999)	More majoritarian system, lower central government expenditure on social security, transport, transfers and public good (i.e., the sum of expenditures on order & safety, transportation, education, health in percentage of GDP, Persson and Tabellini, 1999).

Author	Sample	Expenditure composition indicator	Electoral system	Indicators of electoral system	Main results
Baraldi (2008)	20 Italian regions, 1980-2003	Regional total public consumption expenditure scaled to GDP; subcategories of regional public consumption expenditure on health, education, social services and security, economic services, defense, housing and culture, general services (scaled to total public consumption expenditure).	National	Gallagher (1993) index of votes-seats disproportionality computed for national elections.	More votes-seats disproportionality, lower total public consumption expenditure and general services expenditure; More votes-seats disproportionality, higher health expenditure and social services and security expenditure.
Funk and Gathmann (2010)	Swiss cantons and local governments, 1890-2005	Canton welfare and education expenditure (per-capita); canton expenditure on roads and agricultural subsidies (per 1,000 inhabitants).	State (canton)	Dummy variable (=1 proportional rule for election of canton legislature; 0= plurality rule).	More proportional system, higher education and welfare expenditure; lower expenditure on roads and agricultural subsidies.
Gagliarducci, Nannicini and Naticchioni (2011)	Individual-level data on Italian House of Representatives, 1994-2001	Number of bills targeted on the election region in the total number of bills presented.	National	The margin of victory in the single-member district.	Representatives elected in majoritarian system, higher share of geographically targeted bills.

### 3. Data and variables

The empirical analysis is conducted on a panel of 19 Italian regions in the period 1986-2004.<sup>9</sup> The Italian region is the highest level of local government. The government of each region is divided into three bodies (art. 121): a ‘council’, which exercises legislative powers; an ‘executive committee’, which exercises executive powers; the ‘President of the executive committee’, who is accountable for the region’s government.

#### 3.1 Public expenditure indicators

In order to capture the effective changes in regional expenditure composition, in the empirical analysis I used public expenditure indicators scaled on the regional total public expenditure. As categories of public expenditure I employed those that most likely reflect broad-based and geographically targeted spending. In particular, I considered the regional total current transfers expenditure<sup>10</sup> as a measure of broad-based expenditure because it is mainly devoted to satisfying general interests in the population.<sup>11</sup> However, since a part of it is ascribed to sub-national governments (municipalities and provinces) and other local authorities, I used a more refined indicator based on the share of the regional current transfers expenditure distributed to households and firms. This category of regional expenditure represents a small share of the total regional current transfers expenditure, about 3.7% in 2001.

$$\text{CurrTransfersExp} = \frac{\text{Current transfers expenditure}}{\text{Total public expenditure}} \%$$

$$\text{FFCurrTransfersExp} = \frac{\text{Current transfers expenditure to households and firms}}{\text{Total public expenditure}} \%$$

As a measure of geographically targetable expenditure I used the share of regional current expenditure on local public goods on total public expenditure. This kind of regional expenditure is easily targetable on particular interests groups in voting districts because of their geographic and sector specificity. I called this indicator *PubGoods*.

$$\text{PubGoods} = \frac{\text{Current expenditure in local public goods}}{\text{Total public expenditure}} \%$$

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<sup>9</sup> Only the region of Trentino Alto-Adige is excluded from the sample because the computation of the votes-seats disproportionality index for this region is not easy for the years 2003 and 2004, and it is probably less comparable with those of the other regions. In fact, Constitutional law 2/2001 (art. 4, comma f) introduced a significant change in the election of this region’s council. Members of the regional council are elected from the two provincial councils of the special autonomous provinces of Trento and Bolzano. Since 2003, therefore, regional elections of regional council members have been replaced by provincial elections.

<sup>10</sup> The regional current transfers expenditure represents a significant share of the total regional current expenditure about 89% in 2001) and of the total of regional public expenditure (about 58% in 2001).

<sup>11</sup> A large part of it is devoted to health care spending (about 73% in 2001).



### 3.2 Electoral rules indicators

Law 43/1995 enacted a reform which shifted the proportional system towards a mixed-electoral system in the OSRs. The same electoral rule was adopted by the three SSRs of Friuli Venezia-Giulia, Sicily and Sardinia in 2001 (Const. Law 2/2001<sup>12</sup>).<sup>13</sup> The regional mixed-electoral system is a two-tiers system where 4/5 of the regional council members are elected in constituencies (coinciding with Italian provinces) under a proportional rule, while 1/5 are elected from the coalition of parties (called the 'listino') which obtains the largest share of votes in the regional tier and is formed by a group of parties that obtains an overall percentage of seats below 50% under the proportional system. If this group of parties has a percentage of seats equal to or above 50%, the majority bonus is shared in the following way: 1/10 of seats are assigned to the 'listino' and 1/10 to the groups of parties not linked to the 'listino'.

In order to measure regional institutional changes, I used a dummy variable named *Majbonus* which assumes value 1 when the majority bonus is introduced in the regional proportional system and zero otherwise. This dummy variable varies across regions and over time. The effects of the regional institutional design are also captured by the effective district magnitude computed for constituencies with unequal magnitude (Taagepera, 1998). The indicator is computed for the lower-proportional tier in the following way:

$$EDM_i = \frac{\sum_j (S_{ij}^p)^2}{S_i^p}$$

where  $S_{ij}^p$  is the number of seats allocated in the  $j$ th constituency of the  $i$ th region and  $S_i^p$  is the total number of seats in the lower-proportional tier.

As a further indicator I use the percentage of seats assigned in the upper-tier (i.e. at the regional level) according to the majoritarian rule. Basically, the regional mixed-electoral rule has established that about 1/5 of seats are distributed according to the majoritarian rule. In reality, the mechanism of seats distribution according to the regional majoritarian rule is more complex and the share of seats does not always coincide with 1/5. The index is the following:

$$\text{Upper - tier seats}_i \% = \frac{S_i^m}{S_i} \cdot 100$$

where  $S_i^m$  is the share of seats assigned according to majoritarian rule in the  $i$ th region and  $S$  is the total number of seats.

The indicator used in the empirical analysis to capture the indirect effects of electoral system is the Gallagher (1991) index. The Gallagher (GHI) index of votes-seats disproportionality computed at regional level of government (*Regional GHI index*) corresponds to the following formula:

$$GHI_i = \sqrt{\frac{1}{2} \sum_k (V_{ik} \% - S_{ik} \%)^2}$$

where  $V\%$  is the share of votes (*per cent*) obtained by party  $k$  in region  $i$  and  $S\%$  is the share of seats (*per cent*) assigned to party  $k$  in region  $i$ . The GHI index ranges from 0 to 100. It

<sup>12</sup> This disposition is valid until these three regions have approved their own regional electoral laws that include dispositions of C.L. 2/2001 concerning the direct election of the President of the executive. In practice, from 2001 to 2004, the election of the regional governing bodies of these three regions took place under the same electoral rules as those of the OSRs.

<sup>13</sup> The mixed electoral system was not imposed on the SSRs regions of Valle D'Aosta and Trentino Alto-Adige. The legislator's intention was probably to guarantee ethnic-linguistic representation within the regional governing bodies of these two regions. However, Valle D'Aosta has recently approved regional law 22/2007 which provides for the introduction of a majority bonus. As regards Trentino Alto-Adige, a mainly proportional system was adopted in this region.

describes a pure proportional system when it is close to zero. By contrast, the degree of disproportionality increases when the GHI index tends to 100.

The Gallagher index is intended to capture the indirect effects since it measures the electoral outcome of the electoral law. Taagepera (2003) argues that the Gallagher index only accounts for indirect effects of electoral laws, and for this reason the ‘effective threshold’ or the district magnitude (Lijphart, 1994) should be preferred as direct measures of institutional designs. In effect, the degree of disproportionality of an electoral system is affected by various features of the electoral law, such as the magnitude of the electoral district (i.e., the number of seats allocated within an electoral district) and the electoral formula (Taagepera and Shugart, 1989; Gallagher, 1991; Lijphart, 1994; Anckar, 1997; Powell and Vanberg, 2000; Anckar and Akademi, 2001). In general, a higher degree of disproportionality is associated with a smaller magnitude of the district. In the same way, plurality and majority rules produce greater distortions in the proportionality of votes/seats representation than do proportional rules, although not in all circumstances (Anckar and Akademi, 2001). Since votes/seats disproportionality depends on different features of the electoral system, it may be inadvisable to establish a systematic association between votes/seats disproportionality and institutional design. However, this does not seem to be the point of view of Blais (1988), who argues that it is possible to classify electoral systems also accounting for their electoral outcomes. This issue is controversial in the literature and is still unresolved. Empirical studies have shown that a majoritarian system produces a higher level of disproportionality than does a proportional representation (PR) system (Lijphart, 1994; Anckar and Akademi, 2001), whereas a mixed-electoral system produces an intermediate level (Powell and Vanberg, 2000; Anckar and Akademi, 2001). Some studies have employed the Gallagher index to measure the impact of the electoral rule. For example, Baraldi (2008) uses the Gallagher index to measure the impact of national electoral rules on the growth of Italian regional public consumption spending. On replacing a majoritarian-proportional dummy variable with the Gallagher index, Lupu and Pontusson (2008) do not find any relevant difference in their results.<sup>14</sup>

Computation of the Gallagher index at regional level is rather problematic because of the two-tiers. The *Regional GHI index* underestimates the degree of votes-seats disproportionality because it accounts for the seats allocated among parties in the lower-tier and for about 1/10 of extra-seats distributed across parties not linked to the ‘listino’. Thus, it can produce misleading results in the empirical analysis. Recently, Alfano and Baraldi (2012) have adopted an adjusted version of the GHI index to measure electoral outcomes of the Italian regional mixed-electoral system. Basically, I used the disproportionality version of this index. I call it the *Adjusted (Adj.) Regional GHI index*. The formula of the revisited GHI index follows:

$$Adj. \text{ Regional } GHI \text{ index}_i = \frac{S_i^m}{S_i} \sqrt{\frac{1}{2} \sum_K (V_{i_k}^m \% - S_{i_k}^m \%)^2} + \frac{S_i^p}{S_i} \cdot \sqrt{\frac{1}{2} \sum_k (V_{i_k}^p \% - S_{i_k}^p \%)^2}$$

where

- $V^p\%$  is the percentage of votes obtained by party  $k$  in region  $i$  in the proportional-tier;
- $S^p\%$  is the percentage of seats assigned to party  $k$  in region  $i$  in the proportional-tier;
- $V^m\%$  is the percentage of votes obtained by coalition of parties  $K$  in region  $i$  in the majoritarian-tier;
- $S^m\%$  is the percentage of seats assigned to coalition of parties  $K$  in region  $i$  in the majoritarian-tier.

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<sup>14</sup> See Lupu and Pontusson (2008), footnote 25.

The *Adjusted Regional GHI index* ranges from 0 to 100. It describes a pure proportional system when the share of votes corresponds to the share of seats ( $V^P\% = S^P\%$ ) and the percentage of seats  $S^m$  assigned according to majoritarian system is zero. By contrast, the degree of disproportionality increases when the *Adjusted Regional GHI index* moves towards 100.

In Table 2 the correlation matrix of the regional electoral indexes shows that the indicators are highly correlated across them. In particular, the *Majbonus* dummy variable is correlated with *Upper-tier seats%* and the *Adj. Regional GHI index* of about 0.948 and 0.873, respectively. The indicators of the effective district magnitude is negatively correlated with the others indicators of electoral rule.

Tab. 2 Correlation matrix of the regional electoral indexes

	Majbonus	EDM	Upper-tier seats%	Reg. GHI index	Adj. Reg. GHI index
Majbonus	1				
EDM	-0.349	1			
Upper-tier seats%	0.948	-0.345	1		
Reg. GHI index	0.513	-0.320	0.461	1	
Adj. Reg. GHI index	0.873	-0.340	0.890	0.644	1

Since a part of regional current transfers spending is allocated by central government to implementing its policies at local level, it may be expected that this category of the regional expenditure can be affected by the national electoral system and not only by the regional one. The national electoral system moved from a proportional system towards a mixed-member majoritarian system in the mid-1990s. After the referendum of 18 April 1993, the mixed-electoral system was introduced. Accordingly, most Italian parliamentarians were elected by majority rule in the following form:<sup>15</sup>  $\frac{3}{4}$  of 315 senators were elected for regional districts by a majoritarian system and  $\frac{1}{4}$  by a proportional one; similarly, 75% of 630 deputies were elected by a majoritarian system and 25% by a proportional one. In the 2000s, a step backwards towards the proportional system was made for both chambers by law 270/2005, although it was accompanied by a majority bonus.

To capture changes in the national electoral rules I used the standard formula of the GHI index. In particular, the votes-seats disproportionality index was calculated in relation to Senate elections, because the seats of senators are distributed on a regional basis. I call this indicator *National GHI index*.

### 3.3 Control variables

In the empirical analysis I used control variables widely employed in this kind of literature. I control for the size of the population (*Pop*). A positive effect of population size on public expenditure is consistent with congestion effects in the provision of public services. A significant negative impact of population size on public expenditure is associated with the presence of scale economies in the public goods and services provision. The demographic

<sup>15</sup> L. 276/1993, 1.277/1993.

structure of population is also considered by means of the percentage of young people aged 0-15 (*%Pop 0-15*) and elderly people aged 65 and over (*%Pop 65+*). A positive effect of both control variables on current public expenditure is expected.

As socio-economic variables I consider the per capita gross domestic product (*GDP*) and per-capita *State transfers*, which include state revenue contributions, tax revenues from the state, and state revenue transfers in lieu of tax revenues. It can be expected that both control variables have a positive impact on regional public expenditure. However, a negative effect is also likely. Richer people ask for fewer subsidies from central and sub-national governments. Moreover, they can substitute the provision of local public services with a more efficient private goods provision. A negative relationship between *State transfers* and public expenditure may be consistent with the explanation that other forms of financial resources may be used to fund public expenditure. This relationship may be expected on analyzing Italian regional spending. In fact, since the 2000s, State revenue transfers to the OSRs (D.Lgs. 56/2000) have been partially replaced by regional own tax revenues in order to fund regional expenditure. In this sense, the control variable of *State transfers* is able to capture the effects produced by fiscal federalism reforms introduced at regional level on the side of public revenue.

Electoral cycle is captured by means of two dummy variables, *Election year* and *Pre-election year*, which assumed value 1 in the year of election and pre-election of the regional council, respectively, and zero otherwise. The timing of the regional election is not the same across regional governments. Moreover, there is no problem of endogenous elections in Italian regions because they are exogenously fixed by law.

In Table 3 the descriptive statistics of all the variables used in the empirical analysis are stated.

Tab. 3 Descriptive statistics

Variable	Obs. No.	Mean	Std.Dev.	Min	Max
CurrTransfersExp	353	46.84	18.40	10.57	88.39
FFCurrTransfersExp	353	1.47	1.88	0.00	8.47
PubGoods	353	1.23	1.28	0.09	8.05
Majbonus	361	0.43	0.50	0	1
EDM	361	16.17	7.13	6.05	35
Upper-tier seats%	361	8.15	9.59	0	23.34
Adj. Reg. GHI index	361	6.20	4.15	1.14	14.06
Reg. GHI index	361	3.48	1.25	1.14	6.84
National GHI index	361	14.22	10.52	2.39	51.80
Election year	361	0.17	0.38	0	1
Pre-election year	361	0.21	0.41	0	1
Pop	361	2946117	2247897	112560	9246796
%Pop65+	361	17.3	3.4	9.6	26.3
%Pop0-15	361	16.4	3.7	10.8	26.9
GDP (per capita; euros)	361	15706.8	4180.5	8211.5	24146.3
State transfers (per capita; euros)	353	990.4	987.2	110.2	7141.6

#### 4. Econometric analysis

The static panel data model (1) is estimated to test the impact of local electoral system reforms on the regional spending composition:

$$E_{i,t} = c + \phi ERULE_{i,t-1} + \beta x'_{i,t} + \mu_i + \tau_t + \varepsilon_{i,t} \quad (1)$$

where  $E_{it}$  is the public expenditure indicator for region  $i$  ( $i=1, \dots, N$ ) at time  $t$  ( $t=1, \dots, T$ ) illustrated in the previous section.  $ERULE_{i,t-1}$  corresponds to the indicators of electoral system at time  $t-1$ . Following Baraldi (2008), I consider the past values of electoral system variables because the effects of fiscal policies implemented by regional governments become significant at least one year later. A  $1 \times K$  vector  $x'_{it} = (x'_{it,1}, \dots, x'_{it,K})$  of control variables is included in the model. Time effects  $\tau_t$  are introduced to capture undefined shocks common to regions. Finally,  $\mu_i$  controls for the omission of unobserved features of regions and  $\varepsilon$  is an error term normally distributed with zero mean and constant variance.

Overall, the Hausman test results set out in Tables 4-6 suggests that model (1) can be estimated as a ‘fixed-effects’ (FE) model. Only when  $EDM$  is included in the panel regression with *CurrTransfersExp* as dependent variable (see column 7 of Table 4), it accepts the null, suggesting that the random effect (RE) estimator is more efficient than the FE estimator. The inclusion of the fixed-effects is also validated by a simple  $F$  test (labelled ‘FE test’ in the tables) that rejects the null-hypothesis of identical individual intercepts at 1% level of significance.

I perform diagnostic tests to detect the presence of heteroschedasticity, serial correlation and cross-sectional dependence in the error term structure. The Breusch-Pagan (1979)/Cook-Weisberg (1983) (BP-CW) test signals the presence of heteroschedasticity problems. Cross-sectional dependence is found by performing the Pesaran (2004) test.<sup>16</sup> Finally, the presence of the first-order autocorrelation is shown by means of Arellano and Bond’s (1991) test, labelled the AB-AR1 test in the tables. I take all these problems into account by estimating the model with the ordinary least squares (OLS) estimator with panel corrected standard errors (PCSEs) (Beck and Kats, 1995). In order to increase the robustness of my results, I estimate the fixed-effects (*within*) model with Driscoll and Kraay (1998)<sup>17</sup> standard errors robust to heteroschedasticity, cross-sectional dependence and first-order autocorrelation. I also check for the presence of endogeneity problems in the electoral system by running the Davidson-MacKinnon (1993) test. As shown in Tables 4-6, this test shows the exogeneity of the regressors used to capture the direct and indirect electoral system effects. Therefore, the OLS estimator yields consistent estimates with the sole exception of the estimates in column 7 of Table 4 and columns 7 and 8 of Table 6, where the Davidson-MacKinnon (labelled as D-MK test in the tables) test rejects the null at 5% and 10% level of significance.

In Table 4, I examine the impact of the regional electoral system on *CurrTransfersExp*. According to the theoretical model’s predictions, a reduction in this category of expenditure is expected when the electoral system moves from proportional towards mixed. In line with this prediction, the OLS-PCSEs and Within estimates in Table 4 show that the *Majbonus* coefficient is negative and statistically significant. The impact of  $EDM$  on *CurrTransfersExp* is mixed in the OLS-PCSEs and Within estimates but not statistically significant. Taking into account the Hausman test result in column 7, I re-estimate the panel model with the RE

<sup>16</sup> See De Hoyos and Sarafidis (2006).

<sup>17</sup> See Hoechle (2007).

estimator. I find a positive sign of the *EDM* coefficient although not statistically significant. The same conclusion is drawn when the two-stage least square (2SLS) estimator is adopted to account for the potential endogeneity problem of *EDM*.<sup>18</sup> The regional total current transfers expenditure is significantly reduced when the *Upper-tier seats%* increases. Analogously, I find that it is cut when the degree of the regional votes-seats disproportionality increases. The indirect effects produced by the national electoral system on *CurrTransfersExp* are not statistically significant. Overall, the regional electoral indicators suggest that the regional total current transfers expenditure tends to decrease significantly when there is a shift from proportional to mixed-system at regional level.

In order to refine my analysis, I estimate the static model using the *FFCurrTransfersExp* indicator as dependent variable. In Table 5, I find that the reform of the electoral system at the regional level of government produces a significant impact on the share of regional current transfers expenditure distributed to households and firms. As regards, the coefficient of *Majbonus* is negative and ranges from -1.01 to -0.84. Clearly this finding is consistent with the theoretical predictions. Moreover, it signals that this subcategory of regional current transfers expenditure may be broad-type. A signal of the broad nature of regional current transfers expenditure can be also inferred from the results on the electoral cycle. The negative and significant signs of the coefficients of *Election year* and *Pre-election year* dummies are consistent with the hypothesis that many subcategories of *CurrTransfersExp* and *FFCurrTransfersExp* are ‘non-targetable’ (Drazen and Eslava, 2010). According to Drazen and Eslava’s (2010) model, before an election, the incumbent politician increases the category of expenditure that groups of voters prefer (called *targetable expenditure*) to the detriment of the other remaining categories (called *non-targetable expenditure*). In general, in the electoral cycle literature, the non-targetable expenditure coincides with current expenditure because it is easily tailored to the preferences of a broad interest group in the population. By contrast, there is large consensus on the geographic targetability of capital expenditure, in particular for infrastructure projects (e.g. the construction of hospitals, schools, etc.) because of its geographic and sector specificity. However, this classification is not straightforward because it is reckoned that some categories of current expenditure (e.g. subsidies and wages) can be geographically targetable on narrow specific interests group (Vergne, 2009).

The negative and significant sign of the *Upper-tier seats%* coefficient confirms that *FFCurrTransfersExp* may be targeted towards broad interests in the population by means of general eligibility criteria. In spite of these evidence, the negative coefficient of *EDM* in both OLS-PCSEs and Within estimates, although not statistically significant, suggests an opposite conclusion: some components of *FFCurrTransfersExp* may be targetable to the geographical constituency. Basically, the nature of this type of expenditure varies according to the criteria adopted by regional government to distribute monetary transfers to families and firms. Observing the coefficients of the Gallagher index computed for regional and national elections, this aspect comes to light. A significant reduction in *FFCurrTransfersExp* is found when the degree of regional votes-seats disproportionality increases. By contrast, a more disproportional national electoral rule produces a statistically significant increase in *FFCurrTransfersExp* of about 0.04-0.06. Although the effects of the national and regional votes-seats disproportionality go in the opposite direction, they highlight that the regional current expenditure on families and firms may have a different degree of spending targetability across levels of government. This would be consistent with the adoption of

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<sup>18</sup> The RE and 2SLS estimates are available from the author upon request.

different eligibility criteria by the central and regional government to distribute current transfers to families and firms in order to capture electoral consensus.

Both *CurrTransfersExp* and *FFCurrTransfersExp* are negatively and significantly affected by *State transfers*. These results suggest that state (tax) revenue contributions are mainly used to fund other categories of expenditure. This evidence is consistent with the gradual substitution of State revenue contributions with own regional tax revenues to fund the OSRs' regional expenditure beginning from the early 2000s. An increase in *GDP* significantly reduces the demand for *CurrTransfersExp*, even if the estimated impact is very small (see Table 4). Finally, a larger population size leads to a significant cut in regional current transfers to households and firms (see Table 5).

As a next step, I estimate the static panel data model using as dependent variables the indicators based on the regional current expenditure on local public goods. According to the theoretical predictions, I expect an increase in this category of expenditure under a mixed-electoral system. In Table 6, the Within estimation results show that the total current expenditure in local public goods increases by about 0.61 after the introduction of a majority bonus in the regional electoral system (see columns 6 and 9). The OLS and Within estimates also show that a larger size of district magnitude is associated to a decrease in *PubGoods*. Although the coefficients are not statistically significant, this evidence is consistent with the assumption that this kind of regional current expenditure may be targeted to geographical constituency from regional government. Accounting for the potential endogeneity problem detected in columns 7 and 8 by the D-MK test, I re-estimate the panel data model with the 2SLS estimator. The coefficient of *EDM* is about -0.13 and now statistically significance at 1% level.

An increase in *PubGoods* of about 2.6% is found when the percentage of seats under the majoritarian-tier increases. Re-estimating the model with the 2SLS estimator because of the potential endogeneity problem detected by the D-MK test, results do not change significantly. The only exception is represented by the *National GHI index* coefficient that becomes statistically significance at 5% level with a negative sign.<sup>19</sup> This result highlights that the regional current expenditure on local public goods may be targeted to geographical constituencies by both central and regional governments.

The regional current expenditure on local public goods is negatively and significantly correlated with population size, although the impact of population size on *PubGoods* is modest. The demographic structure of population has also a significant effect on *PubGoods*. In particular, young people are the beneficiaries of it, since an increase in *%Pop0-15* is accompanied by an increase in *PubGoods* of about 17%.

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<sup>19</sup> The 2SLS estimates are available from the author upon request.

Tab. 4 Estimation results of the static panel data analysis on the impact of the electoral system on the regional total current transfers expenditure

	OLS-PCSEs					Within				
	1	2	3	4	5	6	7	8	9	10
Majbonus <sub>t-1</sub>	-13.652*** (-4.13)			-13.680*** (-4.14)		-17.914*** (-3.80)			-17.916*** (-3.75)	
EDM <sub>t-1</sub>		-0.034 (-0.06)					0.122 (0.20)			
Upper-tier seats% <sub>t-1</sub>			-0.405** (-2.51)					-0.645*** (-2.96)		
Reg. GHI index <sub>t-1</sub>				0.432 (0.54)					-0.023 (-0.03)	
Adj. Reg. GHI index <sub>t-1</sub>					-1.122*** (-3.07)					-1.644*** (-3.67)
National GHI index <sub>t-1</sub>	0.102 (0.78)	-0.006 (-0.05)	0.066 (0.50)	0.101 (0.77)	0.062 (0.48)	0.170 (1.51)	-0.054 (-0.41)	0.121 (1.07)	0.169 (1.61)	0.112 (0.88)
Pop (•10 <sup>4</sup> )	0.007 (0.03)	-0.004 (-0.02)	-0.062 (-0.31)	0.004 (0.02)	-0.068 (-0.35)	-0.043 (-0.27)	-0.049 (-0.33)	-0.160 (-0.99)	-0.043 (-0.27)	-0.154 (-0.91)
%Pop65+	2.482 (0.81)	-0.313 (-0.10)	0.835 (0.28)	2.304 (0.75)	0.546 (0.19)	3.308 (0.98)	-1.168 (-0.36)	0.985 (0.30)	3.319 (0.91)	0.592 (0.20)
%Pop0-15	0.015 (0.01)	-0.034 (-0.03)	0.079 (0.06)	-0.127 (-0.10)	0.70 (0.56)	-0.508 (-0.33)	-0.658 (-0.43)	-0.336 (-0.21)	-0.499 (-0.29)	0.625 (0.36)
GDP	-0.003*** (-2.32)	-0.004*** (-2.71)	-0.004*** (-2.54)	-0.003*** (-2.25)	-0.004*** (-2.80)	-0.003*** (-2.47)	-0.004*** (-2.97)	-0.004*** (-2.99)	-0.003*** (-2.57)	-0.004*** (-3.00)
State transfers	-0.004*** (-2.63)	-0.002*** (-1.65)	-0.004*** (-2.24)	-0.004*** (-2.66)	-0.003*** (-2.02)	-0.005*** (-2.04)	-0.002*** (-0.76)	-0.004*** (-1.85)	-0.005*** (-2.15)	-0.003*** (-1.35)
Election year	-5.159*** (-3.67)	-3.233** (-2.36)	-3.686*** (-2.63)	-5.084*** (-3.60)	-4.048*** (-2.92)	-6.292** (-2.46)	-4.114 (-1.45)	-4.951* (-2.05)	-6.297** (-2.46)	-5.249* (-2.07)
Pre-election year	-2.819** (-2.19)	-2.041 (-1.56)	-2.248* (-1.68)	-2.758** (-2.13)	-2.268* (-1.73)	-3.728 (-1.54)	-2.369 (-0.81)	-2.621 (-0.94)	-3.732 (-1.53)	-2.754 (-1.05)
FE test (Ho: $\mu_i = \mu$ )						0.000	0.000	0.000	0.000	0.000
BP/CW test						0.015	0.017	0.053	0.010	0.000
AB-AR1 test						0.000	0.000	0.000	0.001	0.000
Pesaran test						0.000	0.000	0.000	0.000	0.000
Hausman test						0.006	0.260	0.016	0.000	0.026
D-MK test						0.489	0.072	0.392	0.569	0.546
rho	0.513	0.541	0.499	0.513	0.486					

Notes: Dependent variable: *CurrTransfersExp*; t-statistics in parenthesis; z-statistics in parenthesis for OLS-PCSEs estimates; robust-clustered standard errors; p-value is reported for the diagnostic tests; coefficient significant at level \*\*\*1%, \*\*5%, \*10%; observation No. 335.



Tab. 5 Estimation results of the static panel data analysis on the impact of the electoral system on the regional total current transfers expenditure to families and firms

	OLS-PCSEs					Within				
	1	2	3	4	5	6	7	8	9	10
Majbonus <sub>t-1</sub>	-0.843** (-2.05)			-0.844** (-2.06)		-1.010** (-2.79)			-1.006** (-2.77)	
EDM <sub>t-1</sub>		-0.033 (-0.63)					-0.020 (-0.63)			
Upper-tier seats% <sub>t-1</sub>			-0.046** (-2.37)					-0.061*** (-3.20)		
Reg. GHI index <sub>t-1</sub>				0.034 (0.33)					0.031 (0.29)	
Adj. Reg. GHI index <sub>t-1</sub>					-0.154*** (-3.36)					-0.188*** (-4.55)
National GHI index <sub>t-1</sub>	0.037*** (2.70)	0.028** (2.20)	0.039*** (2.81)	0.037*** (2.71)	0.041*** (-3.00)	0.049** (2.57)	0.037* (1.96)	0.053** (2.64)	0.049** (2.58)	0.056** (2.68)
Pop (•10 <sup>4</sup> )	-0.033 (-1.48)	-0.036 (-1.57)	-0.040* (-1.81)	-0.033 (-1.49)	-0.042* (-1.93)	-0.027 (-1.27)	-0.028 (-1.37)	-0.038* (-1.76)	-0.027 (-1.29)	-0.039* (-2.02)
%Pop65+	-0.234 (-0.69)	-0.453 (-1.36)	-0.274 (-0.85)	-0.248 (-0.73)	-0.275 (-0.90)	-0.191 (-0.71)	-0.475 (-1.61)	-0.235 (-0.91)	-0.207 (-0.77)	-0.234 (-0.93)
%Pop0-15	-0.053 (-0.43)	-0.063 (-0.50)	-0.040 (-0.34)	-0.065 (-0.52)	0.054 (0.44)	-0.083 (-0.98)	-0.097 (-1.17)	-0.060 (-0.76)	-0.095 (-0.97)	0.057 (0.72)
GDP(•10 <sup>2</sup> )	0.003 (0.20)	-0.001 (-0.07)	0.003 (0.18)	0.004 (0.25)	0.001 (0.05)	0.004 (0.19)	-0.0003 (-0.02)	0.003 (0.15)	0.005 (0.21)	0.001 (0.07)
State transfers	-0.0005** (-2.27)	-0.0004* (-1.74)	-0.001** (-2.43)	-0.0005** (-2.32)	-0.0005** (-2.25)	-0.001*** (-3.40)	-0.0005** (-2.78)	-0.001*** (-3.78)	-0.001*** (-3.46)	-0.001*** (-3.04)
Election year	-0.484*** (-2.67)	-0.362** (-2.09)	-0.415** (-2.32)	-0.478*** (-2.63)	-0.471*** (-2.70)	-0.448** (-2.63)	-0.324 (-1.41)	-0.405** (-2.11)	-0.442** (-2.47)	-0.455** (-2.43)
Pre-election year	-0.129 (-0.80)	-0.075 (-0.46)	-0.101 (-0.62)	-0.124 (-0.76)	-0.109 (-0.69)	-0.161 (-0.57)	-0.080 (-0.28)	-0.109 (-0.40)	-0.155 (-0.53)	-0.129 (-0.54)
FE test (Ho: $\mu_i = \mu$ )						0.000	0.000	0.000	0.000	0.000
BP/CW test						0.000	0.000	0.000	0.000	0.000
AB-AR1 test						0.000	0.000	0.000	0.000	0.000
Pesaran test						0.013	0.111	0.006	0.018	0.059
Hausman test						0.001	0.008	0.000	0.001	0.001
D-MK test						0.816	0.505	0.964	0.885	0.981
rho	0.429	0.447	0.407	0.425	0.408					

Notes: Dependent variable: *FFCurrTransfersExp*; t-statistics in parenthesis; z-statistics in parenthesis for OLS-PCSEs estimates; robust-clustered standard errors; p-value is reported for the diagnostic tests; coefficient significant at level \*\*\*1%, \*\*5%, \*10%; observation No. 335.

Tab. 6 Estimation results of the static panel data analysis on the impact of electoral system on the regional current expenditure on local public goods

	OLS-PCSEs					Within				
	1	2	3	4	5	6	7	8	9	10
Majbonus <sub>t-1</sub>	0.362 (1.24)			0.359 (1.23)		0.614** (2.13)			0.612** (2.16)	
EDM <sub>t-1</sub>		-0.015 (-0.40)					-0.005 (-0.47)			
Upper-tier seats% <sub>t-1</sub>			0.012 (0.94)					0.026** (2.15)		
Reg. GHI index <sub>t-1</sub>				-0.028 (-0.39)					-0.012 (-0.29)	
Adj. Reg. GHI index <sub>t-1</sub>					0.007 (0.22)					0.029 (1.39)
National GHI index <sub>t-1</sub>	-0.004 (-0.47)	-0.001 (-0.09)	-0.003 (-0.36)	-0.004 (-0.47)	-0.001 (-0.13)	-0.013 (-1.51)	-0.081 (-1.46)	-0.012 (-1.43)	-0.013 (-1.52)	-0.008 (-0.87)
Pop (•10 <sup>4</sup> )	-0.027*** (-2.65)	-0.027*** (-2.60)	-0.025** (-2.41)	-0.027*** (-2.61)	-0.026** (-2.50)	-0.029*** (-3.94)	-0.031*** (-3.83)	-0.024*** (-3.65)	-0.029*** (-3.98)	-0.027*** (-4.32)
%Pop65+	-0.076 (-0.48)	-0.015 (-0.11)	-0.035 (-0.24)	-0.064 (-0.40)	-0.006 (-0.04)	-0.126 (-0.95)	-0.064 (-0.60)	-0.061 (-0.61)	-0.120 (-0.94)	-0.002 (-0.02)
%Pop0-15	0.174* (1.75)	0.175* (1.69)	0.172* (1.70)	0.184* (1.83)	0.173 (1.60)	0.144 (1.34)	0.133 (1.20)	0.136 (1.24)	0.148 (1.43)	0.127 (1.07)
GDP	-0.0001 (-0.86)	-0.0001 (-0.66)	-0.0001 (-0.76)	-0.0001 (-0.91)	-0.0001 (-0.67)	-0.0001 (-0.97)	-0.0001 (-0.67)	-0.0001 (-0.83)	-0.0001 (-1.01)	-0.0001 (-0.69)
State transfers(•10 <sup>2</sup> )	0.001 (0.04)	-0.003 (-0.16)	-0.0006 (-0.03)	0.001 (0.07)	-0.003 (-0.16)	-0.002 (-0.10)	-0.01 (-0.51)	-0.004 (-0.18)	-0.002 (-0.08)	-0.012 (-0.65)
Election year	0.006 (0.03)	-0.041 (-0.28)	-0.032 (-0.21)	0.0004 (0.00)	-0.039 (-0.26)	0.023 (0.09)	-0.046 (-0.18)	-0.018 (-0.07)	0.021 (0.08)	-0.032 (-0.12)
Pre-election year	-0.003 (-0.02)	-0.019 (-0.14)	-0.017 (-0.12)	-0.006 (-0.04)	-0.020 (-0.14)	-0.027 (-0.12)	-0.062 (-0.28)	-0.063 (-0.30)	-0.029 (-0.13)	-0.067 (-0.31)
FE test (Ho: $\mu_i = \mu$ )						0.000	0.000	0.000	0.000	0.000
AB-AR1 test						0.000	0.000	0.000	0.000	0.000
BP/CW test						0.000	0.000	0.000	0.000	0.000
Pesaran test						0.000	0.000	0.000	0.052	0.005
Hausman test						0.000	0.000	0.000	0.000	0.000
D-MK test						0.981	0.016	0.055	0.179	0.127
rho	0.433	0.453	0.445	0.436	0.455					

Notes: Dependent variable: *PubGoods*; -statistics in parenthesis; z-statistics in parenthesis for OLS-PCSEs estimates; robust-clustered standard errors; p-value is reported for the diagnostic tests; coefficient significant at level \*\*\*1%, \*\*5%, \*10%; observation No. 335.

## 4.2 The dynamic panel data analysis

Given that the public expenditure has high degrees of persistence, I estimate dynamic panel data model with the inclusion of the lagged dependent variable  $E_{i,t-1}$  on the right hand side of equation (2).

$$E_{i,t} = c + \alpha E_{i,t-1} + \phi ERULE_{i,t-1} + \beta x'_{i,t} + \mu_i + \tau_t + \varepsilon_{i,t} \quad (2)$$

First differences transformation of all variables is used to remove the individual fixed-effects from the panel model (Anderson and Hsiao, 1981, 1982) because of the correlation between the first-order lagged of the dependent variable and the fixed-effects, involving the correlation between the first-order lagged of the dependent variable and the error term (Wawro, 2002; Baltagi, 2005). However, this transformation is not devoid of problems because of the correlation between the first-differenced lagged dependent variable and the first-differenced error term. To remedy this problem, the instrumental variable approach is implemented using the second order lagged of the dependent variable as well as of the exogenous variables as valid instruments (Anderson and Hsiao, 1981, 1982). Accordingly, I estimate empirical specification (3) with the 2SLS estimator.<sup>20</sup> I use the second order lag of the dependent variable ( $E_{i,t-2}$ ) and of population size ( $Pop_{i,t-2}$ ) as excluded instrumental variables. All regressors taken into first-differences are included as instruments. The validity of the set of instrumental variables is shown by the Hansen J test results in Table 7. The null-hypothesis of instruments validity is accepted in all dynamic panel regressions.

$$\Delta E_{i,t} = \rho \Delta E_{i,t-1} + \phi \Delta ERULE_{i,t-1} + \beta \Delta x'_{i,t} + \Delta \tau_t + \Delta \varepsilon_{i,t} \quad (3)$$

In Tables 7-9, I report the dynamic panel estimation results. I find that the regional expenditure composition changes significantly only with regard to *CurrTransfersExp* and *FFCurrTransfersExp*. As in the static analysis, these kinds of expenditure are significantly reduced after the introduction of a regional mixed-member system (see columns 1 and 4 of Tables 7 and 8). However, I find that the effective district magnitude *EDM* do not significantly impact on both *CurrTransfersExp* and *FFCurrTransfersExp*.<sup>21</sup> The same conclusion is drawn about the effect of the upper-tier seats. On the other hand, when the regional electoral system becomes more votes-seats disproportional, I find that both *CurrTransfersExp* and *FFCurrTransfersExp* tend to decrease significantly (see column 5 of Tables 7 and 8). As in the static analysis, *FFCurrTransfersExp* significantly increases (about 2%) when the national electoral rule becomes more disproportional in terms of votes-seats distribution.

As regards the results of control variables, it is confirmed that electoral cycle is a relevant determinant of both *CurrTransfersExp* and *FFCurrTransfersExp*. Before elections, it is likely that they are significantly cut in favour of other categories of public expenditure. The dynamic panel data analysis also shows a positive and significant effect of elderly people on *CurrTransfersExp*. The impact of population size on *FFCurrTransfersExp* and *PopGoods* remains negative and statistically significant also in the dynamic analysis.

<sup>20</sup> Other estimators based on the generalised method of moments (GMM) can be implemented to estimate the panel dynamic model efficiently. In particular, I refer to the so called first-differenced GMM developed by Arellano and Bond (1991) and the System GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998). However, I do not use them because of the instrument proliferation problem (Roodman, 2009).

<sup>21</sup> The same indication is obtained when *EDM* is instrumented in the dynamic panel regression with  $\Delta CurrTransfersExp$  as dependent variable. See footnote 18.

Turning to the effects of the regional mixed-member system on *PubGoods*, Table 9 shows that the introduction of the mixed-electoral system does not statistically change the growth of regional current spending on local public goods. In the dynamic setting, both the direct and indirect effects of the regional mixed-electoral system do not play any significant role on *PubGoods*. No significant evidence of the national electoral system is found either.<sup>22</sup> However, few regressors are found to be statistically significant, implying a low performance of the dynamic panel data specification for this category of regional current expenditure.

Tab. 7 Estimation results of the dynamic panel data analysis on the impact of the electoral system on the regional total current transfers expenditure

	$\Delta \text{CurrTransfersExp}$				
	1	2	3	4	5
$\Delta \text{Majbonus}_{t-1}$	-9.459** (-2.31)			-9.868** (-2.50)	
$\Delta \text{EDM}_{t-1}$		-0.086 (-0.19)			
$\Delta \text{Upper-tier seats\%}_{t-1}$			-0.017 (-0.09)		
$\Delta \text{Reg. GHI index}_{t-1}$				0.997 (1.62)	
$\Delta \text{Adj. Reg. GHI index}_{t-1}$					-1.00** (-2.14)
$\Delta \text{National GHI index}_{t-1}$	0.078 (0.63)	0.039 (0.33)	0.041 (0.30)	0.068 (0.55)	0.070 (0.55)
$\Delta \text{Pop}(\bullet 10^4)$	0.431 (0.88)	0.536 (1.04)	0.531 (1.01)	0.418 (0.88)	0.399 (0.80)
$\Delta \text{\%Pop65+}$	18.643*** (3.04)	19.538*** (2.95)	19.522*** (2.97)	18.639*** (3.09)	15.193** (2.50)
$\Delta \text{\%Pop0-15}$	3.073 (1.45)	2.705 (1.18)	2.746 (1.19)	2.988 (1.37)	3.421 (1.55)
$\Delta \text{GDP}(\bullet 10^2)$	-0.162 (-0.56)	-0.167 (-0.59)	-0.167 (-0.58)	-0.141 (-0.49)	-0.188 (-0.66)
$\Delta \text{State transfers}$	-0.002 (-1.05)	-0.002 (-0.88)	-0.002 (-0.88)	-0.002 (-1.13)	-0.002 (-1.05)
$\Delta \text{Election year}$	-5.473*** (-4.34)	-4.367*** (-3.25)	-4.395*** (-3.27)	-5.324*** (-4.04)	-4.730*** (-3.85)
$\Delta \text{Pre-election year}$	-3.355*** (-4.00)	-2.911*** (-4.48)	-2.934*** (-3.99)	-3.226*** (-3.75)	-2.984*** (-4.25)
$\Delta \text{Dep.Var.}_{t-1}$	0.367*** (3.47)	0.347*** (3.09)	0.347*** (3.09)	0.370*** (3.42)	0.375*** (3.45)
<i>F</i> test	0.000	0.000	0.001	0.000	0.000
Hansen J test	0.889	0.627	0.635	0.830	0.675

Notes: t-statistics in parenthesis; finite-sample adjustment for cluster-robust standard errors; p-value is reported for the diagnostic tests; coefficient significant at level \*\*\*1%, \*\*5%, \*10%; observation No. 309.

<sup>22</sup> Considering the endogeneity problem, I found that the coefficients of *EDM* and *Upper-tier seats%* are not statistically significant when they are instrumented in the panel regressions. See footnote 18.

Tab. 8 Estimation results of the dynamic panel data analysis on the impact of the electoral system on the regional total current transfers expenditure to families and firms

	$\Delta FFCurrTransfersExp$				
	1	2	3	4	5
$\Delta Majbonus_{t-1}$	-0.959*** (-3.03)			-1.011*** (-2.97)	
$\Delta EDM_{t-1}$		-0.016 (-0.29)			
$\Delta Upper\text{-}tier\ seats\%_{t-1}$			-0.031 (-1.42)		
$\Delta Reg.\ GHI\ index_{t-1}$				0.121 (0.94)	
$\Delta Adj.\ Reg.\ GHI\ index_{t-1}$					-0.102* (-1.88)
$\Delta National\ GHI\ index_{t-1}$	0.021* (2.00)	0.017* (1.79)	0.021* (2.02)	0.020* (1.75)	0.020* (2.05)
$\Delta Pop(\bullet 10^4)$	-0.082** (-2.26)	-0.072* (-1.91)	-0.077* (-1.98)	-0.084** (-2.33)	-0.085** (-2.25)
$\Delta \%Pop65+$	0.272 (0.54)	-0.0002 (-0.91)	0.406 (0.77)	0.271 (0.52)	-0.08 (-0.21)
$\Delta \%Pop0\text{-}15$	0.739 (1.22)	0.691 (1.17)	0.730 (1.21)	0.728 (1.19)	0.778 (1.27)
$\Delta GDP(\bullet 10^2)$	0.0003 (0.01)	-0.0001 (-0.00)	0.003 (0.10)	0.003 (0.11)	-0.002 (-0.09)
$\Delta State\ transfers$	-0.0003 (-1.13)	0.368 (0.69)	-0.0003 (-1.09)	-0.0003 (-1.14)	-0.0003 (-1.14)
$\Delta Election\ year$	-0.589*** (-2.91)	-0.468** (-2.35)	-0.504** (-2.60)	-0.572** (-2.86)	-0.517** (-2.47)
$\Delta Pre\text{-}election\ year$	-0.131 (-1.61)	-0.083 (-0.99)	-0.109 (-1.28)	-0.115 (-1.33)	-0.094 (-1.14)
$\Delta Dep.Var_{t-1}$	0.366** (2.19)	0.339* (1.98)	0.357** (2.16)	0.365** (2.15)	0.375** (2.18)
<i>F</i> test	0.001	0.002	0.000	0.000	0.000
Hansen J test	0.837	0.953	0.931	0.908	0.950

Notes: t-statistics in parenthesis; finite-sample adjustment for cluster-robust standard errors; p-value is reported for the diagnostic tests; coefficient significant at level \*\*\*1%, \*\*5%, \*10%; observation No. 309.

Tab. 9 Estimation results of the dynamic panel data analysis on the impact of electoral system on the regional current expenditure on local public goods

	$\Delta\text{PubGoods}$				
	1	2	3	4	5
$\Delta\text{Majbonus}_{t-1}$	-0.307 (-0.66)			-0.291 (-0.67)	
$\Delta\text{EDM}_{t-1}$		0.127 1.24			
$\Delta\text{Upper-tier seats}\%_{t-1}$			-0.025 (-0.97)		
$\Delta\text{Reg. GHI index}_{t-1}$				-0.036 (-0.37)	
$\Delta\text{Adj. Reg. GHI index}_{t-1}$					-0.037 (-0.90)
$\Delta\text{National GHI index}_{t-1}$	0.006 (0.26)	0.004 0.23	0.007 (0.35)	0.006 (0.27)	0.005 (0.27)
$\Delta\text{Pop}(\bullet 10^4)$	-0.029* (-1.91)	-0.029* -1.82	-0.030** (-2.11)	-0.029* (-2.01)	-0.031* (-1.91)
$\Delta\%\text{Pop65+}$	0.154 (0.74)	0.127 0.58	0.219 (0.98)	0.154 (0.73)	0.025 (0.08)
$\Delta\%\text{Pop0-15}$	0.096 (1.12)	0.124 1.53	0.107 (1.13)	0.099 (1.20)	0.108 (1.33)
$\Delta\text{GDP}(\bullet 10^2)$	-0.001 (-0.03)	-0.004 -0.17	0.002 (0.08)	-0.001 (-0.07)	-0.002 (-0.08)
$\Delta\text{State transfers}$	0.0001 (0.17)	0.0001 0.25	0.00004 (0.14)	0.0001 (0.19)	0.0001 (0.17)
$\Delta\text{Election year}$	-0.041 (-0.25)	-0.017 -0.15	-0.029 (-0.22)	-0.046 (-0.27)	-0.018 (-0.15)
$\Delta\text{Pre-election year}$	0.071 (0.42)	0.075 0.49	0.066 (0.40)	0.066 (0.38)	0.083 (0.57)
$\Delta\text{Dep.Var.}_{t-1}$	0.636*** (3.19)	0.668** 2.85	0.632*** (3.25)	0.636*** (3.19)	0.645*** (3.07)
$F$ test	0.000	0.000	0.000	0.000	0.000
Hansen J test	0.745	0.374	0.750	0.684	0.873

Notes: t-statistics in parenthesis; finite-sample adjustment for cluster-robust standard errors; p-value is reported for the diagnostic tests; coefficient significant at level \*\*\*1%, \*\*5%, \*10%; observation No. 309.

## 5. Conclusion

The purpose of the paper has been to analyse the direct and indirect effects produced by the local electoral system on expenditure composition by exploring the case of Italian regions. Basically, the panel estimation results are consistent with the theoretical prediction that a movement towards a majoritarian system induces a reduction in broad-based expenditure and an increase in geographical targeted spending. As a robust result the panel regression analysis shows that the regional total current transfers expenditure is significantly reduced after the introduction of the regional mixed-electoral system and when the regional electoral rule becomes more disproportional. I have drawn analogous conclusions for the regional current transfers expenditure distributed to households and firms. This category of current transfers expenditure is also significantly affected by the degree of the national votes-seats

disproportionality, although in the opposite direction to the regional one. This evidence may be consistent with the presence of a different degree of spending targetability across hierarchical levels of government that leads to a different fiscal policy implementation by national and local governments to gain electoral support. As regards the effects of electoral rules on the regional current expenditure on local public goods, the static panel data analysis has show a significant increase in the regional current spending on local public goods under a regional mixed-electoral system. Although this evidence matched the theoretical predictions, it was not robust when the dynamic panel data analysis was performed.

#### Appendix 1: Data source and variables definitions

Variable	Data description	Data source
CurrTransfersExp	Regional current transfers expenditure (% of the total regional public expenditure).	ISTAT, Bilanci consuntivi delle regioni e delle province autonome (various years); ISTAT, Finanza locale: entrate e spese dei bilanci consuntivi (comuni, province e regioni) anni 2001-2002.
FFCurrTransfersExp	Regional current transfers expenditure to households and firms (% of the total regional public expenditure).	ISTAT, Bilanci consuntivi delle regioni e delle province autonome (various years); ISTAT, Finanza locale: entrate e spese dei bilanci consuntivi (comuni, province e regioni) anni 2001-2002.
PubGoods	Regional current expenditure on local public goods (% of the total regional public expenditure).	ISTAT, Bilanci consuntivi delle regioni e delle province autonome (various years); ISTAT, Finanza locale: entrate e spese dei bilanci consuntivi (comuni, province e regioni) anni 2001-2002.
State transfers	Per-capita state transfers which include state revenue contributions, tax revenues from the state and state transfers in lieu of tax revenues (euros).	ISTAT, Bilanci consuntivi delle regioni e delle province autonome (various years); ISTAT, Finanza locale: entrate e spese dei bilanci consuntivi (comuni, province e regioni) anni 2001-2002.
Majbonus	1=introduction of a majority bonus in the regional proportional system; 0=otherwise).	Author's compilation.
EDM	Sum of the square of the number of seats allocated in the $j$ th constituency in the lower proportional-tier/Total number of seat in the lower proportional-tier.	Ministero dell'Interno; the Regions of Friuli Venezia-Giulia, Sardegna, Sicilia, Valle D'Aosta.
Upper-tier seats%	Seats assigned under the regional majoritarian rule (% of the total seats)	Ministero dell'Interno; the Regions of Friuli Venezia-Giulia, Sardegna, Sicilia, Valle D'Aosta.
Reg. GHI index	Gallagher index of votes-seats disproportionality computed for regional government elections.	Ministero dell'Interno; the Regions of Friuli Venezia-Giulia, Sardegna, Sicilia, Valle D'Aosta.
Adj. Reg. GHI index	Adjusted version of the Gallagher index of votes-seats disproportionality computed for regional government elections.	Ministero dell'Interno; the Regions of Friuli Venezia-Giulia, Sardegna, Sicilia, Valle D'Aosta.
National GHI index	Gallagher index of votes-seats disproportionality computed for the Italian Senate elections.	Ministero dell'Interno.
Election year	1= if regional government is in election year; 0= otherwise.	Author's compilation.
Pre-election year	1= if regional government is in pre-election year; 0= otherwise.	Author's compilation.
Pop	Population, total.	ISTAT, <a href="http://demo.istat.it/">http://demo.istat.it/</a> .

Variable	Data description	Data source
%Pop65+	Population 65 year and over (% of the total population).	ISTAT, <a href="http://demo.istat.it/">http://demo.istat.it/</a> .
%Pop0-15	Population 0-15 year (% of the total population).	ISTAT, <a href="http://demo.istat.it/">http://demo.istat.it/</a> .
GDP	Per-capita gross domestic product (euros; constant price).	ISTAT, Conti Economici Regionali 1980-2004, Ed. 2005.

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