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Green Polities: Urban Environmental Performance and Government Popularity

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Abstract

Ascertaining whether local election results are driven by incumbents' performance while in office or mechanically reflect constituencies' ideological affiliation and macroeconomic conditions is crucial for evaluating the alleged accountability-enhancing property of decentralization. Based on a unique score of urban environmental performance and the results of all elections held in the major Italian cities over a decade, we investigate the role of local (fiscal and environmental) *versus* national issues in municipal elections. While the empirical evidence points to a strong ideological attachment and a somewhat weaker "fiscal conservatism," it reveals that media reported environmental ranking has a considerable impact on the popularity of city governments.

Key words: local elections; vote function; environmental performance; property tax

JEL classification: D72; H71; Q58

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1 Introduction

Ascertaining whether local election results are driven by incumbents' performance while in office or mechanically reflect constituencies' ideological affiliation and macroeconomic conditions is crucial for evaluating the alleged accountability-enhancing property of decentralization. In fact, the thaumaturgic virtues of the widespread process of devolution of taxing and spending powers to governments that are closer to the people rest on the fundamental assumption of elections as a disciplining device.

The early economic tests of decentralized government accountability mainly focused on, and typically could not reject, the hypothesis of voters as "fiscal conservatives" opposing public spending growth and debt accumulation (Peltzman, 1992). More recent economic research challenged the fiscal conservative view and drew attention to the vote-buying power of public expenditures. A number of aspects of public spending policy have been considered in the literature, with more recent investigations focusing on the electoral consequences of the mix and cycles of various categories of decentralized expenditures (Akhmedov and Zhuravskaya, 2004; Veiga and Veiga, 2007; Sakurai and Menezes-Filho, 2008; Solé-Ollé and Sorribas-Navarro, 2008; Cole et al., 2009; Jones et al., 2009; Litschig and Morrison, 2010; Drazen and Eslava, 2010).

Strictly speaking, though, an ideal empirical test of local government accountability would require investigating whether the actual performance of decentralized policy-makers - in terms, say, of the quality and cost of the effective public services delivered to the people - has an impact on their chances of reelection. However, due to the fact that raw data on a plethora of local governments' budgetary items abound, while accurate public service outcomes are rarely observable, only few recent contributions have been able to ascertain the impact of sensible measures of local government performance on election results. Brender (2003) uses widely observed student performance scores as a measure of education quality, and studies their impact on local contests in Israel. Revelli (2008) exploits the performance evaluation process of English local authorities

that is conducted by an independent commission (the Audit commission) and is openly spread by the major media, and investigates the consequences of authorities' performance ranking on their chances of reelection. Finally, Litschig and Morrison (2010) provide indirect evidence that higher grants increase the re-election chances of local governments in Brazil by inducing a larger provision of public goods.

In a similar vein, recent research points to the potentially crucial effect of information on the likelihood of voters "crossing party lines" and reinforcing government responsibility (Casey, 2011): better information about candidates' competence and honesty can strengthen the accountability nexus and play an important role to avoid poor or distorted information political contests and low accountability equilibria in which citizens cast their votes blindly along partisan lines (Ferraz and Finan, 2008; Da Silveira and De Mello, 2011; Fergusson, 2011).

Among the many aspects of public policy that can signal the quality of government, some recent literature has focused on the potentially important role of environmental protection policies implemented by decentralized governments as an indicator of government motivation - office *versus* policy - and responsiveness (List and Sturm, 2006; Fredriksson et al., 2011). However, and mostly due to lack of data, the key relationship between decentralized environmental policy and government popularity has not been explored yet. This paper aims at shedding light on that issue by employing a unique and highly visible index of environmental performance of the Italian major cities and investigating its impact on the popularity of local governments. Given that environmental protection is one of the main responsibilities of Italian municipalities, we can verify the degree of "environmental accountability" of local policy-makers and test for the first time whether urban environmental quality is a relevant issue in local elections.

The urban environmental quality index that we employ is built for the 100 Italian chief towns of province by an independent environmental organization (*Legambiente*) with the aim of raising local communities' awareness of environ-

mental issues and pushing municipal authorities to adopting good practices, following a sort of "name and shame" philosophy. The index has been available on an yearly basis for over a decade, and ranks Italian cities according to a large number of variables including green space, air quality in terms of pollutant emissions and its consequences on human health, drinking water quality, public transportation systems, energy consumption and waste recycling performance. Importantly, the report receives considerable media attention, with the main national and local newspapers and televisions openly commenting on the environmental performance and ranking of cities. We can consequently expect that the ample visibility of the city ranking generates awareness among citizens about the quality of their urban environment and the ability of city governments to adequately preserve it. In fact, the *Legambiente* ranking implicitly constitutes an assessment of the performance of local policy-makers in managing their environmental tasks.

We estimate a vote equation on all municipal elections that were held in the Italian chief towns of province between 1998 and 2007 in order to elicit the determinants of local election results. The evidence expectedly points to the important role of national politics and localities' ideological attachment in city election contests. Moreover, the results are compatible with the traditional portrait of voters as "fiscal conservatives," though the detrimental popularity impact of local property tax rises seems likely to be attributable to a signal of poor managerial competence. Finally, it turns out that a city's environmental score as reported by the media prior to the elections has a remarkable impact on the fortunes of city governments.

The rest of the paper is organized as follows. Section **2** briefly illustrates the institutional structure and electoral system of local government in Italy, discusses the role and accountability of city governments in environmental protection, and introduces the *Legambiente* environmental performance score. Section **3** builds the empirical model and highlights the key econometric issues in estimating a local vote function; section **4** presents the estimation results, and

section **5** concludes.

2 Institutional framework: the role of local governments in Italy

Italy has a three-tiered (regional, provincial and municipal) structure of government. The municipal tier is made of a varied and fragmented universe of over 8,000 localities, about one-hundred of which are larger cities that also act as chief towns of province and play a crucial role in the provision of a number of public services in urban areas, including: social care, local police, road cleaning and maintenance, public transportation systems, water services, waste management, and environmental protection.[1] While municipal services used to be traditionally funded by central government lump-sum grants, two radical reforms implemented in the early 1990s strengthened the fiscal autonomy and accountability of municipal governments by introducing a municipal property tax and direct election of the mayor in a plurality vote system.

First, a municipal tax on residential and business properties was introduced in 1993. The tax base is uniformly defined by the national government based on cadastral property values, and municipalities set the property tax rate between 0.4 and 0.7 percentage points of the assessed property value. The property tax is an important source of revenue for the cities: it represents nearly 50% of total tax revenues of local governments, and more than 25% of total local government spending. The property owner is liable for the payment of the tax to the municipal government where the property is located, irrespective of the owner's residence. However, city governments can set different tax rates depending on the property destination and owner's residence: a (typically lower) residential tax rate is applied on resident household owners, while a business tax rate is applied onto all other kinds of properties, including commercial and industrial

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[1] In what follows, we disregard the three chief towns of the autonomous provinces in the Alps (Bolzano, Trento and Aosta) because of their peculiar geographical location and institutional structure.

buildings and vacation homes.[2] Since a high proportion of Italian households (around $\frac{3}{4}$) is home-owner, the local property tax has a great visibility and is generally perceived as a signal of the cost of local public services. Moreover, property owners receive every year by mail detailed information about the tax due and the terms of payment, making the setting of the residential property tax rate the crucial fiscal choice that mayors have to make (Bordignon et al., 2003; Padovano, 2008).

Second, direct election of the mayor in a dual ballot was introduced in the local government electoral system in 1993 in order to guarantee strength and stability to municipal legislatures, and to make them accountable to their electorate. If no mayor candidate gets more than 50% of the votes at the first stage, the two most voted candidates run again at the second ballot, with a majority bonus being awarded to the coalition supporting the winning candidate.[3] As shown in appendix A, the Italian political environment remains characterized by a multitude of political parties. However, the new electoral system had the most visible effect of leading to the formation of two main coalitions, i.e., center-left and center-right, that - thanks to the seat allocation system guaranteeing at least 60% of the council seats to the coalition supporting the mayor - typically rule for the entire length of office (five years). Moreover, the law introduced a two-term limit with the aim of reducing the incumbency advantage and encouraging political competition for municipal office.

One of the main responsibilities of Italian city governments is to protect the environment in urban areas and preserve the health of citizens. Urban environmental quality involves a number of aspects of city life - including the quality of air and drinking water and the availability of green areas and public transports (Riseborough, 2000; Yuan, 1999) - and calls into question some crucial municipal policies, such as traffic planning and limitations, cleaning and maintenance

[2] In 2008, the national government abolished the local property tax on the first home dwellings. This change has no effect on our analysis, since our dataset ends in 2007.

[3] Between the two rounds of voting, the parties supporting candidates who did not get to the second round can make an explicit agreement with one of the two remaining candidates and share the majority bonus in case the endorsed candidate is elected at the ballot.

of roads, waste water treatment, and waste management. The importance of those responsibilities is reflected in the share of municipal current expenditure for the environment that, for the major Italian cities, represents over 30% of total municipal expenditure.

While urban environmental quality is clearly a hard to measure multidimensional phenomenon, an independent environmental association (*Legambiente*) publishes an yearly report (*Ecosistema Urbano*) where the chief towns of province are evaluated and ranked based on their environmental performance. Even if those one-hundred cities represent only one seventeenth of the Italian territory, they actually face a core set of environmental problems such as poor air quality, high level of traffic and congestion, noise, poor-quality built environment, derelict land, greenhouse gas emission, urban sprawl, and generation of waste. The *Legambiente* report evaluates the quality and sustainability of the urban environment in order to disseminate knowledge to citizens and policy-makers on relevant environmental matters, to stimulate local governments to implement appropriate strategies, and to assess the effectiveness of the implemented environmental policies.

In particular, *Legambiente* ranks the cities on the basis of three wide categories of indicators that are selected according to the standards and objectives of sustainability identified by the European Union (EEA, 2009) and the OECD (2000). The first category of indicators refers to the quality of the physical environment registered in the cities, such as air pollution, noise pollution, drinking water quality and rate of mortality for breathing apparatus diseases. The second category concerns the pressure exercised on the environment by human activities, as, for example, consumption of fuel, electricity and water, waste production and population density. Finally, the third category refers explicitly to the policies implemented by municipalities. This set of indicators (that includes the share of separate waste collection, the intensity of use of public transports, the urban green space available to citizens, and the municipal monitoring activity of harmful polluters) intends to be a proxy of the environmental

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management ability and effort demonstrated by local policy-makers. Appendix B reports in detail the features of the *Legambiente* Index and the city ranking criteria.

The *Legambiente* index has a number of attractive features. Firstly, multidimensional environmental aspects are blended into a single score of environmental quality that is easy to grasp and use for intercity comparisons. Secondly, the environmental score has been available for over a decade on an yearly basis for all the chief towns of province, and is comparable across years. Finally, and more importantly, the report receives notable national and local media attention. In fact, for some time after its official publication and release, that typically occurs around November or December, national and local newspapers, televisions and blogs vivaciously discuss the environmental performance and ranking of cities. The high visibility and widespread popularity of the *Legambiente* ranking might in fact raise voters' awareness of environmental issues and stimulate their demand for adequate environmental protection policies on the part of city governments. Moreover, the fact that the ranking implicitly constitutes an assessment of the performance of city policy-makers in managing their environmental tasks might have non-negligible electoral consequences.

In order to investigate the determinants of local election results, and in particular to test the fiscal and environmental accountability of city governments, we have collected complete data on all elections that were held in the 100 chief towns of province between 1994, right after the new electoral system started, and 2007, the last year for which complete information on election results and city characteristics and policies are available. The election results are based on official data of the Home Ministry of the Italian Government and are described in more detail in appendix A. Using those election data, we focus on the impact of environmental and fiscal performance on mayors' popularity.

3 Empirical analysis: the local vote equation

Conventional empirical analyses of the determinants of local election results rely on the share of the vote earned by the incumbent at the elections held at the end of the term of office (Revelli, 2002; Bosch and Solé-Ollé, 2007; Veiga and Veiga, 2007; Solé-Ollé and Sorribas-Navarro, 2008; Cole et al., 2009; Drazen and Eslava, 2010; Martins and Veiga, 2011), or employ a binary re-election outcome - success or failure (Besley and Case, 1995; Revelli, 2008; Sakurai and Menezes-Filho, 2008; Jones et al., 2009; Litschig and Morrison, 2010).[4] It seems preferable to follow here the former approach and use a continuous vote share variable so as to fully exploit the available vote information. In particular, we measure the electoral result of the incumbent government (i.e., the government that was voted into office in municipality m at the elections held at time $t - l$, with l being the length of the term of office) by the share of the vote it got at the subsequent election held at time t. Given the dual-ballot electoral system and in order to have comparable figures across elections, we always use the share of the vote earned by the coalition supporting the incumbent mayor in the first round of elections.

We start by expressing the vote share of the incumbent at the elections held at time t in municipality m (v_{pmt}) as:

$$v_{pmt} = i_{pm} + c_{pt} + \mu_{pmt} \tag{1}$$

where p is an index of the ideological affiliation of the incumbent government (left-wing or right-wing). Equation (1) highlights the three fundamental components of the election outcomes. First, i_{pm} is a sort of normal, time-invariant vote share of party p in municipality m due to ideological attachment of the electorate (Peltzman, 1990); any historic trend in political party popularity is captured by time effects and their interactions with party indicators (see below). Second, c_{pt} captures the common influence on party p representatives in local contests from the nationwide popularity of party p leaders, and might reflect

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[4]Nannestad and Paldam (1994) provide an extensive review of the early empirical literature on economic voting.

the state of the economy (inflation, unemployment, growth), as well as the relevance of foreign policy stances or national political scandals. Finally, μ_{pmt} is the component of the vote share that is attributable to the policies enacted and the performance attained by the city's incumbent during its term of office. In particular, we hypothesize that μ_{pmt} is a linear combination of the fiscal (τ) and environmental (e) performance of local governments during their term of office, plus a random component (ε):

$$\mu_{pmt} = \beta_\tau \tau_{mt} + \beta_e e_{mt} + \varepsilon_{mt} \tag{2}$$

$\beta_\tau = \beta_e = 0$ would imply that local elections are simply driven by the ideological complexion of the jurisdiction (i_{pm}), the popularity of national party leaders (c_{pt}) and random shocks (ε_{mt}), thereby dismissing the role of local government performance in driving local electoral results and raising doubts on the public service efficiency-enhancing property of decentralization.

In the empirical work, we estimate (2) by employing the residential property tax rate set in the election year as an index of fiscal performance (τ_{mt}) due to its high visibility and purposeful accountability-enhancing role.[5] Second, we use the *Legambiente* city score e_{mt} (alternatively, the city ranking $r(e_{mt})$) as a measure of environmental performance. In particular, for each election we use the *Legambiente* score (ranking) that was released in the immediacy of the election date. Given that local elections typically occur in spring and that *Legambiente* discloses its assessment around November or December, the environmental performance ranking released at time $t-1$ (and based on data from year $t-2$) is used in the elections occurred at time t. This amounts to assuming that voters at time t use the latest release of the environmental ranking, and disregard - or ignore - the state of the environment in their locality in the most recent years. In order to check whether current environmental performance is taken instead into account by voters, we alternatively include in (2) the environmental index that relies on the data collected in the election year

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[5] Due to its limited variation over time, similar results are obtained when using the average residential property tax rate over the term of office.

t (and label it $\widetilde{e}_{mt}$) and is released only after the elections.

To control for the impact of national politics, c_{pt}, equation (1) includes year-party specific effects by interacting year dummies with political party (left *versus* right) dummies. As further controls, we include a dummy variable capturing the advantage of the incumbent mayor running for re-election ($= 0$ if the mayor steps down voluntarily or because of a binding term limit) and a political aggregation dummy that is equal to 1 if the ratio of the number of parties supporting the incumbent mayor over the total number of parties participating at the election is larger than the same ratio in the previous election.[6]

An important issue when estimating vote equations on a time-series of cross-sectional election outcomes consists in properly controlling for the time-invariant partisanship of the local electorate i_{pm} (Strumpf and Phillippe, 1999). Correlation between unobserved time-invariant ideological traits in a locality and the fiscal or environmental policies implemented there would bias the estimates of the causal effects of those policies on the popularity of incumbents. In principle, the "fixed" municipality effect i_{pm} in (1) could be swept away by differencing between consecutive elections: $v_{pmt} - v_{pmt-l}$. However, differentiation does not eliminate the fixed party effect in those instances where party p was not in power in the previous term of office $(t - 2l, t - l)$.[7] Moreover, differentiation would imply renouncing altogether to the first wave of elections and would consequently lead to a considerable data shrink. Therefore, for all municipal elections held between 1998 and 2007 we proxy the normal, long-term ideological attachment to party p in city m (i_{pm}) by the average vote share earned by party p in each

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[6] Unlike what happens in two-party systems, in a multi-party environment such as the Italian one party coalitions might change between elections $t - l$ and t, making the accountability nexus a bit blurred and harder to verify (Vermeier and Heyndels, 2006; Bosch and Solé-Ollé, 2007). However, in most instances the bulk of the coalition stays the same in subsequent elections, while the number of smaller parties supporting one of the two main coalitions might change.

[7] Of course, neither taking deviations from group means does. One possibility consists in building a "responsibility" indicator $d_{t-l} = 1$ (or $d_{t-l} = -1$) if the incumbent at time t was the incumbent (or was the challenger) at the elections held at time $t - l$ (Hibbs, 1982), and then first-differencing the party p time series: $v_{pmt-l} = i_{pm} + c_{pt-l} + d_{t-l}\mu_{pmt-l}$. However, this procedure is best suited to strictly two-party systems (Strumpf and Phillippe, 1999).

municipality in the elections for regional government that were held nationwide in 1995, 2000 and 2005.

Finally, one might want to allow for dynamics in equation (1): a shock to popularity at a given election might be persistent over time and influence the share of the votes of the incumbent government in subsequent elections too. As is customary in the literature, we also estimate a specification that includes the share of the vote got by the incumbent in the previous election (v_{pmt-l}) along with the above described components i_{pm}, c_{pt}, and μ_{pmt}.

4   Results

The results of estimation of Eq. (1) with μ_{pmt} as defined in (2) are presented in Table 1. In all estimations, the dependent variable is the share of the vote earned at the first round of the elections held at time t by the coalition supporting the incumbent mayor. Similar results - presented in Table 2 - are obtained when using the log of the odds ratio, according to which the dependent variable is expressed as the logarithm of the relative vote share of the incumbent party: $\ln(\frac{v_{pmt}}{1-v_{pmt}})$.[8] We focus here on the estimation results of the linear specification for the more intuitive and straightforward interpretation of the coefficients.

In columns 1 to 3 of Table 1, three distinct measures of environmental quality are used: column 1 uses the absolute environmental score released by *Legambiente* for each city just before the election date e_{mt}; column 2 uses the corresponding rank position - 1st to 100th - of a city, labelled $r(e_{mt})$; column 3 uses instead the environmental score based on the election year data and released after the elections ($\widetilde{e}_{mt}$): by doing so, we verify if the relevant environmental impact on elections occurs through the media release of the performance score (e_{mt}), or via direct experience of voters of government ability in environmental management ($\widetilde{e}_{mt}$). Next, in columns 4 to 6 the local property tax rate is

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[8]The logistic transformation ensures that the share is bounded between 0 and 100 percentage points, while linear predictions may give implausible results outside that range. However, the predictions of the linear models turn out not to exceed the admissible range.

included along with the above environmental performance indices.

Remarkably, environmental performance is estimated to have a positive and significant effect on the popularity of the incumbent in all specifications that include the *Legambiente* index - either the score e_{mt} or the ranking $r(e_{mt})$ - that is released just before the elections. In terms of magnitude, a one point improvement in the score is estimated to increase the incumbent's share of the vote by 0.27 percentage points in column 1, and almost 0.3 percentage points in column 4 when also the fiscal policy is included. Similarly, the rank position of a municipality turns out to have a significant popularity impact. According to the estimation results in column 2, the electoral cost for the incumbent's coalition of a ten position drop in the ranking is of about 0.6 percentage points. On the other hand, columns 3 and 6 show that the environmental quality registered in the year of election - and released through the *Legambiente* report well after the elections - turns out not to have any significant effect on the vote share, reinforcing the hypothesis that the environmental accountability mechanism is driven by the independent assessment of performance released and publicized by the media right before the elections.

As for fiscal accountability, the estimation results suggest that the residential property tax rate set in the election year has a significant and negative impact on the incumbent's share of the vote. This result emerges in all specifications of Table 1 and Table 2, irrespective of which of the environmental measures are included.[9] An increase of 1 point in the local tax rate is estimated to negatively affect the share of the vote of the incumbent by about 2 percentage points.

As far as the other variables are concerned, the average vote earned by the incumbent coalition in regional elections plays a large and significant role, demonstrating the high partisanship of the electorate in Italian municipalities.

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[9]We also verified if the ideology of the incumbent's coalition matters to voters. In the literature (Alesina and Rosenthal, 1995), it has been hypothesized that voters could have different expectations on policy outcomes, depending on the government ideological complexion. In particular, we tested if right-wing coalitions suffer more severe electoral consequences from local property tax rate rises, and if the popularity of left-wing coalitions is more vulnerable to poor environmental performance. However, we did not find any compelling evidence in that regard.

Furthermore, mayors that run again to get re-election have an incumbency advantage that is estimated to be about 4 percentage points. Finally, coalitions that enlarge with respect to previous elections earn on average a 6 percentage points larger share of votes.

Table 3 presents the estimation results when the lagged vote share is included among the explanatory variables. As a benchmark, column 1 reports the results when the average vote earned by the incumbent's coalition in regional elections is not included. The share of the vote of the incumbent's coalition in the previous election has a significant positive impact, meaning, as expected, that popularity is serially correlated. In fact, the average vote earned by the incumbent's coalition in regional elections remains significant too, but the estimated coefficient is lower with respect to the one estimated in the static model, since now part of the partisanship is explained as persistency of shocks to popularity rather than as time invariant ideological traits. For what concerns the other variables, the estimation results in the dynamic specification are similar to the static ones. The two crucial policy outcomes - the local property tax rate and the *Legambiente* score - always display a significant effect, and the coefficient of the latter variable is slightly larger than before. An increase in the *Legambiente* score by one percentage point is expected to increase the incumbent's share of the vote by over 0.3 percentage points. Interestingly, the two local policies remain significant even after controlling for partisan attachment, persistence of popularity, and national politics.

4.1 Policy Endogeneity

In principle, since the policy variables included in the vote equation could be strategically manoeuvred by incumbent governments with the aim of improving their re-election chances, they cannot be assumed strictly exogenous. As far as the municipal tax policy is concerned, if an incumbent expects a negative (positive) shock to her re-election chances, she can strategically reduce (or afford to raise) the local property tax rate prior to the elections. This implies that

the observed tax rate would not be orthogonal to the idiosyncratic error term. Moreover, omitted variables that are correlated with the property tax rate - such as government inefficiency or waste - and have an effect on government popularity would bias the causal effect of the property tax rate on election results.

On the other hand, the features and timing of the construction process of the urban environmental quality score virtually rule out any chance of short-term strategic manoeuvring by opportunistic incumbents before the elections: in addition to being the result of a multifaceted policy-making process that can hardly have substantial effects in the very short run, the environmental score published at the end of year $t - 1$ - and having an impact on the elections held at time t - relies on municipal data from one or two years earlier. As a result, incumbents have little chances of strategically manipulating their environmental performance index when elections approach, and the performance score released before the elections is orthogonal by construction to shocks occurring in the later years of the term of office.

Therefore, we allow for endogeneity of the local property tax rate and employ the following set of instruments. First, the hypothesis of rational voting and political market efficiency (Peltzman, 1990; 1992) dictates that all information on government performance during the term of office $(t - 2l, t - l)$ should be capitalized into the share of the vote got by the incumbent at the elections held at time $t - l$. That information should consequently play no role in the subsequent term of office once the lagged vote share v_{pmt-l} is controlled for in the time t vote function. As a result, the property tax rate set in the last year of the previous term of office (τ_{mt-l}) should be legitimately thought of as a suitable instrument for τ_{mt} in the dynamic specification. Second, changes in a city demographic structure, such as an ageing population, might add some pressure on a city budget particularly as far as social care services are concerned, while not having a direct impact on the popularity of incumbents: we therefore use the percentage of elderly people (population over 65 years old) as an instru-

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ment for τ_{mt}. Finally, we use as instrument the rate of unemployment in the province where the city is located, based on the idea that city governments have little role in active labour market policies, yet their budgetary choices might be affected by adverse macroeconomic conditions and high unemployment in own and surrounding communities.

Table 4 reports the estimation results when the property tax rate is treated as endogenous and instrumented as described above. The first stage statistics suggest that the instruments have a strong explanatory power on the property tax rate (F test > 26), and that they can be validly excluded from the vote equation (p value of the Hansen test ≈ 0.5). The most striking result consists in the fact that, when instrumented, the tax rate is no longer estimated to have a significant detrimental impact on governments' popularity. This suggests that the negative effect of the tax rate emerging in the OLS estimates might in reality be due to omitted factors that are correlated with the tax rate and have adverse popularity consequences. In general, being the property tax the major source of revenue for city governments, it seems likely that high accumulated debt, financial distress, waste and inefficiency will tend to force city governments to raise property tax rates: in those circumstances, it seems reasonable that overall poor budgetary management be responsible for a loss in votes for the incumbent, rather than the property tax change itself.

5   Conclusions

In both developed and developing countries, accurate information on government performance is increasingly viewed as a crucial determinant of the likelihood of voters crossing party cleavages and reinforcing government responsibility. Independent assessment of policy outcomes can play an important role to avoid low accountability equilibria in which citizens cast their votes blindly along partisan lines. In fact, the very process of decentralization crucially rests on the hypothesis of elections as a disciplining device, according to which local communities reward (punish) governments for good (bad) public service perfor-

mance while in office.

As far as decentralized environmental management is concerned, assessment of the performance of policy-makers in managing their environmental tasks can successfully raise local communities' awareness of environmental issues and push municipal authorities to adopting good practices, particularly in urban areas facing dramatic environmental problems such as congestion, pollution, noise, poor-quality built environment, greenhouse gas emission and waste generation.

This paper has employed a unique and highly visible index of the environmental performance of the Italian major cities. Given that environmental protection is one of the main responsibilities of Italian municipalities, we have investigated the degree of "environmental accountability" of local policy-makers and tested for the first time whether urban environmental quality is a relevant issue in local elections. The urban environmental quality index that we have used has a number of attractive features. Firstly, multidimensional environmental aspects are summarized into a single measure of environmental quality by which cities can be ranked univocally. Secondly, the index has been available for over a decade for all chief towns of province, and is comparable over years. Finally, and more importantly, the disclosure of the city environmental ranking receives national and local media attention, possibly generating awareness among citizens about the quality of their urban environment and the performance of their governments.

Using data on all elections held between 1998 and 2007 in the 100 chief towns of province, we have estimated a vote equation focusing on the popularity impact of conventional measures of local tax policy and of the environmental performance of municipal governments. The main results of our empirical analysis are as follows. First, party attachment turns out to be an important feature of local elections, with a large number of voters sticking to their preferred parties irrespective of their performance while in office. Second, the conventional picture of voters as fiscal conservatives is confirmed, though it seems that the detrimental impact of a tax rise might be attributed to its role as a signal of

poor public management. Finally, urban environmental quality has considerable consequences on voters' evaluation of local government performance: in particular, the *Legambiente* index that is released in the immediacy of the elections has a significant impact on election results, suggesting that the media can be crucial actors in mitigating political agency problems by spreading information to citizens on the performance of their governors.

Table 1: OLS regression results: linear static model

	(1)	(2)	(3)	(4)	(5)	(6)
τ_{mt}				-2.395**	-2.485**	-2.432**
				(0.998)	(1.022)	(0.999)
e_{mt}	0.273***			0.289***		
	(0.095)			(0.09)		
$r(e_{mt})$		-0.055**			-0.062***	
		(0.023)			(0.022)	
$\widetilde{e}_{mt}$			0.077			0.090
			(0.081)			(0.079)
Regional vote share	0.727***	0.717***	0.729***	0.707***	0.696***	0.706***
	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)
Political aggregation dummy	6.359***	6.315***	6.662***	6.713***	6.687***	7.016***
	(1.440)	(1.444)	(1.409)	(1.455)	(1.461)	(1.425)
Incumbency dummy	4.561***	4.478***	4.552***	4.381***	4.292***	4.396***
	(1.342)	(1.348)	(1.341)	(1.326)	(1.330)	(1.324)
Year effects	yes	yes	yes	yes	yes	yes
Prob > F	0.000	0.001	0.001	0.000	0.001	0.001
Year-party effects	yes	yes	yes	yes	yes	yes
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
N	217	217	218	217	217	218
adj. R-sq	0.476	0.468	0.475	0.489	0.482	0.489

Standard errors robust to heteroskedasticity are in parenthesis; *, **, *** (0.10, 0.05, 0.01).

Table 2: OLS regression results: static model, log odds ratio

	(1)	(2)	(3)	(4)	(5)	(6)
τ_{mt}				-0.105**	-0.109**	-0.108**
				(0.045)	(0.046)	(0.045)
e_{mt}	0.012***			0.013***		
	(0.004)			(0.004)		
$r(e_{mt})$		-0.002**			-0.003***	
		(0.001)			(0.001)	
$\widetilde{e}_{mt}$			0.003			0.004
			(0.003)			(0.003)
Regional vote share	0.748***	0.737***	0.753***	0.727***	0.715***	0.728***
	(0.081)	(0.081)	(0.082)	(0.081)	(0.081)	(0.083)
Political aggregation dummy	0.279***	0.277***	0.290***	0.295***	0.294***	0.306***
	(0.062)	(0.063)	(0.061)	(0.063)	(0.064)	(0.062)
Incumbency dummy	0.194***	0.190***	0.191***	0.186***	0.182***	0.184***
	(0.058)	(0.058)	(0.058)	(0.057)	(0.057)	(0.057)
Year effects	yes	yes	yes	yes	yes	yes
Prob > F	0.001	0.002	0.002	0.000	0.001	0.002
Year-party effects	yes	yes	yes	yes	yes	yes
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000
N	217	217	218	217	217	218
adj. R-sq	0.465	0.457	0.463	0.479	0.472	0.478

Standard errors robust to heteroskedasticity are in parenthesis; *, **, *** (0.10, 0.05, 0.01).

Table 3: OLS regression results: dynamic model

	(1)	(2)	(3)	(4)
τ_{mt}	-2.610**	-2.238**	-2.365**	-2.218**
	(1.050)	(0.948)	(0.980)	(0.977)
e_{mt}	0.355***	0.343***		
	(0.098)	(0.088)		
$r(e_{mt})$			-0.078***	
			(0.021)	
$\widetilde{e}_{mt}$				0.107
				(0.075)
Regional vote share		0.464***	0.449***	0.479***
		(0.077)	(0.078)	(0.077)
Lagged vote share	0.554***	0.371***	0.373***	0.336***
	(0.060)	(0.062)	(0.063)	(0.065)
Political aggregation dummy	9.994***	8.504***	8.494***	8.562***
	(1.424)	(1.338)	(1.342)	(1.331)
Same mayor runs	5.927***	5.374***	5.277***	5.289***
	(1.311)	(1.272)	(1.279)	(1.281)
Year effects	yes	yes	yes	yes
Prob > F	0.000	0.000	0.000	0.000
Year-party effects	yes	yes	yes	yes
Prob > F	0.000	0.000	0.000	0.000
N	217	217	217	218
adj. R-sq	0.493	0.561	0.554	0.547

Standard errors robust to heteroskedasticity are in parenthesis; *, **, *** (0.10, 0.05, 0.01).

Table 4: Instrumental Variable regression results

	IV	first stage
	v_{pmt}	τ_{mt}
τ_{mt}	-1.293	
	(1.512)	
e_{mt}	0.337***	0.006
	(0.085)	(0.006)
Regional vote share	0.471***	0.000
	(0.073)	(0.005)
Lagged vote share	0.374***	-0.004
	(0.059)	(0.004)
Political aggregation dummy	8.374***	0.150*
	(1.308)	(0.085)
Incumbency dummy	5.450***	-0.091
	(1.201)	(0.071)
Instruments:		
τ_{mt-l}		0.650***
		(0.081)
Percentage old		-3.210**
		(1.577)
Unemployment (province)		-0.017**
		(0.008)
F test instruments (p value)		26.73 (0.000)
Hansen test (p value)		1.479 (0.477)
N	217	217

Standard errors robust to heteroskedasticity are in parenthesis; *, **, *** (0.10, 0.05, 0.01).

Party dummies, year effects and year-party effects included.

A   Elections

We have detailed information on the characteristics and share of the vote earned by candidate mayors and by their supporting coalitions in all elections occurred in the 100 major Italian cities between 1998 and 2007. As shown in Table 5, mayors were elected at the first stage in 58% of cases and were from left-wing coalitions in 56% of instances.

Table 5: Electoral rounds in elections, 1998-2007

Elected	No.	Percent
1st Stage	130	58.04
Ballot	94	41.96
Total	224	100

Table 6: Political affiliation of municipal governments, 1998-2007

	No.	Percent
Center-right coalition	98	43.75
Center-left coalition	126	56.25
Total	224	100

The Italian political environment remains characterized by a multitude of parties. That result appears clear by looking at Table 7, where it is shown that the total number of parties increases over time: the average value is about 14 parties in elections held in 1998 and 21 in 2007. Similarly, Table 8 shows that the number of parties supporting the incumbent mayor increases over time too.

Table 7: Number of parties which run for elections, 1998-2007

Election Year	Average no. of parties running for elections	s.d.	Min	Max
1998	13.72	3.09	9	19
1999	16.27	4.18	11	30
2000	16.18	4.56	9	24
2001	16.87	5.61	11	32
2002	16.46	3.97	9	26
2003	17.90	4.01	9	24
2004	17.59	4.35	11	27
2005	18.17	5.62	13	31
2006	19.48	6.34	12	36
2007	21.38	4.89	14	35
Total	17.28	5.07	9	36

Table 8: Number of parties supporting the incumbent mayor at the first round of elections, 1998-2007

Election Year	Average no. of parties supporting the incumbent mayor	s.d.	Min	Max
1998	4.41	1.81	1	8
1999	5.83	1.09	4	8
2000	5.64	2.01	3	9
2001	5.83	2.01	3	10
2002	6.27	1.71	3	9
2003	5.80	2.20	2	8
2004	6.76	2.05	3	10
2005	7.08	3.20	3	14
2006	7.04	2.73	2	13
2007	7.73	3.68	1	20
Total	6.21	2.45	1	20

Since the municipal elections have not been held simultaneously in all municipalities, and the term of the office has been modified during the years (from 4 to 5 years in 1999), the panel is unbalanced, both in the sense that there are more observations on some municipalities than on others, and because the elections have been held in different years. This is shown in the first column of Table 9.

In particular, as shown in Table 10, for 71% of the sampled municipalities we have complete information for two elections, while for the remaining ones three election data are available.

Table 9: Re-election histories of mayors, 1998-2007

Year	Elections	Runner	Re-elected	% Re-elected	Could not run	Would not run
1998	32	24	15	63%	0	8
1999	30	19	15	79%	1	10
2000	11	4	4	100%	3	4
2001	23	8	8	100%	13	2
2002	26	13	10	77%	10	3
2003	10	5	4	80%	4	1
2004	29	13	10	77%	16	0
2005	12	4	4	100%	4	4
2006	25	12	9	75%	10	3
2007	26	13	10	77%	8	5
Total	224	115	89	77%	69	40

Table 10: Distribution of sampled municipalities according to the number of observed elections, 1998-2007

Number of elections	Freq.
1	1
2	71
3	27
Total	99

B The *Legambiente* Index

Since 1994, *Legambiente*, an Italian independent association with the mission of preserving and promoting the environment (www.legambiente.it), has published an annual report, "*Ecosistema Urbano*", on the environmental quality observed in the Italian chief towns of province. Those cities represent the Italian major urban areas, with great concentration of population (one out of three Italian citizens) and economic activities, and play a crucial role as economic, social and cultural drivers for neighboring areas too. Consequently, even if they represent only one seventeenth of the Italian territory, they actually face a core set of environmental problems such as poor air quality, high level of traffic and congestion, noise, poor-quality built environment, derelict land, greenhouse gas emission, urban sprawl, generation of waste and waste-water.

The purpose of the *Legambiente* study is to evaluate the quality and sustainability of the urban environment in order to disseminate knowledge to citizens and policy-makers on relevant environmental matters, to stimulate local governments to implement concrete strategies and to evaluate the effectiveness of the implemented environmental policies. *Legambiente* ranks the cities on the basis of three wide categories of indicators reported in Table 11, that are selected according to the standards and objectives of sustainability identified by the European Union and the OECD. The first category of indicators refers to the quality of the physical environment registered in the cities. The second category concerns the pressure exercised by human activities on the environment. The third category refers to the policies implemented by municipalities, and is intended to proxy the environmental management ability of local policy-makers. This category also includes the monitoring activity of harmful polluters by municipalities. Since the third category represents a measure of the quality of the local government response to environmental challenges and to the citizens' needs, it is considered particularly important for assessing what has been done by city authorities. In fact, the goal of these policies should be to encourage changes in citizens' behavior and consequently they have also a positive impact

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on the other two types of indicator categories. This is also reflected in the higher weight given to these indicators in the final ranking.

Table 11: Principal indicators of Legambiente Index for category

Categories of indicators	Most important indicators
1 - Physical environmental quality	Air pollution
	Noise pollution
	Drinking water quality
	Rate of mortality for
	breathing apparatus diseases
2 - Pressure on environment	Consumption of fuel, electricity and water
	Motorization rate
	Waste production
	Population density
3 - Environmental policies implemented by municipalities	Level of separate waste collection
	Public transportation services
	Urban green space
	Bicycle paths
	Monitoring activity

In the Italian context, the *Legambiente* report is the first to analyze and compare the cities' environmental performance. For some components of the index the data sources are the statistics provided by public and private agencies. For some indicators, the data is directly asked to municipalities, which certify the information to be correct. *Legambiente* has constructed a specific survey with a set of questions for each parameter, but the lack of public data is indicative of the low attention given by local governments to environmental issues, and it also represents a problem for the quality of the data. For some indicators, there might be a comparability problem because of different interpretations given by different administrators. In these situations, *Legambiente* has decided either to give low weight to these indicators or not to take them in consideration. Moreover, sometimes *Legambiente* has not been able to evaluate some cities because of lack of information given by the cities themselves. However, the quality and availability of data have improved substantially over time. After 2001, all cities

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have received a comprehensive evaluation (see Table 12).

During the years, the ranking construction has undergone slight changes because of learning by doing processes as well as thanks to the availability of new data, and the number of indicators employed has increased. However, in most cases the changes basically represent a more detailed analysis of the same fundamental phenomena. For example, as from 2003 not only the intensity of use of public transport is observed, but also its supply and environmental impact. Overall, the structural framework based on the three indicator categories has remained the same, making it possible to use the score to make comparisons of cities' performances over time.

Table 12: Summary statistics of Legambiente Index

	Legambiente score			
Year	Mean	Min	Max	Observations
1993	57.21	28.93	74.25	70
1994	55.19	39.88	69.33	94
1995	42.90	28.32	53.78	103
1996	42.93	28.50	57.00	103
1997	42.48	23.68	50.61	99
1998	50.91	36.00	69.00	98
1999	48.29	28.80	66.40	101
2000	49.01	27.80	64.10	103
2001	50.56	28.80	67.70	103
2002	50.88	31.60	65.90	103
2003	48.20	31.30	62.00	103
2004	48.46	30.47	63.33	103
2005	54.54	31.37	69.43	103
2006	51.03	26.84	71.40	103
2007	52.32	28.04	74.63	103

C Summary statistics

Table 13: Descriptive statistics on local variables in the chief towns of province: election years

Variable	Obs	Mean	Std. Dev.	Min	Max
Area	224	184	169	20	1285
Population	224	160,928	298,125	20,980	2,705,603
Urbanization rate	224	1138.91	1333.34	79.27	8566.36
% population < age 15	224	0.13	0.02	0.09	0.19
% population > age 65	224	0.21	0.04	0.12	0.29
Unemployment rate	224	9.34	6.81	1.65	33.16
Per capita grants	224	249	80	129	664
Disposable income per capita	224	21,037	3,954	13,112	32,060

Table 14: Descriptive statistics on the 100 chief towns of province: all years (1998-2007)

Variable	Obs	Mean	Std. Dev.	Min	Max
Residential property tax rate	1000	5.03	0.67	3.20	7.00
Business property tax rate	1000	6.34	0.72	4.00	7.25
Population	1000	168,313	310,798	20,980	2,718,768
Area	1000	182.45	174.36	20.43	1285.30
Urbanization rate	1000	1197	1390	79	8646
% population < age 15	1000	0.13	0.02	0.09	0.20
% population > age 65	1000	0.21	0.04	0.11	0.29

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