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(Working Papers)

Public sector efficiency and political culture

by Raffaella Giordano and Pietro Tommasino

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# PUBLIC SECTOR EFFICIENCY AND POLITICAL CULTURE

by Raffaella Giordano\* and Pietro Tommasino\*

## Abstract

The capability of a country's public sector to provide high-quality goods and services in a cost-effective way is crucial to fostering long-term growth. In this paper we study the determinants of public service efficiency (PSE) and in particular the role of citizens' political values. Indeed, we argue that citizens' willingness to invest time and effort monitoring public affairs is necessary if policy-makers are to be held accountable for what they do and deterred from wasting public resources. Contrary to other papers, our empirical analysis exploits within-country variation, therefore reducing the risk of omitted variable bias and implicitly controlling for differences in formal institutions. First, we compute PSE measures for several public services (namely education, civil justice, healthcare, childcare and waste disposal) for the 103 Italian provinces; then we show that a higher degree of political engagement increases PSE. This remains true even after controlling for the possible endogeneity of political culture. In our analysis, values specifically related to the political sphere are kept distinct from generically pro-social values. Our results suggest that the latter have no independent impact on PSE.

**JEL Classification:** C14, H50, H77, Z13.

**Keywords:** public spending, efficiency, culture.

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# 1 Introduction<sup>1</sup>

The capability of a country's public sector to provide high-quality goods and services in a cost-effective way is crucial to foster long-term growth. It's up to politicians and bureaucrats to set rules and practices which increase efficiency and reduce slack, delivering the highest possible value for money to taxpayers.

The literature on political economy and public choice stresses that one cannot take for granted that public decision-makers will always use public resources in the most appropriate way. The relationship between citizens and politicians is to some extent similar to a principal-agent relationship, which creates risks of opportunistic behaviour and moral hazard.<sup>2</sup>

As we cannot have unquestioning faith in the honesty and competence of public decision-makers, there is the need for well-designed formal rules for the political and administrative system: electoral rules, term limits, checks and balances, etc.

However, citizens' willingness to invest time and effort monitoring public affairs is also necessary if policy-makers are to be held accountable for what they do and deterred from wasting public resources. This in turn requires both a shared set of values which go beyond narrow self-interest and, in particular, a widespread concern for public affairs. Indeed, there is a well-known free-riding problem inherent in the political sphere: the impact of a single individual on outcomes is negligible, whereas mobilizing for elections and other political activities redirects time and resources from the care of one's private affairs, and can be quite costly.

The first and foremost goal of this paper is to assess empirically the importance of citizens' political engagement for public sector efficiency (PSE). To this aim, we first compute measures of efficiency for several public services (namely childcare, education, healthcare, civil justice and waste disposal), for the 103 Italian provinces. Then we relate these PSE indicators to the propensity to be politically active. Looking at within-country differences, our approach implicitly controls for differences in formal institutions, and limits omitted variable bias. As we document in the first part of the paper, we are helped by the fact that there are big differences in PSE across Italy's regions and provinces, despite 150 years elapsing since the political and administrative unification of the country.

Measuring people's values is obviously problematic, but we rely on proxies used in several previous studies. Besides measurement problems, however, there is the concern that the degree of political engagement may be endogenous. This is a common problem with any attempt to use values to explain political or economic outcomes (Guiso et al. 2006). We would ideally like to capture only the effects of the truly exogenous component of values, which is really part of the

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<sup>2</sup>The literature on the agency relationship between citizens and politicians is thoroughly surveyed by Besley (2006). Of course, by focusing on this relationship we do not mean to downplay the other conflicts that shape political life, in particular that between groups of citizens with conflicting goals and values. However, in a context in which efficiency is the main dependent variable, the latter problem seems less pressing: even if people disagree about the size and the composition of public sector activities, they should all agree on the fact that public resources should not be wasted.

society’s cultural heritage, that is “those customary beliefs and values that ethnic, religious and social groups transmit fairly unchanged from generation to generation” (Guiso et al., 2006).<sup>3</sup> In order to address the endogeneity of political values (as well as measurement error) we instrument them with two sets of variables: measures of political and social participation in early 20th century Italy (from Nuzzo, 2006), and features of formal political institutions in place in the 14th century (from de Blasio and Nuzzo, 2006). Indeed, while Italy is still quite homogenous ethnically and in terms of religion, the Italian regions are deeply different with respect to their century-long political history, and there is a vast literature arguing that Italy’s ancient vicissitudes still partly shape its contemporary political life (Putnam, 1993).

Our paper relates to a growing body of literature assessing the effects of culture on government performance. The seminal papers on this issue are Knack and Keefer (1997) and La Porta et al. (1997).<sup>4</sup> Both studies use a cross section of about 40 countries, and take indicators of trust and civiness from the World Value Survey. However, drawing inferences from cross-country data is problematic, due to the high number of possibly relevant variables. Moreover, as pointed out by Guiso et al. (2006), these early contributions did not control for the endogeneity of trust. Our paper is more closely related to Knack (2002), which uses data from US states (and controls for possible endogeneity). Our approach differs from his because we use objective efficiency indicators as our dependent variable instead of perceived quality. We believe this is appropriate given that expectations concerning government performance might be unreliable: individuals in areas in which short-sighted selfishness and distrust are widespread, and governments consistently under-perform, will probably expect less from their politicians and public officials. Objective measures analogous to ours have recently been computed for a cross-section of countries by international organizations, such as the OECD (Hakkinen and Joumard, 2007, Sutherland et al, 2007), the IMF (Verhoeven et al. 2007) and the European Commission (European Commission, 2008).<sup>5</sup> A paper in many respects similar to ours is the one by Borge et al. (2008). The authors build an aggregate objective index of public sector efficiency for almost 400 Norwegian provinces, for the years 2001-2005, encompassing six service sectors (elderly care, primary and lower secondary education, daycare, welfare benefits, child custody and primary healthcare). The index is a simple ratio of a performance indicator (expressed in relation to the sample mean) and the amount of available fiscal resources. They relate this index to local government revenues and to local political characteristics such as party fragmentation, the left-wing majority, voter turnout, and top-down vs bottom-up budgetary procedures. They find in particular that more cohesive government and stronger democratic participation increase efficiency but do not address the issue of endogeneity.

More generally, our paper aims to contribute to the broader debate on the impact of cultural traits on economic outcomes (Tabellini, 2008a, 2010). With respect to this literature, we try to keep distinct generically pro-social values (so-called “generalized morality”) from values inherent

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<sup>3</sup>This is actually the definition of culture that we adopt in this paper. Furthermore, we follow the political science literature and call “political culture” that particular subset of beliefs and values specifically related to the political sphere: views about how the political system should function and beliefs about the ways it actually functions, views about how people should behave in the political sphere and beliefs about they actually behave. In the paper we focus on a crucial item in any political culture, namely the extent to which citizens feel a moral obligation to participate to political life. We refer to this sense of obligation indifferently as “political engagement”, “interest in politics”, or “propensity to participate”.

<sup>4</sup>See also La Porta et al. (1999).

<sup>5</sup>See also OECD (2008) and Afonso et al. (2005). Within-country studies are also frequent. Afonso and Scaglioni (2007) provide efficiency measures for Italy at the Region level.



to the political sphere. We adhere to the idea, well-established in political science at least since Almond and Verba (1963), that political values (and more generally political culture), should be distinguished by morals. For example, it may well be possible that in recent decades there has been an increase in people’s willingness to participate in pro-social activities (e.g. volunteering for NGOs) together with a growing disillusion and detachment from politics (Inglehart, 1977).<sup>6</sup>As we will argue below, at least in the in the case of Italy, it seems that political participation is much more relevant than generalized morality per se in explaining differences in PSE.<sup>7</sup>

The rest of the paper is structured as follows: in the second section we compute and discuss our measures of PSE for five public services; in the third section we present and justify our baseline econometric exercise; in section 4 we report the results; section 5 discusses the role of decentralization in service provision; and section 6 concludes.

## 2 Public sector efficiency in the Italian provinces

### 2.1 Defining (in)efficiency

There are several well-established definitions of (in)efficiency of a production unit (be it an industrial plant, a firm or a public entity) in the microeconomic literature (see e.g. Fried et al. 2008). In this paper we use concepts of technical efficiency, all of which boil down to a comparison between actual and potential performance. More formally, suppose that several production units produce a certain (vector of ) output  $y$  with a certain (vector of) input  $x$ , where  $T$  is the set of all technically possible input-output combinations. Define:

$$L(y) = \{x | (x, y) \in T\}$$

$$P(x) = \{y | (x, y) \in T\}$$

$$F(x) = \text{Max}\{y | y \in P(x)\}$$

Then a natural measure of inefficiency for a production unit  $i$ , which produces output  $y_i$  with input  $x_i$ , is:

$$\text{Ineff}_i^{\text{OUT}} = \text{Max}\{\theta \in R^+ | y_i \theta \in P(x_i)\}.$$

Basically, it defines inefficiency as the ratio between potential (given technology and inputs) and actual performance. In turn, the inverse of  $\text{Ineff}_i^{\text{OUT}}$  can be taken as a measure of efficiency:

$$\text{Eff}_i^{\text{OUT}} = \frac{1}{\text{Ineff}_i^{\text{OUT}}}.$$

Another widely used measure is provided by:

$$\text{Eff}_i^{\text{INP}} = \text{Min}\{\theta \in R^+ | x_i \theta \in L(y_i)\}.$$

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<sup>6</sup>In the same vein, people in a community might have a high degree of interpersonal trust, but be sceptical about the possibility of effectively influencing public policies.

<sup>7</sup>Of course, pro-social values can also have a positive *indirect* influence on public service efficiency, if they increase political engagement (for example raising the likelihood of having honest politicians).

It measures how much less input unit  $i$  could use to produce the level of output it actually produces.<sup>8</sup>  $Ineff_i^{OUT}$  and  $Eff_i^{INP}$  are also referred to, respectively, as output-oriented and input-oriented Debreu-Farrell indices, while  $Eff_i^{OUT}$  is known as the Shephard index.<sup>9</sup>

In the rest of the paper, unless otherwise stated, we focus on  $Eff_i^{OUT}$  as our preferred definition of efficiency. We check that our results do not change with different definitions of efficiency.

## 2.2 Estimating the frontier

Whatever the definition of efficiency adopted, the main problem encountered in measuring efficiency is how to find out the production frontier. In practice efficient performances are defined as un-dominated performances, i.e. performances located on the “best practice frontier”. To construct this frontier from the observed input-output pairs  $(x_i, y_i)$ , two approaches have been used in the literature: the parametric and the non-parametric approaches. The advantage of the non-parametric approach is of course that it does not require the specification of a functional form, so that it avoids the risk of confusing the effects of misspecification of the functional form with those of inefficiency. The basic idea underlying non parametric methods is quite simple. Given our sample of production units  $(x_i, y_i)$ , we use this sample to deduce the production possibility set  $T$ . Once we have this approximation of  $T$  - let us call it  $T'$  - we will also have approximations of the sets  $L(x)$ ,  $P(x)$  and  $F(x)$ :

$$\begin{aligned} L'(y) &= \{x | (x, y) \in T'\} \\ P'(x) &= \{y | (x, y) \in T'\} \\ F'(x) &= Max\{y | y \in P'(x)\}. \end{aligned}$$

Non-parametric methods differ in how they build  $T'$ . Our baseline measure of the efficiency of public spending in the Italian provinces is constructed applying a commonly used non-parametric method, called Data Envelopment Analysis (DEA). In the DEA approach,  $T'$  is identified as the intersection of all the production sets which satisfy the following list of assumptions: (1) all the  $(x_i, y_i)$  belong to the set; (2) free disposability; (3) convexity; (4) a strictly positive amount of input is needed to produce a strictly positive amount of output.<sup>10</sup> In practice, the various efficiency indexes in a non-parametric setting are computed solving linear programming problems.<sup>11</sup>

<sup>8</sup>In the presence of constant return to scale the two scores coincide.

<sup>9</sup>As  $Ineff_i^{OUT}$  takes values between 1 and  $+\infty$ ,  $Eff_i^{OUT}$  takes values in  $(0,1)$ . When we use efficiency as the dependent variable in our econometric exercises, we actually use the ratio of  $Eff_i^{OUT}$  to the average level.

<sup>10</sup>Another non-parametric approach that can be used to assess productive efficiency is the FDH (Free Disposal Hull) technique. The main difference between the two methodologies is that in the FDH assumption 1 (convexity) is dropped. The DEA efficiency frontier always encompasses the FDH frontier, so that some units which are efficient according to the FDH method are instead inefficient according the DEA technique (see Tanassoulis et al. 2008 for further details).

<sup>11</sup>In the case of 1 input, 1 output and  $N$  productive units,  $Eff_i^{INP}$  equals:

$$Eff_i^{INP} = Min \left\{ \theta \text{ subject to : } \sum_{j=1}^N x_j \lambda_j \leq \theta x_i; \sum_{j=1}^N y_j \lambda_j \geq y_i; \lambda_j \geq 0 \forall j; \sum_{j=1}^N \lambda_j = 1 \right\}.$$

$Ineff_i^{OUT}$  is instead computed as:

Moreover, to check further the robustness of our results, we also use parametric techniques. In particular, we follow most of the literature by assuming a log-linear relationship:

$$\ln y_i = \alpha_0 + \alpha_1 \ln x_i + u_i.$$

We first assume that  $u_i \leq 0$  (known as the “deterministic approach”). As a further exercise, we also make the alternative assumption that the error term is decomposable into a truly inefficiency component and a random error:

$$u_i = u_{1i} + u_{2i}$$

where  $u_{1i} \leq 0$  is half-normal and  $u_{2i}$  is a standard normal error term (the “stochastic approach”).<sup>12</sup> In both cases, the frontier is then given by the function:

$$\ln y = \hat{\alpha}_0 + \hat{\alpha}_1 \ln x.$$

### 2.3 Input and output measures for the Italian public sector

In assessing the efficiency of the public sector in the 103 Italian provinces we focus on five spending categories. Two of them are the responsibility of the central government (the judiciary and education); one is within the remit of the regional governments (health); the remaining two (childcare and waste collection) are administered by the local governments.<sup>13</sup> Depending on the sector, we consider averages over a given period of time (assuming that it takes time for public intervention to influence outcomes) or the most recent year for which data are available (when we have more straightforward output measures). In what follows we provide information about how we measure inputs and outputs for each of the five spending categories and our data sources.

**Health** – We use as input per capita public health expenditure adjusted for the age structure of the population. We take averages over the years 1985-2007. Our computation is based on official expenditure and population statistics, and on coefficients provided by the Ministry of Health to compute the equivalent population (intuitively, these coefficients correct for the fact that health expenditure is concentrated in particular age-groups, so that regions with a higher share of elderly people tend to have higher per capita spending). All these data refer to the 20 Italian regions. Given the lack of province-level data, we assume here that our input measure does not vary across provinces within the same region. Our health performance indicator is the change in life expectancy

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$$Ineff_i^{OUT} = Max \left\{ \theta \text{ subject to : } \sum_{j=1}^N x_j \lambda_j \leq x_i; \sum_{j=1}^N y_j \lambda_j \geq \theta y_i; \lambda_j \geq 0 \forall j; \sum_{j=1}^N \lambda_j = 1 \right\}.$$

In both expressions the last constraint implies variable returns to scale (non-increasing returns to scale if it holds with  $\leq$ ). Dropping this constraint amounts to assuming a production function with constant returns to scale. In our baseline calculation, we assume non-increasing returns to scale. We also provide PSE estimates in which constant returns to scale are assumed.

<sup>12</sup>To implement the deterministic approach we performed the two-step procedure called Corrected Ordinary Least Squares, which delivers consistent estimates of the parameters  $\alpha_0$  and  $\alpha_1$  (Greene, 2008). To implement the stochastic approach we resorted to ML techniques, which again ensure consistency of  $\hat{\alpha}_0$  and  $\hat{\alpha}_1$ .

<sup>13</sup>Besides the Provinces and the State, the other administrative units in Italy are the 20 Regions and the approximately 8100 municipalities.

between the years 1981-1983 and 2003-2005 (as customary, we use averages to reduce the influence of temporary and exceptional events on mortality rates, such as particularly cold winters). We take variations in life expectancy instead of levels to at least partially control for environmental factors which influence outcomes independently of public healthcare. Data for each province from 1992 onward are available from Istat (the National Institute of Statistics); for the previous years, we use data from Lipsi and Caselli (2002), who compute mortality tables for the Italian provinces in the years 1971-73, 1981-83, 1991-93. We also experiment with the inclusion of a second input, namely GDP growth over the period considered, to take into account the fact that a better standard of living can have a positive influence on behaviour and ultimately on health outcomes: it turns out that differences between the two efficiency measures are negligible (correlation between them is equal to 0.94).

**Education** – Our input measure is the number of teachers per pupil in the primary and first three years of secondary school (school year 2005-06). These data are published for each province by the Ministry of Education. Basing our calculations on teachers instead of on spending, for which we do not have province-level data, should not affect our results. In fact, about 97% of education expenditure in Italy is accounted for by compensation of employees. As a measure of output, we use the performance of 6th and 9th grade students in tests carried out by INValSI (the public institute in charge of evaluating the Italian educational system) during the school year 2005-06.<sup>14</sup> Performance is measured by the average score (i.e. the percentage of correct answers in a multiple choice questionnaire) obtained in the Italian, Maths and Science tests. In contrast to evaluation exercises carried out by international institutions (e.g. OECD-PISA, TIMSS, PIRLS), whose sample of pupils cannot be used for our purposes as it is not representative at the province level, INValSI evaluations encompass a much larger number of schools. Actually, for the 6th grade basically all the schools have been tested, while for the 9th grade we have access to a very large representative sample.<sup>15</sup> We also computed an alternative efficiency index, including as a second input the average educational attainment of adults in the province, to take into account the fact that parents' educational background may have an impact on child attainment; results are however very similar under both specifications (the correlation between the two measures of efficiency is equal to 0.96).

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<sup>14</sup>In a very interesting study, Cipollone et al. (2010) use the scores for the 9th and the 11th grades. Instead of taking, as we do, the *averages* of the two measures, they consider the *differences* between the two scores which they interpret as the "value-added" indicators of the school (even if they use only the 2005-2006 cross section, as we do). We believe that the two papers nicely complement each other. As a general method to allow for the possibility that different starting points have an impact on the performance of the school system as a whole, the Cipollone et al. (2010) idea of using for individual-level longitudinal data a method that has previously been applied to class-level cross-section data seems promising. However, we preferred to address this issue in a more traditional way (see Sutherland et al. 2007 and, with special reference to Italy, Boarini, 2009 and OECD, 2009), i.e. trying to control for the educational background of adults (see below). Interestingly, we find a quite similar geographical gradient as in Cipollone et al. (2010).

<sup>15</sup>The 2005-2006 survey is the last one for which a census approach as been followed. Afterwards, INValSI surveyed only a sample of schools. Although on average the results reported by INValSI do not differ substantially from those of other international tests, the outcomes in the South, particularly those obtained in primary schools, seem more favourable than those resulting from other evaluation exercises. Some observers argue that this might be due to some cheating by teachers administering the test in the Southern area. While we are unable to correct for this potential problem - INValSI has indeed recently devised a procedure that corrects for the possibility of cheating, but these data are available only for a small sample of schools and so cannot be used for our purposes - the existence of cheating in the South would imply an even steeper north-south gradient in efficiency, and therefore would strengthen our results.

**Civil Justice** – We take the number of judges per 1,000 new trials in 2006 as our input. Two remarks are in order about this measure. First, lower-level court districts in Italy do not perfectly overlap with provinces (there are 103 provinces and 165 *tribunali*<sup>16</sup>), so we restrict ourselves to the judges working in the main court (*tribunale*) of the province (typically located in the main city, even if there are sometimes other subsidiaries inside the province, which we consider as well). Second, in many districts it is not clear how many judges work in the civil sector, and how many in the criminal sector. We use estimates of this ratio, computed using the available data.<sup>17</sup> Our measure for output in the civil justice sector is the average length of trials in 2006, as estimated by Istat.

**childcare** – Our input is expenditure for child daycare provided by municipalities in 2007 (we only consider the capital of the province). Our output is given by the number of children in daycare in 2007. Data come from the Ministry of the Interior (*Certificati di conto consuntivo dei comuni*). As a robustness check, we added as a second output the best available proxy for the quality of the service, that is the number of nurses available for each child: while this reduces the number of observations (as the information is only available for a subset of provinces) results are basically unchanged (correlation between the quality-adjusted and the unadjusted measure is 0.95).

**Waste Collection** – We take as our input the amount of expenditure for waste collection. We consider separately two outputs, namely tons of waste collected and recycled and tons of waste simply taken to waste disposal sites or incinerated. This distinction is necessary as the first process has of course much higher unit costs, so using the average amount of waste disposal as a single output would certainly be misleading. For both input and outputs we use official data from the Government’s Environmental Protection Agency (APAT, *Rapporto rifiuti* 2006).

## 2.4 The map of public sector efficiency in Italy

In Table 1 we report regional averages of public sector output indicators for each of the five spending items. In the last column we also report a summary measure of regional public sector output, obtained as a simple average of the indicators in each spending area. The indicators show notable differences across Italian regions. In all service categories, regions in the South exhibit the lowest output level. Overall, public sector output in the South is 74 per cent of the Italian average. The gap is higher for services supplied by municipalities (childcare and waste collection).

A similar picture emerges if we look at PSE. In Table 2 we report our baseline measures of efficiency. Again, average public sector efficiency in the South is about 10% below the Italian average. Geographical differences in efficiency are generally more pronounced in the sectors where the service is delivered by municipal authorities: the standard deviation-to-mean ratio ranges between 0.53 (childcare) and 0.08 (education). Interestingly, however, the dispersion in judicial efficiency scores is quite high as well (0.45), mainly due to the high efficiency of courts in the North-west (particularly, in Piemonte). Overall, the correlation between efficiency scores in different public services is not strong (Table 3).

Finally, we compare our baseline measure of average public sector efficiency with other indices, obtained by using different definitions of efficiency and frontier estimation methodologies (Table

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<sup>16</sup>Lower-level court districts (*circondari di tribunali*) are in turn grouped into 29 higher-level districts (*distretti di corte d’appello*).

<sup>17</sup>We are grateful to our colleague C. Giogiantonio for providing us with these figures, based on data from the *Consiglio Superiore della Magistratura* website.

4). The results just described for the baseline measure seem extremely robust. In particular, the correlation coefficient between the output-oriented DEA-based efficiency measures and the values obtained by estimating the frontier by means of the parametric approach is 0.91 for the deterministic case and 0.68 for the stochastic case (Table 5).

### 3 The determinants of public sector efficiency

What determines the efficiency of a public service? Our hypothesis is that strong oversight of citizens and users is crucial in keeping politicians accountable. However, political participation has the nature of a public good: all citizens benefit from it in a non-rival, non-excludable way. This is true even for the most basic form of political participation, i.e. the act of voting: as highlighted by the literature on the so-called voting paradox, for narrowly self-interested citizens the costs of going to vote are likely to outweigh the expected benefits. This is even more true for other more resource-consuming forms of political participation, such as finding out about politics or actively collaborating with others in an effort to influence political decisions.<sup>18</sup> A political culture in which political engagement is a highly-considered value must provide for politicians' oversight.<sup>19</sup>

In what follows we first provide a very simple model in which these ideas are spelled out more formally. Then we move from theory to data, describing our preferred measure of preferences for political participation.

#### 3.1 A simple framework

We propose a straightforward extension of the retrospective voting model of Barro (1973) and Ferejohn (1986). In this model, the only relevant dimension of political conflict is the agency relationship between citizens and the political decisionmaker. In particular, there is no conflict of interests among citizens (who are assumed to behave in a coordinated manner), and there are no differences in competence or talent between politicians (so the problem is one of moral hazard).

A politician (e.g. the prime minister, a regional governor, a mayor) is in charge of providing a service  $s$  in a certain province  $p$ . He can either provide the service in an efficient way, by exerting an effort which costs him  $C$  in utility terms, or he can shirk, and provide the service inefficiently, but at no cost to himself. However, shirking may have a cost for him on election day, when he runs against an opponent. Suppose that a fraction  $q$  of citizens knows that he has shirked. In line with the literature on retrospective voting we assume that the citizens will punish this candidate and vote for his opponent. The uninformed voters will instead randomize between the two candidates. If there are no relevant differences between candidates, this voting rule is (weakly) individually rational. Let the incumbent utility be increasing in the fraction of votes received in the province (according to a concave twice differentiable function  $U(\cdot)$ ). Then the politician's pay-off will be equal to:

$$U\left(q + \frac{1-q}{2}\right) - C$$

if effort is exerted in providing the public good, and to

$$U\left(\frac{1-q}{2}\right)$$

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<sup>18</sup>On the different channels of political participation, an authoritative reference is Verba et al. (1995).

<sup>19</sup>Needless to say, this is a recurring theme in political science and political theory (see e.g. Almond, 1978).

if not. Therefore, the politician will behave if and only if  $q > q^*$ , where  $q^*$  is defined as the unique value of  $q$  for which:<sup>20</sup>

$$U\left(q^* + \frac{1 - q^*}{2}\right) - C = U\left(\frac{1 - q^*}{2}\right)$$

Ex ante, citizens can decide whether to acquire information about the actions of the politician. In particular, suppose that they can see whether the politician shirks or not at a cost  $c_s$ . If the politician does not shirk, and the public service is provided efficiently, each citizen will get a higher level of utility (say,  $u^h$ ) than if the politician shirks (say  $u^l$ ). However, from a purely self-interested point of view, of course, no citizen will find it optimal to acquire information, because it is clear that the impact of one vote at the electoral stage will be negligible. As it is often done in the literature on turnout, we assume that the overall utility of citizens does not only depend on the efficiency of the public service, but since citizens also have a sense of duty, they get utility from the very act of finding out about politics.<sup>21</sup> In particular, the utility of citizen  $i$  is set equal to:

$$u - X_i(c_s - v_i),$$

where  $u = u^h$  if the politician behaves and  $u = u^l$  if the politician shirks,  $v_i$  represents the “psychic gains” that individual  $i$  gets from participating in politics,  $X_i$  is an indicator that is equal to 1 if the citizen acquires information and zero otherwise. Moreover, we assume that in the province  $p$   $v_i$  is distributed in the population according to a uniform distribution with support  $[0, v_p]$  (so provinces with higher  $v_p$  have a higher degree of civicness). Thus the the fraction of people that acquire information about service  $s$  in province  $p$  is equal to  $\min[0, 1 - c_s/v_p]$ , and this in turn implies that service  $s$  will be provided efficiently in province  $p$  if and only if:

$$1 - \frac{c_s}{v_p} > q^*.$$

In words, service  $s$  in province  $p$  will be provided efficiently if  $c_s$  is sufficiently low, and/or if  $v_p$  is sufficiently high (i.e. if the province is sufficiently imbued with civic values).

One can easily extend the basic framework to take into account another element that is considered relevant to determine PSE levels, namely the quality of politicians (Besley, 2006). While in our basic framework all politicians are purely self-interested, one could introduce a fraction of “good-spirited” politicians who always behave honestly, irrespectively of incentives. Let us set the fraction of “good” politicians in province  $p$  equal to  $\pi_p$ , let self-interested politicians differ with respect to their level of  $C$  (which is continuously distributed according to a cumulative distribution function  $F_C(\cdot)$ ), and assume that the quality of the politicians is unobservable, so that an adverse selection component is added to that of moral hazard. In such a framework, the incentives of self-interested politicians change, because behaving honestly now has the further benefit of improving one’s reputation with the well-informed citizens. In particular, in equilibrium the informed citizens

<sup>20</sup>We assume that  $U(1) - C > U(0)$ , so that  $q^*$  is between 0 and 1.

<sup>21</sup>This “consumption benefit” from voting was first introduced by Ricker and Ordeshook (1968) to address the well-known “voter paradox” (the fact that people go to the polls even if the probability for any one of them to be pivotal is negligible). In the literature, several other explanations of the “paradox” have been advanced (for a survey, see Feddersen, 2004). Up to now there seems to be a consensus that voters are indeed motivated to vote by a sense of duty and that it varies systematically across social groups (see Blais, 2000 for a review of the empirical evidence). Of course, for our purposes we do not need to argue that this is the only or even the main motivation to vote.

understand that the probability that the incumbent is good, given the latter exerts effort, is:

$$\frac{\pi_p}{\pi_p + (1 - \pi_p)F_C(C^*)} > \pi_p$$

(while it is obviously 0 otherwise), where  $C^*$  is the level of  $C$  such that

$$U\left(q + \frac{1-q}{2}\right) - C = U\left(\frac{1-q}{2}\right)$$

and the probability of a high effort is  $\pi_p + (1 - \pi_p)F_C(C^*)$ , which is decreasing in  $\frac{c_s}{v_p}$  and increasing in  $\pi_p$ .<sup>22</sup>

### 3.2 Measuring interest in politics

It goes without saying that measuring cultural variables is bound to be difficult and controversial, and political engagement is no exception. We try to capture the degree of political engagement using two proxies borrowed from previous highly influential work. First, we consider the number of newspapers sold in the province (first used by Putnam 1993; updated figures for Italy are taken from Cartocci, 2007) and turnout for referenda from 1946 to 1989 (as in Putnam 1993 and Guiso et al. 2004).<sup>23</sup> We use the simple average of the two indicators as our index of “interest in politics” (*intpol*). Referendum turnout is a more accurate measure of participative attitudes than election turnout, because patronage motivations are absent (we do not consider post-1989 referenda because, given the existence of a minimum turnout threshold, in recent years abstention has been used by those contrary to the referendum objective as a means to make it fail). We checked that results are robust to the use of alternative measures. In particular we also built a more comprehensive index using opinion data from the 2004 Bank of Italy Survey on Household Income and Wealth (SHIW), concerning a representative sample of the Italian population (Banca d’Italia, 2006). In a special section of the 2004 wave a subgroup of the sample (about 10,000 respondents) was asked: “How interested are you in politics?”. Four answers (Very, fairly, not very, not at all) were possible. We used answers to this question (averaged at the province-level), together with newspaper circulation figures and referendum turnout to build a more comprehensive measure of interest in politics. The results (available on request) are qualitatively and quantitatively analogous to those presented in the paper.

To assess the role of “generalized morality” (*morality*) we use as a proxy the amount of blood donations in the province, used among others by Guiso et al. (2004) and Nannicini et al. (2010). For *morality*, as for *intpol*, we experimented with other proxies, and in particular we exploited the fact that in the 2004 SHIW respondents were asked to what extent they deemed the following three behaviours acceptable: a) not paying for one’s ticket on public transport; b) keeping money obtained by accident when it would be possible to return it to the rightful owner (for example, if you found a wallet with the owner’s name and address, or if you were given too much change at the supermarket check-out); c) not leaving your name for the owner of a car you accidentally scraped

<sup>22</sup>Here we make the standard assumption that the informed voters compare the incumbent’s reputation with the reputation of an outsider chosen at random from the population, so they vote for the incumbent as long as his reputation is better.

<sup>23</sup>The importance of the press for political accountability is stressed, among others, by Snyder and Stromberg (2010).



while parking. Using answers to these questions (province averages) together with blood donations as an alternative index of generalized morality did not change our results.

Table 6 displays region averages for our baseline *intpol* (together with its sub-indices) and *morality* measures, all showing as expected that the Southern part of the country lags behind with respect to both indicators.

## 4 Empirical analysis

In our theoretical framework, the degree of citizens’ concerns for public affairs has an impact on efficiency (due to the pressure that vigilant citizens put on politicians). In our empirical analysis we capture this link estimating the following equation:

$$Eff_p = \beta_0 + \beta_1 intpol_p + \beta_2 X_p + \epsilon_p, \quad (1)$$

where  $Eff_p$  stands for PSE in province  $p$  (expressed as a ratio of its sector-specific mean);  $intpol_p$  is our “interest in politics” indicator, and  $X_p$  is a vector of controls. In our baseline specification, and unless otherwise stated, it consists of the province population and of a dummy for the Southern provinces (the latter variable is meant to capture any other factor, besides political participation, which could drive the north-south divide<sup>24</sup>).  $\beta_1$  is the parameter we are primarily interested in.

### 4.1 OLS estimation

As our point of departure, we estimate equation (1) by OLS, using average PSE as our dependent variable: the impact of *intpol* is positive and significant at 1% confirming our hypothesis that interest in politics has a positive impact on efficiency (Table 7a, column 1). As a robustness exercise, we also show the results of regressions in which on the left-hand side are the five PSE sub-indices (Table 7b; for all the five dependent variables, the set of controls is the same as in the baseline regression). This helps to identify whether our result is driven by the way in which average PSE is computed. Reassuringly, the coefficient on *intpol* is positive and significant in four out of five sectors (the exception being civil justice).

Our second step is to include *morality* among the regressors, which however turns out to be non significant (Table 7a, column 2). This finding suggests that pro-social values are important for PSE only to the extent that they translate into higher political participation.<sup>25</sup> It seems indeed that, as remarked by Putnam, “citizens in the civic community are not required to be altruists”, and altruism is neither sufficient nor necessary to participate in politics. Inefficient public action in the less developed areas of Italy might have more to do with political apathy and discouragement, with a sense of political ineffectiveness, than to the often quoted “amoral familism” (Banfield, 1958).

<sup>24</sup>This is in the same vein as in Guiso et al. (2008), which focus on the effects of different levels of social capital within the North.

<sup>25</sup>As we remarked in the introduction, several political scientists (e.g. Inglehart 1977) tend to be sceptical about the existence of such a direct link between the two set of values, at least in advanced post-industrial societies. Interestingly, Almond and Powell (1963, chapter IX) noticed that in their dataset (coming from surveys conducted in 5 Western nations) this link was particularly weak in the case of Italy.

## 4.2 Instrumental variables estimation

While it is plausible that preferences shape political and economic outcomes, one cannot take for granted that preferences themselves are exogenous. Concerning our subject matter, there are many reasons why current PSE may influence current interest in politics. Low quality governments may indeed breed discouragement and apathy with respect to politics in some citizens, instead of pressure for change.

Ideally, we would like to capture the effects of the truly exogenous components of political values. To this aim, we resort to IV estimation.

First, we instrument *intpol* with measures of political engagement of earlier generations of Italians, consistent with recent research which shows that several cultural traits are transmitted across time from one generation to the next (Tabellini, 2008b). So we consider indices of political and social participation in the early 20th century, given respectively by electoral turnout in the last pre-fascism election and by the fraction of people participating in pro-social associations (both are taken from Nuzzo, 2006).

A second complementary possibility is to argue that the degree of political engagement observed in a community is due to past political institutions. Therefore, we also try to identify the exogenous component of *intpol* using as instruments the features of formal political institutions in place in the XIV century (taken from de Blasio and Nuzzo, 2006). The idea here is that while in the medieval *repubbliche* civic liberties and political engagement were flourishing, in the rest of the Italian provinces institutional arrangements were characterized by weaker democracies and less developed political life. In particular, de Blasio and Nuzzo (2006) identify four other kinds of government, namely, the dictatorial *signorie*, the absolutist kingdom of the church (*pontificio*), the southern *Regno delle due sicilie*, and a residual group of provinces governed by foreign powers (*periferiche*). The assumption is that even a short experience of democracy and participation in the very distant past is able to shape citizens' attitudes towards politics today (as in Guiso et al., 2007), while it is unlikely to have had a direct impact on today's PSE.

Results are shown in Table 8a (average PSE is the dependent variable). The first stage regressions are quite encouraging: the fit is good and values of the F statistics are always well above the thresholds usually required (Table 8b).

The second stage regressions confirm that political values matter in explaining PSE. Indeed, the component of *intpol* explained by political history is again positive and significant at 1%, (the coefficient is actually higher than in the OLS estimation, suggesting that instruments go some way in solving measurement error problems for our independent variables). For both sets of instruments, the Hansen test cannot reject the null that instruments are clean.

The economic significance of higher levels of civic engagement is non negligible: a 10% increase of *intpol* from its average level implies an increase in PSE of more than 3%.

Our next step is to run the IV estimation adding *morality* as a further regressor. Even in this case, *intpol* turns out to be strongly significant, whereas *morality* is not (Table 8a). This is true even when *morality* is instrumented with the same set of instruments used to instrument *intpol*, although our instruments seem weaker in this case (see Table 8b, last two columns: the R-square and the F statistics are somewhat lower than in the other first stage regressions, especially when we use the set of political history dummies).<sup>26</sup>

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<sup>26</sup>In a way, the very fact that the historical roots of today's generalized morality seem quite different from those of today's political culture lends weight to our argument that the two concepts should be kept distinct.

As a final robustness exercise, we try to address the concern that our instruments, which perform quite well in explaining today's political participation, do not have a direct impact on PSE today, making our IV strategy invalid. Of course, this possibility can never be ruled out or tested. However, we try to relax our identification assumption including among the regressors (an estimate of) the level of GDP per capita at the province level. These widely used data (the only ones available for Italy) are provided by the Italian Chamber of Commerce, and are definitely not free from measurement errors. In any case, the results of our further empirical exercise are reassuring, as even with the inclusion of GDP per capita among the regressors the (historically determined) component of *intpol* remains significant (Table 8a and Table 8b).

## 5 Extension: the role of decentralization

Due to the institutional characteristics of the Italian public sector, our data-set can also shed some light on a second possible determinant of PSE besides political culture, namely the degree of centralization in public sector provision.

Indeed, the decentralization of service provision may affect PSE through several channels (see for example Treisman, 2002; Rodden, 2006; Lockwood, 2006, Oates, 2005). On the one hand, it is often emphasized that local politicians are more easily monitored, so that (using the framework put forward in the previous section)  $c_s$  is lower if service  $s$  is provided by a lower level of government. On the other hand, there might be diseconomies of scale in providing services in a decentralized manner:  $C$  could be higher if the service is provided locally. This last point has an obvious impact on incentives: as  $C$  is higher for the decentralized providers (let us assume that for each politician the cost of effort is increased by a quantity  $\Delta C > 0$  equal for all of them),  $q^*$  and  $C^*$  are higher as well, so that the probability that self-interested politicians will behave in an honest way tends to be lower. Finally, the benefits from decentralization are likely to depend on the quality of the local pool of politicians. Thus, decentralization is beneficial if and only if:

$$(\pi_p - \pi_{mean})(1 - F_C(C^{*dec})) + (1 - \pi_{mean})(F_C(C^{*dec}) - F_C(C^{*cen})) > 0. \quad (2)$$

which can be true or false depending on the parameters, and on the specific characteristics of the province considered. In particular, the first term is positive in areas in which the politicians are more honest than average, and negative otherwise. The second term is positive if and only if  $C^{*dec} > C^{*cen}$ <sup>27</sup>, i.e. if the increase in the benefits stemming from honest behaviour due to stricter oversight is higher than the increase in the cost of effort, due to diseconomies of scale. To sum up, whether on average decentralized service provision enhances efficiency remains an empirical question.

Moreover, it is not even certain on a priori grounds whether the net benefits of decentralization increase with the degree of political engagement. Indeed, while this is true for  $(\pi_p - \pi_{mean})(1 - F_C(C^{*dec}))$ , it can be easily shown that  $F_C(C^{*dec}) - F_C(C^{*cen})$  decreases as  $v_p$  rises (intuitively, the decrease in  $c_s$  due to decentralization is less important in those provinces in which there is a high level of  $v_p$ : in these provinces, people monitor politicians' behaviour in any case).

<sup>27</sup>The two thresholds are defined by the following indifference conditions:

$$C^{*cen} = U(q^{cen} + \frac{1 - q^{cen}}{2}) - U(\frac{1 - q^{cen}}{2}); C^{*dec} = U(q^{dec} + \frac{1 - q^{dec}}{2}) - U(\frac{1 - q^{dec}}{2}) - \Delta C$$

As the five public services that we study are delivered by different levels of government (the central government provides education and administrates justice, regions provide healthcare, municipalities provide child daycare and waste collection), our data-set allows us to shed some light on the impact of decentralization on PSE. Indeed, we can relate our service-specific measures of public sector efficiency to decentralization in service provision. To this end, we use a pooled sample, in which each sector-province data point is considered as a distinct observation. On this expanded sample, we estimate our baseline specification, augmented by a dummy variable which is equal to one if the service is provided at the municipal level and zero otherwise. It turns out that the effect of decentralization is statistically insignificant (Table 9, column 1).

However, this result might conceal opposite effects of decentralization on the lower and the upper tails of the efficiency distribution. To detect such effects, we perform quantile regressions.<sup>28</sup> Results indicate that the effect of decentralization is indeed significant and negative for the lower quantiles (Table 9, columns 2 to 5). It becomes positive (and significant) in the upper part of the efficiency distribution. That is, being managed by central or regional governments improves PSE in areas where efficiency is low. In contrast, within the provinces where the average quality of public services is higher, locally-provided services are more efficient than centrally-provided ones.

Needless to say this result is potentially of great policy relevance. As decentralization might amplify differences between regions, forms of “two-speed decentralization”, where only the most efficient regions are allowed to provide certain services, seem advisable.<sup>29</sup>

## 6 Conclusions

In this paper we build objective measures of PSE for the Italian provinces and show that they positively depend on the citizens’ willingness to participate in politics. Using within-country data allows us to control for differences in formal rules, reduces omitted variable bias, and also gives us the possibility to exploit the unique peculiarities of Italy’s extremely long and rich political history. Indeed, it turns out that, as Putnam (1993) imagined, this history still has an impact on today’s political life. We find that historically-determined political values still influence the quality of the Italian public sector. In particular, it seems confirmed that, whatever the level of government involved, a well-functioning public sector requires active citizens, able and willing to monitor and sanction inefficient politicians. As Putnam puts it: “citizens in civic communities expect better government, and (in part through their own effort) they get it [...] if decision makers expect citizens to hold them politically accountable, they are more inclined to temper their worst impulses rather than face the public protests”. We also provide evidence which suggests that pro-social values per se seem neither necessary nor sufficient to have a well-functioning government. Finally, shifting our focus from cultural to institutional variables, we find that service decentralization is something of a mixed blessing: it is likely to benefit areas in which PSE is already strong, at the risk of further depressing PSE in areas in which is already very low.

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<sup>28</sup>Koenker and Hallok (2001) provide a very readable introduction to the literature on this technique, as well as a comprehensive set of readings.

<sup>29</sup>A similar arrangement is in place in Spain, and has been proposed in Italy as well.

## 7 References

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Table 1. Public sector output indicators

Region (1)	Health (2)	Education (3)	Judicial system (4)	Daycare (5)	Waste disposal (6)	Average
Valle d'Aosta	1.04	1.06	1.35	1.20	1.13	1.16
Piemonte	1.01	1.06	1.95	1.07	1.18	1.25
Liguria	1.00	1.01	1.04	1.19	0.99	1.05
Lombardia	1.18	1.04	1.43	0.72	1.34	1.14
Trentino Alto Adige	1.21	0.98	1.52	1.64	1.25	1.32
Veneto	1.20	1.04	1.10	0.78	1.44	1.11
Friuli Venezia Giulia	1.09	1.11	1.39	1.25	1.07	1.18
Emilia Romagna	0.98	1.05	1.03	2.63	1.32	1.40
Toscana	0.95	1.04	1.05	1.59	1.30	1.19
Umbria	0.91	1.02	0.97	0.96	1.16	1.00
Marche	0.98	1.05	0.97	0.84	0.88	0.94
Lazio	0.93	1.01	0.97	1.29	0.69	0.98
Abruzzo	0.88	1.03	0.95	0.60	0.89	0.87
Molise	0.84	0.98	0.93	0.23	0.42	0.68
Campania	0.94	0.96	0.95	0.19	0.66	0.74
Puglia	1.06	0.95	0.66	0.24	0.67	0.72
Basilicata	0.85	0.94	0.62	0.67	0.47	0.71
Calabria	0.87	0.93	0.77	0.13	0.63	0.67
Sicilia	0.91	0.95	0.83	0.56	0.58	0.77
Sardegna	0.95	0.95	0.74	0.54	0.59	0.76
<b>ITALIA</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>
North-west	1.06	1.04	1.44	1.04	1.16	1.15
North-east	1.12	1.04	1.26	1.58	1.27	1.25
Centre	0.94	1.03	0.99	1.17	1.01	1.03
South	0.91	0.96	0.81	0.39	0.61	0.74

(1) Regional values are obtained as simple averages of provincial values. - (2) Change in life expectancy. - (3) Invalsi score obtained by 6th and 9th grade students. - (4) Inverse of average length of trials. - (5) Number of children receiving care per inhabitant. - (6) Average performance computed on two indicators: total disposal per inhabitant and percentage of differentiated disposal.

Table 2. Public sector efficiency indicators (output-oriented DEA)

Region (1)	Health	Education	Judicial system	Daycare	Waste disposal	Average
Valle d'Aosta	0.77	0.92	0.30	0.17	0.70	0.57
Piemonte	0.76	0.91	0.43	0.45	0.65	0.64
Liguria	0.74	0.87	0.23	0.44	0.87	0.63
Lombardia	0.87	0.89	0.32	0.38	0.76	0.64
Trentino Alto Adige	0.89	0.84	0.34	0.38	0.63	0.62
Veneto	0.88	0.89	0.24	0.37	0.72	0.62
Friuli Venezia Giulia	0.82	0.95	0.31	0.33	0.70	0.62
Emilia Romagna	0.72	0.92	0.23	0.71	0.87	0.69
Toscana	0.72	0.90	0.23	0.49	0.89	0.65
Umbria	0.69	0.88	0.25	0.50	0.76	0.61
Marche	0.74	0.91	0.21	0.41	0.82	0.62
Lazio	0.69	0.87	0.22	0.52	0.84	0.63
Abruzzo	0.66	0.89	0.21	0.35	0.75	0.57
Molise	0.62	0.84	0.21	0.11	0.56	0.47
Campania	0.70	0.83	0.21	0.27	0.65	0.53
Puglia	0.78	0.82	0.15	0.34	0.78	0.57
Basilicata	0.69	0.81	0.14	0.38	0.58	0.52
Calabria	0.68	0.81	0.17	0.33	0.74	0.55
Sicilia	0.67	0.82	0.18	0.40	0.74	0.56
Sardegna	0.70	0.82	0.16	0.29	0.77	0.55
<b>ITALIA</b>	<b>0.75</b>	<b>0.87</b>	<b>0.24</b>	<b>0.42</b>	<b>0.76</b>	<b>0.59</b>
North-west	0.79	0.90	0.32	0.36	0.75	0.62
North-east	0.83	0.90	0.28	0.45	0.73	0.64
Centre	0.71	0.89	0.23	0.48	0.83	0.63
South	0.69	0.83	0.18	0.31	0.70	0.54

(1) Regional values are obtained as simple averages of provincial values.



Table 3. Correlations across sector-specific efficiency measures (1)

	Healthcare	Education	Judicial system	Daycare	Waste disposal
Healthcare	1.00	0.19	0.33	0.02	0.01
Education		1.00	0.26	0.21	0.06
Judicial system			1.00	-0.02	-0.07
Daycare				1.00	0.31
Waste disposal					1.00

(1) Measures refer to output efficiency (DEA).

Table 4. Public sector efficiency scores

Region (2)	Output efficiency (DEA)		Input efficiency (DEA)		Linear efficiency (3)		Deterministic efficiency	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Valle d'Aosta	0.57	13	0.39	18	0.39	17	0.62	11
Piemonte	0.64	4	0.51	6	0.47	8	0.65	4
Liguria	0.63	5	0.47	10	0.42	12	0.64	6
Lombardia	0.64	3	0.56	2	<b>0.51</b>	<b>1</b>	0.66	3
Trentino Alto Adige	0.62	10	0.46	12	0.41	15	0.63	8
Veneto	0.62	8	0.54	3	0.48	6	0.64	7
Friuli Venezia Giulia	0.62	7	0.50	9	0.48	5	0.65	5
Emilia Romagna	<b>0.69</b>	<b>1</b>	<b>0.62</b>	<b>1</b>	0.50	3	0.66	2
Toscana	0.65	2	0.53	4	0.49	4	<b>0.66</b>	<b>1</b>
Umbria	0.61	11	0.50	7	0.47	7	0.63	10
Marche	0.62	9	0.52	5	0.50	2	0.63	9
Lazio	0.63	6	0.50	8	0.43	10	0.61	12
Abruzzo	0.57	14	0.43	13	0.43	11	0.60	13
Molise	0.47	20	0.38	20	0.38	20	0.52	20
Campania	0.53	18	0.40	16	0.38	18	0.56	18
Puglia	0.57	12	0.47	11	0.47	9	0.58	15
Basilicata	0.52	19	0.40	17	0.40	16	0.55	19
Calabria	0.55	17	0.42	15	0.42	14	0.57	16
Sicilia	0.56	15	0.43	14	0.42	13	0.58	14
Sardegna	0.55	16	0.39	19	0.38	19	0.56	17
<b>ITALIA</b>	<b>0.59</b>		<b>0.49</b>		<b>0.46</b>		<b>0.62</b>	
North-west	0.62		0.48		0.45		0.64	
North-east	0.64		0.53		0.47		0.64	
Centre	0.63		0.51		0.47		0.63	
South	0.54		0.41		0.41		0.57	

(1) Scores refer to average public sector efficiency. - (2) Regional values are obtained as simple averages of provincial values. - (3) Linear and deterministic efficiency for waste disposal are computed using total disposal only as a measure of output.

Table 5. Correlations across different efficiency measures (1)

	Output-oriented DEA	Input-oriented DEA	Linear efficiency	Deterministic efficiency	Stochastic efficiency
Output-oriented DEA	1.00	0.91	0.76	0.91	0.68
Input-oriented DEA		1.00	0.85	0.85	0.60
Linear efficiency			1.00	0.83	0.61
Deterministic efficiency				1.00	0.71
Stochastic efficiency					1.00

(1) Measures refer to average public sector efficiency.

Table 6. Interest in politics and morality.

Region (1)	Referendum turnout	Newspapers (2)	<i>Intpol</i>	<i>Morality</i> (3)
Valle d'Aosta	85.42	52.64	69.03	34.47
Piemonte	91.41	42.75	67.08	44.52
Liguria	88.75	75.84	82.30	37.70
Lombardia	93.69	57.30	75.49	45.81
Trentino Alto Adige	90.74	83.15	86.94	48.38
Veneto	95.31	50.32	72.81	48.91
Friuli Venezia Giulia	91.87	79.82	85.84	67.32
Emilia Romagna	97.84	61.63	79.74	59.15
Toscana	94.55	54.29	74.42	56.03
Umbria	94.66	36.25	65.45	46.77
Marche	93.18	36.56	64.87	40.62
Lazio	89.20	35.53	62.36	34.47
Abruzzo	82.50	30.79	56.65	38.15
Molise	73.81	16.97	45.39	40.48
Campania	74.79	18.50	46.64	25.31
Puglia	80.24	21.96	51.10	43.63
Basilicata	79.91	15.65	47.78	46.86
Calabria	70.17	21.59	45.88	24.78
Sicilia	75.46	21.12	48.29	39.18
Sardegna	80.50	55.85	68.18	36.58
<b>ITALIA</b>	<b>86.20</b>	<b>43.43</b>	<b>64.81</b>	<b>42.96</b>
North-west	<b>89.82</b>	<b>57.13</b>	<b>73.48</b>	<b>40.63</b>
North-east	<b>93.94</b>	<b>68.73</b>	<b>81.33</b>	<b>55.94</b>
Centre	<b>92.90</b>	<b>40.66</b>	<b>66.78</b>	<b>44.47</b>
South	<b>77.17</b>	<b>25.30</b>	<b>51.24</b>	<b>36.87</b>

(1) Regional values are obtained as simple averages of provincial values.

(2) Copies sold per 1,000 inhabitants; (3) Blood donors per 1,000 inhabitants

Table 7a. OLS estimation (robust standard errors in parentheses)

	Total PSE			
Constant	0.800 (0.076)	***	0.784 (0.0781)	***
<i>Intpol</i>	0.003 (0.001)	***	0.003 (0.001)	**
<i>Pop</i>	0.002 (0.001)	***	0.003 (0.001)	***
<i>D_South</i>	-0.094 (0.032)	***	-0.091 (0.031)	***
<i>Morality</i>			0.001 (0.001)	
R <sup>2</sup>	0.46		0.47	
Observations	103		103	

Table 7b. OLS estimation by sector (robust standard errors in parentheses)

	PSE								
	Education		Health		Civil Justice		Child Care		Waste coll.
Constant	0.957 (0.042)	***	0.787 (0.073)	***	1.116 (0.290)	***	0.092 (0.342)		0.779 (0.116)
<i>Intpol</i>	0.001 (0.001)	*	0.003 (0.001)	***	0.000 (0.003)		0.011 (0.005)	**	0.003 (0.002)
<i>Pop</i>	0.000 (0.000)	*	0.001 (0.001)		0.001 (0.002)		0.015 (0.002)	***	0.001 (0.001)
<i>D_South</i>	-0.066 (0.018)	***	-0.024 (0.032)		-0.409 (0.118)	***	-0.075 (0.135)		0.000 (0.050)
R <sup>2</sup>	0.31		0.20		0.17		0.32		0.08
Observations	103		103		103		95		103

Table 8a. Instrumental variables estimation (robust standard errors in parentheses)

	Instruments: Political history		Instruments: Past political participation		Instruments: Political history (1)		Instruments: Past political participation (1)		Instruments: Political history (2)		Instruments: Past political participation (2)		Instruments: Political history		Instruments: Past political participation	
Constant	0.656	***	0.634	***	0.602	***	0.585	***	0.369	**	0.590	**	0.635	***	0.634	***
	(0.0873)		(0.096)		(0.0929)		(0.1072)		(0.378)		(.2599)		(0.0754)		(0.080)	
<i>Intpol</i>	0.005	***	0.005	***	0.005	***	0.005	***	0.004	**	0.005	***	0.005	**	0.005	*
	(0.0012)		(0.001)		(0.0013)		(0.0013)		(0.0018)		(.0018)		(0.0019)		(0.003)	
<i>Pop</i>	0.002	***	0.002	***	0.002	***	0.002	***	0.003	***	0.002	***	0.002	***	0.002	***
	(0.001)		(0.001)		(0.0006)		(0.0006)		(0.0006)		(0.0007)		(0.0006)		(0.001)	
<i>D_South</i>	-0.044		-0.043		-0.040		-0.043		-0.025		-0.043		-0.036		-0.042	
	(0.0336)		(0.03)		(0.0031)		(0.0326)		(0.0387)		(0.0339)		(0.0333)		(0.0321)	
<i>Morality</i>					0.001		0.001		0.006		0.001					
					(0.0012)		(0.0012)		(0.0078)		(0.0056)					
<i>GDP per capita</i>													0.001		0.001	
													(0.0046)		(0.007)	
Hansen test (p-value)	0.969		0.979		0.478		0.837		0.386		just identified		0.950		0.795	

(1) Only *intpol* is instrumented; (2) Both *intpol* and "morality" are instrumented.

Table 8b. First stage regressions (robust standard errors in parenthesis)

	Dependent variable: "intpol"				Dependent variable: "morality"											
<i>Repubbliche</i>	0.738				0.396				2.162				3.827			
	(3.757)				(3.8148)				(3.135)				(3.259)			
<i>Signorie</i>	0.771				0.484				1.674				3.221			
	(3.959)				(3.9211)				(3.369)				(2.837)			
<i>Pontificio</i>	-11.564	***			-11.461	***			-6.806	**			-1.149			
	(3.801)				(3.791)				(3.249)				(3.110)			
<i>DueSicilie</i>	-21.258	***			-21.141	***			-15.112	***			-1.310			
	(2.877)				(2.896)				(2.822)				(2.3701)			
<i>Election</i>			0.494	***			0.474	***			0.313	***			0.232	***
			(0.086)				(0.0841)				(0.0823)				(0.0867)	
<i>Associations</i>			0.015	*			0.016	*			0.002				-0.010	*
			(0.0087)				(0.009)				(0.0062)				(0.006)	
<i>Morality</i>					0.089		0.087									
					(0.0798)		(0.0856)									
<i>GDP per capita</i>									1.026	***	1.489	***				
									(0.295)		(0.302)					
R <sup>2</sup>	0.75		0.66		0.75		0.67		0.78		0.73		0.17		0.21	
F statistic	72.63		49.42		60.93		39.40		66.04		66.15		3.29		6.11	
Observations	103		103		103		103		103		103		103		103	

In the first stage *D\_south*, *Pop*, and a Constant are always included among the regressors.

Table 9. OLS and quantile regression estimation (robust standard errors in parentheses)

	OLS		Quantile regression: deciles							
			0.1		0.25		0.75		0.9	
Constant	0.471	***	0.614	***	0.716	***	0.845	***	0.901	***
	(0.089)		(0.148)		(0.085)		(0.079)		(0.188)	
<i>Intpol</i>	0.002	*	0.003	*	0.003	**	0.003	***	0.003	
	(0.001)		(0.002)		(0.001)		(0.001)		(0.003)	
<i>Pop</i>	0.001	*	0.001	*	0.001	**	0.002		0.011	***
	(0.001)		(0.001)		(0.001)		(0.003)		(0.003)	
<i>D_South</i>	-0.032		-0.218	***	-0.081	*	-0.080	***	-0.128	*
	(0.038)		(0.077)		(0.047)		(0.026)		(0.066)	
<i>D_Municipality</i>	-0.026		-0.226	***	-0.123	***	0.055		0.163	**
	(0.024)		(0.044)		(0.042)		(0.042)		(0.069)	
Observations	507		507		507		507		507	

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