

# Equitable and sustainable well-being in Italian municipalities: Do women in politics make the difference?<sup>☆</sup>

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## ARTICLE INFO

### JEL classification:

codes: I31  
H75  
J16

### Keywords:

Well-being  
Female politicians  
Gender  
Municipalities

## ABSTRACT

This paper investigates whether the gender of elected politicians affects the performance of Italian local governments in providing equitable and sustainable well-being to citizens. In fact, Italy was the first country in the European Union to include citizens' well-being objectives in economic planning. We use data on more than 6000 Italian municipalities for two years to investigate the relationship between gender representation at three bodies of local government with measures of socio-economic and environmental sustainability and find that larger representation of women in municipal leadership, executive and council bodies is significantly associated with improved municipal well-being. These results are also confirmed by accounting for endogenous issues, by adopting an extended definition of well-being and other robustness checks. Differences among northern and southern regions emerge with regard to the effects of incumbent female politicians. Other heterogeneous impacts are unclear or less marked.

## 1. Introduction

In recent decades, and in almost every advanced country, municipalities have been under pressure to carry out public functions and to deliver a higher quantity and quality of local public services. Meanwhile, they have undertaken growing expenditure reduction in order to comply with the European Union and national fiscal discipline on public finance goals. Thus, ensuring the efficiency and effectiveness of the public sector and the quality of performance may be challenging for local governments [1]. These efforts respond to the general aim of enhancing the well-being of citizens and their societal quality of life, which are fundamental functions performed by local governments [2–6].

Several scholars have suggested that the gender structure of local governments matters for the performance of public organizations [7]. Women are underrepresented in elected political institutions in almost all countries [8]. However, the relative rise of women in governing functions has affected the economic and political outcome in several respects, such as increased institutional quality [9,10] as well as budgetary stability and financial sustainability [11]. Moreover, the

gender composition of political bodies can influence the adoption of particular policies and the provision of specific public goods reflecting gender preferences [12]. The corresponding budget allocation impacts not only on the government efficiency [13,14] but also on the societal quality of citizens' everyday lives [15].

In this study, we investigate if a more gender-balanced participation favouring the inclusion of women in local political processes can play a role in ensuring a higher level of citizens' equitable and sustainable well-being. This issue has received only limited attention, though concern over individual well-being is increasing across the world.

Focusing on the Italian context, this paper contributes to the existing literature on local government performance and well-being in several respects. First, we measure the impact of women's representation in local government and the gender of mayors on performance outcomes across Italian municipalities. The novel feature of this paper is that it measures the performance in the provision of equitable and sustainable well-being, instead of focusing on the provision of public services which is a common feature in the international literature [16,17]. Citizen's well-being is conceived as a multidimensional concept and is measured by means of a diversified set (or dashboard) of indicators as suggested by

<sup>☆</sup> We are grateful to Editor-in-Chief and two Anonymous Referees for their valuable comments. We would like to thank participants at the XLV International Conference on Regional Science, Valencia (Spain) and at the 62 Annual Conference of Italian Society of Economist, Ancona (Italy). This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors. Authors' declaration of interest: none.

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the general “going beyond GDP” initiative [18].<sup>1</sup> Given that the importance of adopting this approach is spreading across several countries, assessment of the correlation between individual well-being and public action may be of interest in nations other than Italy.

Second, we use the Wroclaw Taxonomic Method [19] to aggregate the set of indicators of well-being. The resulting index is computed as a normalized distance of each municipality from an ideal unit, that is, the unit which achieves the best performance on all the indicators. The Wroclaw Taxonomic Method (hereafter, WTM) has several advantages. Since the ideal unit is a hypothetical unit that assumes, for each indicator, the most desirable value within the data set (optimal score), it depends on data distribution. Thus, the WTM is a data-driven method since it avoids any arbitrariness in the choice of minimum and maximum thresholds for normalization. To make it clearer, the WTM works differently of what happens in the normalization step adopted in the framework of the well-known Human Development Index, where the minimum and the maximum are fixed to \$100 and \$75,000, respectively, even if \$100 is not the minimum of the distribution and several countries achieve more than \$75,000 [20]. Furthermore, one of the WTM strengths is its ease of calculation which is a desiderata property in composite indicators construction [21].

Finally, local government performance analysis is often limited to a single region or to groups of municipalities of a specific size [22–24]. In this study, we focus on all the Italian municipalities belonging to Ordinary Statute Regions (hereafter, OSRs) since they share a common institutional framework.

The empirical analysis is conducted on more than 6000 Italian municipalities in 2014 and 2015. Using the Ordinary Least Squares (OLS) method, we find that a larger female composition of political bodies significantly increases local government’s performance in the provision of citizens’ well-being. We also check for potential unobservable heterogeneity, omitted variables, or reverse causality between well-being and a politician’s gender by adopting a Two Stage Least Square (2SLS) method using as instrument the introduction of gender quotas in Italy from 1993 (law 81/1993) until 1995, already exploited in other studies [25]. The 2SLS results confirm the OLS evidence. Overall, it is shown that a higher number of women in politics correlates with the provision of higher levels of well-being to citizens. These estimates were robust to alternative estimation procedures, such as pooled panel data analysis for the two years available. Similar conclusions hold when we adopt an extended definition of well-being where a further indicator of local government environmental quality is added. Differences in performance between North and Central-South regions are detected. Female politicians appear more effective in providing well-being in councils located in the Center and in the South of Italy. Heterogeneity effects among municipalities with high/low female rate of labour participation are less statistically significant. Mixed results emerge as to the impact of gender interaction among more feminized political bodies within the municipality.

The rest of the paper is organised as follows. In Section 2, we review the strand of literature relevant to this study. Section 3 provides a description of the Italian institutional setting. Section 4 describes data and variables, and the methodology used to construct the municipal well-being index. Section 5 illustrates the empirical model and the estimation methodology. It follows results, sensitivity analysis and robustness checks in Section 6. Finally, Section 7 concludes.

## 2. Literature background

### 2.1. Gender and public policy performance

The possibility that men and women have different preferences

regarding public policy priorities and resource allocations has been addressed in the literature to a large extent (for a review see Ref. [12]). The presence of females in decision-making positions reduces the risk that women’s interests are not taken into account in policy making [26]. Focusing on local government studies, it has been observed that female representation can shift policy choices and spending allocation decisions toward local public goods and services particularly targeted on women’s needs and preferences [25]. The evidence is stronger in the case of developing countries [27–29]. Results are more mixed when local councils from more advanced countries are examined. On the one hand, Svaleryd [30] found that Swedish local public expenditures were aligned with elected women’s preferences because resource allocation was relatively weighted towards childcare and education. Also Funk and Gathmann [31] reported that the gender gap in Swiss policy issues affected local spending patterns even if it had small impact on the size of government.<sup>2</sup> In the context of Brazilian municipalities, Brollo and Troiano [32] found that when female mayors were in office, resources were more likely to be allocated to health and education facilities, thus supporting female needs and being more attentive to the well-being of citizens. On the other hand, according to Ferreira and Gyourko [33], the mayor’s gender is uncorrelated with both local government size and the composition of municipal spending in the context of US cities. The presence of women among local council members does not matter for policy decisions also within Spanish municipalities as shown by Bagues and Campa [34] who did not detect significant differences either in the budget composition or in the amount of allocated public expenditure. As regards the Italian case, which is relevant for the purpose of the present paper, Rigon and Tanzi [35] found, at the level of local municipalities, that gender in politics had no (or limited) effect on resource allocation among different categories of current expenditures. Conversely, the investigation carried out by Braga and Scervini [25] proved that the gender of politicians, including that of the mayor, did not affect the general ‘quality of life’, but it significantly increased the efficacy of policies targeted on women and households and the efficiency of the municipality proxied by the size of the administrative bodies. Finally, studies using the quasi-experimental approach report that a larger female participation in local councils rises expenditure for security and reduces administration costs [36]. Other ones show that no differences emerge between mayors of different sex, except for female mayors backed by a larger female share in the municipal council who tend to increase environmental expenditure [37].

### 2.2. Equitable and sustainable well-being

Societal well-being occupies a prominent position on the agendas of not only economists and social scientists but also policy-makers. The topic has received greater interest since 2009, when the so-called Stiglitz-Sen-Fitoussi Commission on the Measurement of Economic Performance and Social Progress stated clearly the limitations of Gross Domestic Product (GDP) as an indicator of the economic performance and social progress of countries and regions [18]. Distributional issues and the contribution to the development of the entire area of non-market goods and services, such as health, education, security, environment, and governance, are completely ignored when a single indicator is used [18,38]. In this sense, well-being is a multifaceted concept and a multidimensional phenomenon encompassing several dimensions that extends far beyond income. Thus, the “beyond GDP” initiative requires the development of indicators that are as informative and appealing as GDP but are more inclusive of environmental and social aspects of progress.

Based on the guidelines established by the Stiglitz, Sen and Fitoussi

<sup>1</sup> For more details on “going beyond GDP” see: [https://ec.europa.eu/environment/beyond\\_gdp/index\\_en.html](https://ec.europa.eu/environment/beyond_gdp/index_en.html).

<sup>2</sup> For example, women care more about environmental protection, public health, and social welfare. To be noted is that these issues are closely relevant to societal well-being [18].

Commission, in 2010 the Organization for Economic Cooperation and Development (OECD) launched the Better Life Index. This was one of the first attempts to measure well-being as a dashboard of 11 dimensions: that is, income and wealth, jobs and earnings, housing conditions, health status, work-life balance, education and skills, social connections, civic engagement and governance, environmental quality, personal security, and subjective well-being. Indicators of well-being were calculated for 34 OECD countries [39]. Thereafter, several countries launched similar initiatives that have produced country-specific well-being measures (for a review of the literature see Ref. [40,41]).<sup>3</sup>

In Italy, in 2011, an index of “Equitable and Sustainable Well-being” (henceforth BES using the Italian acronym) was developed by the Italian National Institute of Statistics (ISTAT) and the National Council of Economy and Labor (CNEL) with the purpose of making the concept of “going beyond GDP” the basis of individual choices and public policies to improve the well-being of citizens.<sup>4</sup> Accordingly, the Italian budget law 163/2016<sup>5</sup> introduced the more comprehensive multidimensional concept of well-being besides recommended economic goals into the Italian Economics and Finance Document (henceforth DEF according to the Italian acronym). A small group of indicators, among those proposed by ISTAT for the development of BES, were adopted to assess the quality of the policies enacted and their effects on citizens in terms of collective well-being and sustainability. The indicators chosen were the following: the average available income; an index of inequality; the rate of non-participation in work; the emissions of CO2 and other climate-altering gases.

Italy was the first country in the European Union to include welfare objectives in the budget formulation process and in the forward-looking evaluations of the government’s programmatic actions i.e., in economic planning [42]. This reform of the budget has placed Italy at the forefront in introducing aspects of the well-being of citizens that “go beyond GDP” in public decision-making processes.

### 3. Institutional setting

Italy is a decentralized country consisting of a central government and three levels of local government: regions, provinces, and municipalities. The region is the upper level of local government, whereas the province and municipality are the intermediate and the lowest level, respectively. Currently, there are 20 regions,<sup>6</sup> 107 provinces (including two autonomous provinces) and 7904 municipalities in 2021.

<sup>3</sup> As examples, “Measuring National Well-being Programme” in United Kingdom, “Well-being Framework” in Australia, “National Strategy for Sustainable Development - Findicator” in Finland, “Les Nouveaux Indicateurs de Richesse” in France, “National Sustainable Development Strategy - W3 Indikatoren” in Germany.

<sup>4</sup> The BES project, which was presented to the public in 2013, consists of a set of 134 indicators partitioned into 12 dimensions of well-being: health, education and training, work-life balance, economic well-being, social relationships, politics and institutions, safety, subjective well-being, landscape and cultural heritage, environment, research and innovation, and quality of services. See <https://www.istat.it/en/well-being-and-sustainability/the-measurement-of-well-being/indicators>.

<sup>5</sup> In Italy, the state budget law is the main instrument of the public finance manoeuvre together with the law of stability.

<sup>6</sup> There are 15 ordinary statute regions (Abruzzo, Basilicata, Calabria, Campania, Emilia Romagna, Lazio, Lombardia, Liguria, Marche, Molise, Piemonte, Puglia, Toscana, Umbria, Veneto) and 5 special statute regions (Friuli Venezia Giulia, Trentino Alto Adige, Valle D’Aosta, Sardegna, and Sicilia). Special statute regions have more fiscally and legislatively autonomy than the ordinary ones. For a geographical representation of the Italian regions by macro areas see Figure A1 in Appendix A.

National law assigns to municipalities a wide range of functions to perform in the areas of administration and control, education, environment and territory, roads and transport and social services, among others.<sup>7</sup> Thus, municipalities are responsible for providing local public services such as kindergartens, school buses, street lighting, waste collection and many other functions: an array of services that can strongly affect citizens’ quality of life and overall well-being. These functions are exercised by the mayor (*Sindaco*) who is accountable for the administration of the municipality. The mayor is directly elected by voters and remains in office for no more than two mandates of five years each (Law 120/1999).<sup>8</sup> In municipalities with a population of up to 15,000 inhabitants, the mayor is elected according to a single-ballot plurality procedure. Accordingly, the mayoral candidate who receives the largest share of votes is elected. In municipalities with a population greater than 15,000 inhabitants, the mayor is elected according to dual-ballot rule. Specifically, the mayoral candidate who obtains the absolute majority of the votes (i.e., 50 % + 1 of the valid votes) is elected. If none of the candidates reaches the absolute majority, a second electoral round takes place between the two candidates ranked in the first and the second position in terms of votes received in the first round. The candidate who obtains the largest number of valid votes is then elected as mayor in the second round (Law 81/1993, Legislative Decree 267/2000).

The mayor has the power to appoint and remove the members of the executive body (*Giunta Comunale*) (Law 81/1993). Their number ranges from a minimum of 2 for municipalities with a population of fewer than 3000 inhabitants to a maximum of 12 for those with over 1 million inhabitants (Law 56/2014). They collaborate with the mayor for carrying out his/her electoral program and for implementing the general guidelines of the *municipal council* (*Consiglio Comunale*), which is a body responsible for the fundamental acts of direction, programming and control at the municipal level. The municipal council exercises political and administrative control of the municipal activities. It is composed of the mayor and a number of councillors which depends on the population size. In municipalities with a population of fewer than 3000 inhabitants, 10 municipal councillors are elected, while in municipalities with more than 1 million inhabitants, 48 councillors are elected (Law 56/2014). The election of its members is carried out simultaneously with that of the mayor. In small municipalities, with up to 15,000 inhabitants, 2/3 of the municipal council seats are assigned to the party list supporting the winning mayoral candidate that reported the highest number of valid votes. The remaining seats are divided proportionally among the other party lists. In large municipalities, with populations greater than 15,000, the party list (or a coalition of parties) supporting the winning mayoral candidate receive a majority bonus according to the share of votes obtained by it in the first or second electoral round.<sup>9</sup> The majority bonus ensures that they obtain 60 % of the seats of the municipal council, guaranteeing a greater political stability at the municipal level.<sup>10</sup>

<sup>7</sup> For more details on the municipal functions see art. 13, Legislative Decree 267/2000; art. 21, comma 3, Law 42/2009; art. 14, comma 27, Law 122/2010; art. 19, comma 1, letter a), Legislative Decree 95/2012 converted by Law 125/2012.

<sup>8</sup> Since 2014, the number of mandates has increased to three for municipalities with a population of up to 3000 inhabitants (art. 1, comma 138, l. 56/2014).

<sup>9</sup> Specifically, if the candidate for mayoral office is elected in the first round, the party lists supporting him/her receives 60 % of the council seats if they obtain at least 40 % of the valid votes and other party lists does not exceed 50 % of the valid votes. If the candidate for the mayoral office is elected in the second round, the party lists supporting him/her also receives 60 % of the council seats in case they do not achieve 60 % of the valid votes and any other party list supporting the candidate for mayoral office exceed 50 % of the valid votes in the first round.

<sup>10</sup> Majority bonus characterizes local electoral systems of some European countries such as Italy, France and Greece [74]. Its effectiveness with regard to the democratic representation is often debated [75].

#### 4. Data and sample

We examined Italian municipalities belonging to the OSRs. We thus maintained a common institutional framework by excluding local governments located in the 5 Italian Special Statute Regions, given that the latter enjoy own specific electoral rules, a larger degree of autonomy and a broader set of powers in organizing lower levels of government.

The nexus between gender representation in political bodies and municipalities' well-being performance was examined in the two years of 2014 and 2015. For more recent years, we had a limited availability of data at municipal level suited to matching the domains of well-being addressed in DEF as fundamental for policy action.

After adoption of the above selection criteria and the removal of municipalities for which well-being indicators, data on the gender composition of institutional bodies or control variables were missing, the sample for the baseline estimation reduced to 6019 and 6162 observations in 2014 and 2015, respectively. Further details on sample refinements and missing municipalities are illustrated in Appendix C.

To build the data set for the empirical analysis we relied on different data sources to collect information on the following areas: local councils' performance, data on politicians elected in municipalities and statistics on councils' characteristics. Summary statistics of all the variables developed for the empirical analysis are reported in Table 1 (descriptive statistics for 2014), Table 2 (well-being index development for 2014 and 2015) and Appendix Table B1 (descriptive statistics for 2015).

##### 4.1. Women in politics indicators

Data on representation of women in politics were obtained from two sources. The *A misura di Comune* database, released by ISTAT, provided the shares of women in the municipal executive bodies (*femexec*) and in city councils (*femcoun*). Both indicators were developed by ISTAT using the data of the Municipal Administrators' Registry of the Ministry of the Interior. As a further indicator of politicians' gender, we used the Municipal Administrators' Registry of the Ministry of the Interior to determine a mayor's gender. We created a dummy variable *femayor* that assumed value 1 if the mayor was a female and zero otherwise.

Descriptive statistics of the above variables are reported in Table 1. Fig. 1 presents the distribution of gender representation in Italy for *femexec* and *femcoun* and the mean values of the entire set of gendered political variables over the years 2014 and 2015. These two variables present distributions and statistics very similar across the two years. One possible explanation is that in year 2014 more than 50 % of Italian municipalities renewed their political bodies through election while only 13 % in 2015.<sup>11</sup> The scenario that emerges from Fig. 1 indicates a low representation of women in political bodies which is in line with evidence already reported by Ceciari [8]. The lower values were reported by statistics on female mayors.

##### 4.2. Index of well-being performance

To compute the well-being index used to measure municipal performance, we aggregated indicators provided by *A misura di Comune*, a multi-source data system collected by ISTAT. It provides indicators at municipal level related to both important structural aspects and to phenomena observed in the context of the measurement of equitable and sustainable well-being; indicator series normally start in 2014.

As to computation of the performance indicator, the Italian budget law 163/2016 prescribed that a set of indicators narrower than the general BES framework designed by ISTAT-CNEL should be included in the DEF for reporting to parliament in the context of budgetary

discussions. It was intended to direct attention to outcomes that matter for people's living conditions and quality of life but were not currently considered in routine policy analysis. The selected indicators were: the average available income; an index of inequality; the rate of non-participation in work; the emissions of CO<sub>2</sub> and other climate-altering gases. Clearly, equitable and sustainable well-being includes not only economic components of progress, but also social and environmental ones. Because these indicators were not available at the municipal level of analysis, we adopted several proxies in our study. Specifically, the municipality's total gross income of registry families divided by the number of members of registry families stood for the average available income (*ypc*). *Inequality (ineq)* was computed at the municipal level as the ratio between the total pre-tax equivalent income held by 20 % of registered person with higher incomes and the total equivalent pre-tax income held by 20 % of registered persons with lower incomes. The percentage of registry households with work intensity less than 20 % of their potential in total registry families signalled the rate of non-participation in work within a municipality (*work*). Finally, the environmental disregard of the municipality was proxied by the percentage of circulating cars in Euro class 0–3 in the total of circulating cars (*car*). With the exception of income, higher values of these proxies corresponded to lower levels of citizens' well-being.

To evaluate performance of local governments in providing well-being according to the multidimensional concepts indicated by the DEF, we computed a composite index *WB\_index* that aggregated all the above well-being indicators into a single number. It measured the overall well-being registered at the municipal level. In the context of the current paper, this approach has the advantage of providing an easy measure of the municipality's performance while also allowing rankings and comparisons across municipalities. Even if this approach has the drawback of collapsing all the information into a single number, so that some aspects may be hidden or minimized [38], the use of a synthetic index is quite widespread and most valuable for supporting political decisions and public communication, and for policy monitoring [43].

Among possible methodologies for constructing composite indices [21,44],<sup>12</sup> we adopted the WTM. This was first designed in the early 1950s by Polish mathematicians belonging to the Wroclaw Graduate School of Economics [19] and applied by Harbison et al. [45] to aggregate indicators of economic development. The idea behind this method is to account for the distance with respect to an ideal unit. The concept of ideal unit is broadly used in the measurement of well-being. It is a synonymous of reference value or goalpost. For instance, according to UNDP [46], to normalize the indicators in the interval [0, 1], the goalposts are the minimum and maximum values that ensure that original data expressed in different units fall into the above-mentioned interval. Similarly, the reference values can be fixed exogenous to the dataset to avoid extreme values. For instance, for the construction of the Human Development Index (HDI), the goalposts for all the dimensions have been set by experts. In the case of life expectancy at birth, that is the first domain of the HDI, the minimum is set to 20 years (even if no countries register such value) and the maximum to 85 years. In this way, normalized indicators range into the interval [0.51, 1.00] [47].

In the recent years, the WTM has attracted the attention of numerous scholars. For instance, Agovino et al. [48] adopt the WTM to construct a composite indicator for evaluating the sustainability in agriculture through 16 variables for 28 EU countries over the period 2005–2014. Senetra and Szarek-Iwaniuk [49] use the WTM to classify the counties in the Region of Warmia and Mazury based on their demographic, socio-economic and spatio-functional parameters. Feldmeyer et al. [50] define

<sup>11</sup> In 2014, 4098 out of 8057 municipalities had election; 95.2 % of municipalities belonged to OSRs. In 2015, only 1060 out of 8047 municipalities had election; 48.3 % of municipalities belonged to OSRs.

<sup>12</sup> These two essays testify the growing interest about composite indicators in social sciences and the importance of exploring the potential of different approaches to address the issue. For an example, the special section edited by Charles et al. [44] proposes interesting methodologies building on multivariate statistics, spatial analysis techniques and non-parametric approaches.



**Table 1**  
Variables definition and summary statistics - Year 2014.

Variable	Definitions	Obs	Mean	Std. Dev.	Min	Max
WB_index	Well-being index: 4 indicators	6019	0.499	0.143	0	0.781
WB_index2	Well-being index: 5 indicators	5532	0.520	0.147	0	0.792
femcoun	Share of women in municipal council	6019	0.275	0.145	0	1
femexec	Share of women in municipal executive	6019	0.263	0.203	0	1
femmayor	Gender of the mayor (dummy: 1 = female, 0 = otherwise)	6016	0.142	0.349	0	1
fempop	Share of female on total population (%)	6019	50.686	1.551	35.065	62.37
educated	Share of educated (university) on total population (%)	6019	22.967	8.524	0	100
oldage	Ratio between elderly (>65) and young (<15) people	6019	207.172	167.273	29.55	5400
density	Municipal population density (1000/sq. km)	6019	0.319	0.632	0.001	12.06
htspec	Employees in high-tech manufacturing and service industries in total local unit employees (%)	6019	1.744	3.933	0	62.66
servspec	Ratio between employees of business services in the municipality in total employees of the municipality over employees of business services in Italy in total number of employees in Italy (%)	6019	0.634	0.354	0	3.41
heritage	Endowment of cultural assets measured as number of archaeological, architectural and museum assets per 100 square kilometers	6019	26.901	107.75	0	4356
houseserv	Arithmetic mean of the percentage ratios of the number of occupied dwellings provided with a) indoor drinking water, b) indoor toilet, c) bathtub or shower and hot water to total occupied dwelling	6019	0.991	0.016	0.66	1
coastal	Coastal Municipality (dummy: 1 = coastal; 0 = otherwise)	6019	0.06	0.237	0	1
altim	Altrimetic zone: Inland hill	6019	0.338	0.473	0	1
macro-area	Geographical area: North-West (dummy:1 = North-West	6019	0.453	0.498	0	1
genderquota	Duration of gender quota law (number of days/365)	6019	1.637	0.757	0	2.118

Legend: Variables and basic indicators to develop the Well-being indices are derived from “A misura di Comune” database, released by ISTAT. As exceptions, data source of genderquota is Historical Electoral Archive of the Ministry of the Interior and femmayor is Municipal Administrators’ Registry of the Ministry of the Interior.

**Table 2**  
Summary statistics for Wroclaw and its dimensions in 2014 and 2015.

	Description	Min.	1st Qu.	Median	Mean	3rd Qu.	Max
W B_index2014	Wroclaw 2014	0.0000	0.3813	0.5414	0.4948	0.6099	0.7813
Components							
Ypc	Average income per capita	4088	10625	13415	13002	15072	29543
Work	Rate of non-participation	2.00	12.00	16.00	18.88	25.00	77.00
Ineq	Inequality	0.00	5.00	7.00	8.91	11.00	66.00
Car	C02 emissions	9.00	42.00	49.00	50.21	58.00	87.00
W B_index2015	Wroclaw 2015	0.0000	0.5455	0.7031	0.6586	0.7719	0.9611
Components							
Ypc	Average income per capita	4472	10894	13775	13360	15473	30428
work	Rate of non-participation	3.23	13.81	18.64	21.48	27.80	79.59
Ineq	Inequality	0.08	4.87	7.33	8.74	10.92.00	72.97
Car	C02 emissions	0.00	38.650	45.27	46.97	55.08	112.60

a regional climate resilience index for federal state of Baden-Württemberg (Germany) and prove that, according to the sensitivity analysis, the WTM performs the best. Consequently, the resilience indicators aggregated with WTM are validated as the best Regional-Climata-Resilience-Index (RCRI). More recently, Punzo et al. [51] propose a composite indicator of sustainable tourism for the 21 Italian Regions by aggregating 75 elementary indicators, using the WTM among the 23 different combinations of system of weighs and aggregation methods. Finally, Marino and Tebala [52] use the WTM to construct a synthetic index of the welfare of European countries.

Among the large class of aggregation methods, the WTM has several advantages. First, it is a data-driven method since the benchmark depends on its distribution. Second, if a new year  $t$  is added, the values of the indices for the previous years do not change. This is also true if a new territorial unit  $i$ , whose values of the variables are less than or equal to the reference values, are added. Thus, it is useful to perform spatial-temporal analysis even with a changing sample of units under observation. Third, even if there is no consensus on the identification of the ideal unit [53,54], according to Marino and Tebala [52] the use of the ideal unit is among the main advantages of the WTM. In fact, it is a kind of benchmark, that is the optimal point to reach. For each unit, the final score is computed as a sort of distance between itself and the benchmark. This final score permits to easily analyze the differences among units as well as, in overtime analysis, the improvement or worsening year by year. Thus, by means of the ideal unit, the WTM allows to rank the units with respect to their distance from the optimal situation. The idea

behind the WTM is quite intuitive since it is based on the Euclidean distance from a theoretical unit characterized by the best performance for all indicators considered. Then, the composite indicator is based on the distances from the ideal unit and normalized by a measure of variability.

The construction of the composite indicator typically involves two main steps [21]: the normalization and the aggregation. Following the classical notation, we denote by  $x_{ij}^t$  the value of the  $j$ -th indicator  $j \in \{1, \dots, k\}$  collected at time  $t$  for the  $i$ -th Italian municipality  $i \in \{1, \dots, n\}$ . Thus, data can be summarized by means of a rectangular matrix whose rows represent the endowment of a given municipality. Now, to remove the effects due to different units of measurement, for each year  $t$ , we normalize the data and, simultaneously, we also take the so-called polarity<sup>13</sup> of the indicator into account. The elementary indicators are normalized according to the z-score (usually called “standardization method”):

$$z_{ij}^t = \pm \frac{x_{ij}^t - \mu_j^t}{\sigma_j^t} \tag{1}$$

<sup>13</sup> The polarity represents the sign of the relation between the indicator and the phenomenon to be measured. We have a positive polarity if the individual indicator represents a dimension considered positive, that is, the indicator is positively correlated with the phenomenon. Similarly, we have a negative polarity if it represents a dimension considered negative.

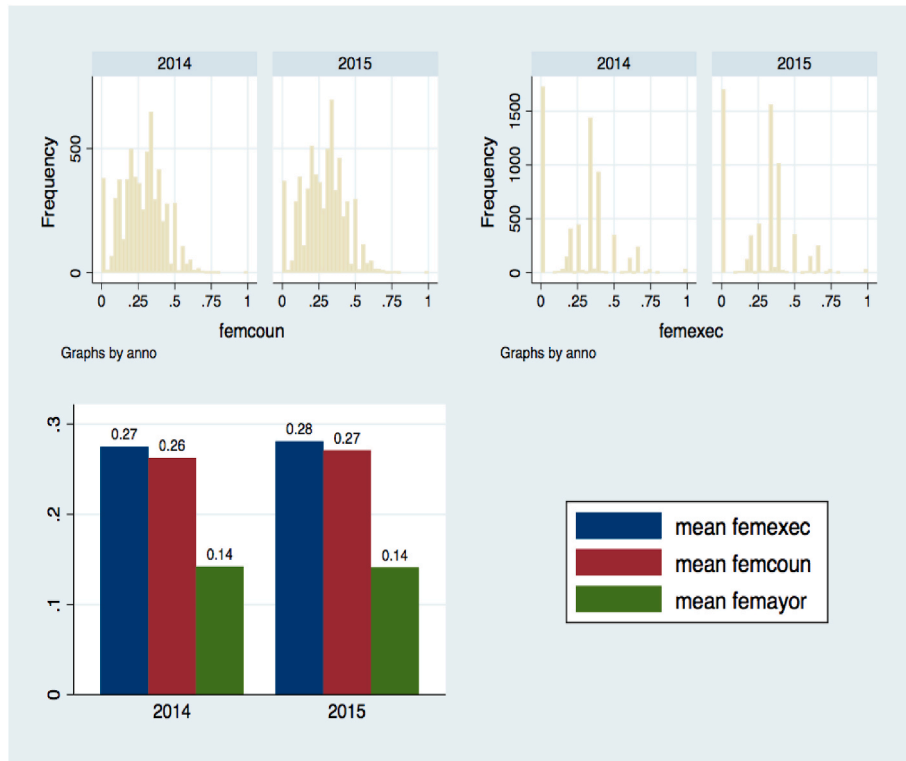


Fig. 1. Distribution of female political representation in Italy - years 2014, 2015. Source: Authors' elaboration

where  $\mu_j^t = \frac{1}{n} \sum_{i=1}^n x_{ij}^t$  represents the mean for indicator  $j$  at time  $t$  and  $\sigma_j^t = \sqrt{\frac{1}{n} \sum_{i=1}^n (x_{ij}^t - \mu_j^t)^2}$  is the corresponding standard deviation. The sign  $\pm$  is used to take into account the polarity, that is, we will use the sign  $+$  in the case of indicators with positive polarity and the sign  $-$  in the case of negative polarity.<sup>14</sup> Thus, after the normalization procedure all the indicators are positively correlated with the phenomenon we are measuring. This type of normalization is the most used because it converts all indicators to a common scale with an average equal to 0 and standard deviation equals to 1. Moreover, this type of normalization, also known as standardization, has the advantage that an indicator with very higher values will have intrinsically a greater effect on the composite indicator [21].

As discussed before, for the aggregation step, the WTM requires the definition of ideal unit. Thus, for all the indicators and for each year, we set the ideal unit equal to the maximum value. Thus, for each unit and for each year, the Euclidean distance between all the normalized values and such maximum is computed:

$$d_i^t = \sqrt{\sum_{j=1}^m \left( z_{ij}^t - \max_i(z_{ij}^t) \right)^2} \tag{2}$$

The combination of the normalization step via z-score with the Euclidean distance allows us to emphasize those units (namely, municipalities) that are better performing since they achieve the minimum distance. This is another strength of the WTM.

Finally, the Wroclaw synthetic indicator is defined as:

<sup>14</sup> We observe that Equation (1) is a faster way to normalize. Alternatively, it is possible to apply to variables with negative polarity the following linear transformation:  $x'_{ij} = \max_i(x_{ij}) - x_{ij}$ , where  $\max_i(x_{ij})$  represents the maximum of indicator  $j$ , and then apply the z-score with the sign  $+$  to all.

$$W_i^t = \frac{d_i^t}{d^t - 2\sigma(d^t)} \tag{3}$$

where  $d^t = \frac{1}{n} \sum_{i=1}^n d_i^t$  denotes the arithmetic mean of the distances of each territorial unit from the ideal one and  $\sigma(d^t) = \sqrt{\frac{1}{n} \sum_{i=1}^n (d_i^t - d^t)^2}$  is the standard deviation of the distances.

By construction,  $W_i^t$  takes the minimum value 0 when the municipality reaches the maximum value in all the pillars, and it increases the further the territorial unit (municipality) is from the reference. However, the definition of  $W_i^t$  seems somewhat counter-intuitive since as the index increases, we are far from an optimal situation in which all the countries show better performances. Thus, the complement to the maximum achieved in each year of the indicator was computed as follows:

$$WB_i^t = \max_i W^t - W_i^t \tag{4}$$

As discussed above, the WTM, even if it is a “old” method, since it has been introduced in the 1950s, it has been receiving increasing interest in recent years. In fact, compared with more traditional and widely used methods such as the Arithmetic Mean or the Geometric Mean, it has several advantages. For instance, it can be applied also when normalized values are equal to zero whereas, for a theoretical point of view, methods based on the Generalized Means, such as the geometric mean or, more in general, power means, could be applied only for (strictly) positive quantities. Moreover, since units that are below the mean achieve negative values, in the computation of the distance, such values are emphasized respect to units that perform on average. In addition, besides the Euclidean distance  $d_i^t$  (see Eq. (2)), there is also a normalization by means of a measure of variability of these distance (in the denominator there is the mean plus twice the standard deviation) (see Eq. (3)). This is essential because it makes the WTM a non-compensatory method, unlike the arithmetic mean which suffers from the

compensability of the indicators. In general, the components of a composite indicator are called ‘substitutable’ if a deficit in one component can be compensated by a surplus in another one. In this way, we can define a method for aggregation as ‘compensatory’ or ‘non-compensatory’ depending on whether it permits compensability or not [55]. The non-compensatory approach allows us to overcome problems related to the non-substitutability of indicators and for this reason is a suitable requirement for the construction of a composite indicator. The main weakness of the WTM is that, from a computational point of view, it is more difficult to calculate than traditional arithmetic mean. However, to overcome this drawback, in recent years scholars have developed various software and packages (see for example the “Ranker software” developed by ISTAT<sup>15</sup> or the “Compind package”<sup>16</sup> for the R software).

By adopting this procedure for the above-described basic indicators and examined years, we were able to compute a Wrocław well-being index (*WB\_index*) for any municipality. Specifically, the composite indicators for 2014 and 2015 have been computed using contemporaneous sub-components data for years 2014 and 2015, respectively. Summary statistics and the distribution of these indexes are reported in Table 2 and Fig. 2, respectively.

Looking at Table 2, the Wrocław well-being index displays quite different values in the two years. However, the plot of the two distributions (Fig. 2), where the colours are almost identical, suggests that they are similar in terms of rank. For example, looking at the extreme tails of the distributions, Table 3 of the ranking of the top 10 municipalities, as well as the ranking of the bottom 10 in the two years, displays that 7 municipalities are listed in both the 2014 and 2015 top ten group; similarly, it happens for 5 out of 10 municipalities in the bottom list. A final confirmation is offered by the computation of the  $\tau$  rank correlation according to the Kendall’s rank non-parametric correlation coefficient [56] which returns a value equal to 0.9391. We test the null hypothesis that the two rankings are uncorrelated and an almost zero value for the p-value suggests that we have to reject the null hypothesis, meaning that true  $\tau$  is not equal to 0.<sup>17</sup>

Table 4 reports the correlations between the Wrocław index and its sub-components in the two years as well as the correlation among sub-components. More in detail, the column(row) in grey colour reports the correlations among Wrocław index and its sub-components in 2014 (2015). The lower triangular matrix is for 2014 and the upper triangular matrix refers to 2015. In this way, a value of 0.9147 denotes the correlation between the composite indicator and the *Ypc* component for 2014 and 0.9109 is for 2015. As expected, in 2014, the index positively correlates with the income variable, confirming the sign used in the normalization step for the construction of the Wrocław index. Moreover, looking at the composite index, the highest correlation (in absolute term) is between the composite index of 2014 and *ypc* (0.9147), whereas the lower one is with *ineq* (−0.1828) for the same year.

### 5. Empirical model and estimation methodology

This section illustrates the empirical model and the estimation methodology used to estimate the effects of female representation in politics on a municipality’s well-being performance. The baseline model specification used to estimate this effect is reported in Equation (5).

$$WB\_index_i = \alpha + \beta gender_i + X_i \gamma + \epsilon_i \tag{5}$$

It is a cross-sectional model where the dependent variable corresponds to the indicator of the equitable and sustainable well-being performance *WB\_index* of the *i*-th municipality, and gender is the indicator of gender representation in a municipality’s political bodies - i.e.,

<sup>15</sup> See: <https://i.ranker.istat.it/>.

<sup>16</sup> See: <https://rddocumentation.org/packages/Compind/versions/2.5>.

<sup>17</sup> The plots of the distributions as well as complete test results are available to reader upon request.

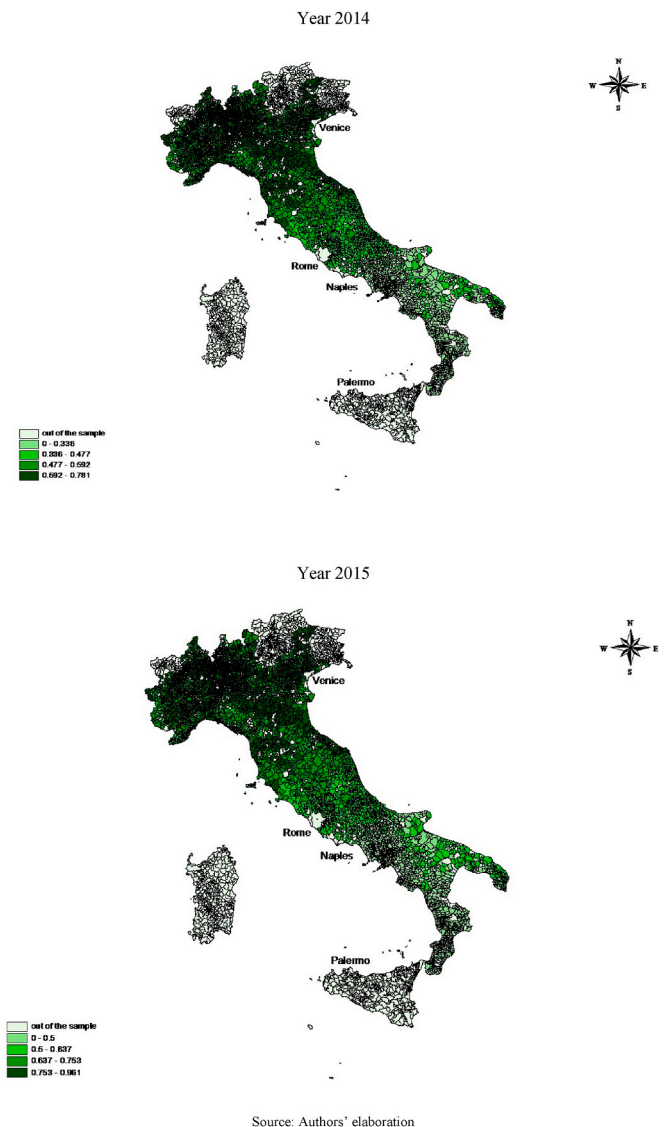


Fig. 2. Distribution of well-being index in Italy - Years 2014, 2015. Source: Authors’ elaboration

*femexec*, *femcoun*, *femayor*. *X* is the  $N \times K$  matrix of the control variables to describe socio-economic and geographical characteristics of the municipalities extracted from the source *A misura di Comune*. We include among controls, the following socio-demographic characteristics of municipalities: the shares of women in the total population (*fempop*); the share of high educated people in the total population (*educated*); old age dependency ratio computed as the ratio between population aged over 65 as a percentage of the population aged under 15 (*oldage*); population density (*density*). We add controls on general economic characteristics of the municipality proxied by: production specialization in high-tech sectors as the percentage of employees in high-tech manufacturing and service industries in total local unit employees (*htspec*); location quotient of employees of business services computed as the per cent ratio between employees of business services in the municipality in total employees of the municipality over employees of business services in Italy in total number of employees in Italy (*servspec*). These indicators capture the attractiveness of the municipal area in terms of a higher level of human capital and more profitable activities which increase labour productivity and wealth of the municipality with benefices for economic well-being of citizens [57]. The urban structure and historical identity of the municipality can affect overall citizen’s quality of life and well-being. They reflect the concrete opportunities of accessing

**Table 3**  
Top and bottom 10 municipalities in 2014 and 2015.

Rank	Top Municipality	Wroclaw	Rank	Bottom Municipality	Wroclaw
<b>2014</b>					
1	Ceresole Reale	0.781	6390	Sorrento	0.000
2	Cortina d'Ampezzo	0.778	6389	Val Rezzo	0.022
3	Milano	0.768	6388	Campora	0.023
4	Bologna	0.767	6387	Giffone	0.030
5	San Lazzaro di Savena	0.766	6386	Verbicaro	0.042
6	Cellatica	0.763	6385	Anacapri	0.056
7	Casalecchio di Reno	0.756	6384	Casalattico	0.072
8	Oldenico	0.754	6383	San Sebastiano al Vesuvio	0.083
9	Voltago Agordino	0.751	6382	Castel Volturno	0.086
10	Travacò Siccomario	0.747	6381	Terravecchia	0.087
<b>2015</b>					
1	Pila	0.961	6390	Africo	0.000
2	Tremezzina	0.928	6389	Giffone	0.208
3	Cortina d'Ampezzo	0.927	6388	San Luca	0.220
4	Oldenico	0.926	6387	Verbicaro	0.222
5	San Lazzaro di Savena	0.925	6386	Livo	0.225
6	Bologna	0.921	6385	Val Rezzo	0.233
7	Ceresole Reale	0.919	6384	Casalattico	0.235
8	Voltago Agordino	0.915	6383	Peglio	0.241
9	Portofino	0.914	6382	Settingiano	0.258
10	Milano	0.914	6381	Anacapri	0.259

**Table 4**  
Correlation in 2014 (lower triangular matrix) and 2015 (upper triangular matrix).

	2014/2015	ypc	work	Ineq	car
2014/2015	–	0.9109	–0.8520	–0.2010	–0.8946
Ypc	0.9147	–	–0.7547	0.0628	–0.7906
Work	–0.8566	–0.7551	–	0.0978	0.6971
Ineq	–0.1828	0.0859	0.0874	–	0.0064
Car	–0.8890	–0.8010	0.6960	–0.0222	–

facilities, enjoying active citizenship and belonging to communities [58]. These aspects are controlled by: an index of services availability in the dwelling recorded at census year 2011 calculated as the arithmetic mean of the percentage ratios of the number of occupied dwellings provided with a) indoor drinking water, b) indoor toilet, c) bathtub or shower and hot water to total occupied dwelling (*houseserv*); endowment of cultural assets measured as number of archaeological, architectural and museum assets per 100 square kilometers registered in 2017 (*heritage*).<sup>18</sup> Territorial and geographical dummy variables are: coastal municipality (*coastal*); altimetric zone (*inland hill*) dummy (*altim*); geographical macro-area (*macro\_area*). Finally,  $\varepsilon$  is the error term clustered at provincial level.

The empirical model is estimated with the OLS method. However, the gender composition of institutional bodies may be endogenous [26]. Unobservable heterogeneity, omitted variables, or reverse causality between well-being and a politician's gender could bias OLS estimates. Prejudice about women's effectiveness or omitted variables that may hinder the empowerment of females at municipal level or their propensity to run for election are factors potentially correlated with

council's performances [25,59–61]. They may influence the likelihood that citizens cast their votes for female candidates, making identification of the effect of gender representation in a municipality's political body not reliable.

In order to address these issues, we use a 2SLS strategy. A first-stage equation was estimated where the endogenous variable gender was regressed on an instrumental variable  $z$  and  $X$ . In the second stage,  $WB\_index$  is regressed on  $X$  and the estimated value of gender.

The instrumental variable was selected according to whether it was statistically significant in predicting the value of the endogenous variable but was not correlated with the municipality's well-being provision estimated in the second stage. In fact, if the instrument is only weakly correlated with the endogenous variables, the 2SLS estimates are biased towards the OLS estimates and standard errors are biased downward (Hahn & Hausman, 2003, 2005). For the choice of the instrument, we follow Braga and Scervini [25]. These authors exploited the fact that gender quotas were in force in Italy from 1993 (Law 81/1993) until 1995. Under this rule, neither gender can represent more than 2/3 of the electoral candidates. Given the short period covered by the reform, not all municipalities voted under the gender quota regime. It is thus possible to identify two groups of municipalities, one affected by the quota and the other unaffected. The authors assumed this occurrence as an exogenous source of variation between municipalities and over time that may have had an impact on the presence of females in legislative bodies with no expected effects on political outcomes. Accordingly, they instrumented the variable denoting the gender composition of local political bodies with a dummy signalling if the appointed local politicians were elected and appointed while the gender quota was in force. This approach is also supported by the findings of several studies that demonstrate that quotas regulating the gender composition of candidate lists promote the representation of women in politics, even after the quota is removed [34,62,63]. Building on these premises, in our analysis we adopted *genderquota* as the instrument. It was computed as the number of days, measured as a fraction of year, elapsing from the introduction of the gender quotas law and the date of the last election in which resident of a municipality voted under the quota regime. It measured the duration and the intensity of the quota treatment to which the municipality was subject. It was assumed to be positively correlated with the share of women elected to local councils' political bodies. The instrumental variable *genderquota* was computed using municipal election dates provided by the Historical Electoral Archive (*Archivio Storico delle Elezioni*) of the Ministry of the Interior.<sup>19</sup>

## 6. Results

### 6.1. Baseline results

The OLS and 2SLS estimates of Equation (5) are reported in Table 5. Estimation results are reported only for the year 2014 since, as illustrated in section 4, data does not change substantially among the two years. Estimates for 2015 almost replicate results obtained for 2014.<sup>20</sup> For the sake of brevity, Table 5 displays only key variables results; the whole estimate including controls is reported in Table B2 in the appendix section.

Focusing on key variables and OLS results, we detect a statistically significant positive correlation between the well-being performance index and female participation in local government political bodies. The larger the share of females in councils (*femcoun*), the greater the impact on the level of well-being provided (*WB\_index*). A one-unit share increase in female presence in a council's composition leads to an increase in the local municipality well-being performance index of about 0.20 points. Similarly, the expected marginal improvement of well-being in

<sup>18</sup> This indicator is available starting from 2017, the closest year to the ones adopted in this study. The variable is subject to slow variation across years.

<sup>19</sup> Data are available at: <https://elezionistorico.interno.gov.it>.

<sup>20</sup> Results for 2015 are available upon request.



**Table 5**  
OLS and 2SLS Estimates of municipal well-being performance and women in politics – Year 2014.

	Dependent variable: <i>WB_index</i>					
	OLS (1)	OLS (2)	OLS (3)	2SLS (4)	2SLS (5)	2SLS (6)
<i>femcoun</i>	0.197*** (0.027)			0.678*** (0.086)		
<i>femexec</i>		0.117*** (0.020)			0.610*** (0.087)	
<i>femayor</i>			0.031*** (0.006)			1.054*** (0.265)
First Stage Instrument: <i>genderquota</i>				0.041*** (0.003)	0.046*** (0.004)	0.027*** (0.006)
Obs. No.	6019	6019	6016	6019	6019	6016
R <sup>2</sup>	0.441	0.430	0.408			
Kleibergen-Paap rk LM stat.				46.15***	41.75***	14.13***
Kleibergen-Paap rk Wald stat.				169.8	122.9	18.57

Notes: Regressions include a constant and control variables. Standard errors, clustered at the provincial level, are in parenthesis. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

the case of a larger unitary share of female politicians in a local executive body (*femexec*) is assessed as 0.117 points for the years examined. Finally, the presence of a woman mayor in the local government positively contributes to the well-being performance with a coefficient estimate of *femayor* equals to 0.031.

As regards the control variables, most of the indicators present the expected sign and are statistically significant. A larger share of educated inhabitants, a higher employment specialization in hi-tech activities, and a localization in northern regions are positively correlated with higher level of well-being. All the variables depicting urban structure and historical identity are significant and coefficients present the expected sign. In addition, all coefficients are approximately stable across all estimated empirical models for both years.

Taking the endogeneity issue into account, we instrument female representation in politics with the indicator *genderquota*. Results for the 2SLS estimation are displayed in columns 4–6. They show that a larger share of women in councils and executives and the presence of a female mayor are positively associated with a municipality's better performance in term of well-being provision. While these results confirm the positive sign of the correlation already detected between a municipality's performance and the gender composition of political bodies by OLS, the 2SLS results return a higher magnitude of the estimated impacts. The robustness of these estimates is confirmed by the expected sign and statistical significance displayed by the coefficients of *genderquota* in the first stage. Moreover, according to the Kleibergen-Paap rk Wald statistic, the instruments also pass the critical threshold values of 10, corroborating the evidence that the hypothesis of weak identification does not hold for the 2SLS estimates [64]. Additionally, by considering the Kleibergen-Paap rk LM statistic, we can also reject the null hypothesis of under-identification at the 1 % level of significance, so that the instrument adequately identifies the model. Overall, we find that the external instrument is valid and estimates of the impact of *femcoun*, *femexec* and *femayor* are robust.

As an attempt to investigate if results are driven by single sub-components of the composite index of well-being, we run separate regressions of Equation (5) by using as dependent variable each indicator of the index of well-being. In Table 6, we display the OLS results which demonstrate the presence of a significant relationship, with the expected sign, between our key variables and each single sub-component of the index. It suggests that the impact on the well-being index of the political bodies is not driven by selected features of a particular single component. Overall, each indicator contributes to the whole citizen's well-being. These results are corroborated by the 2SLS estimates and, to save space, they are available on request.

## 6.2. Sensitivity analysis

We tested the sensitivity of our main results by elaborating an enlarged definition of the dependent variable. We added to the baseline definition of *WB\_index* the indicator waste, measured as the percentage of separated municipal waste in total collected municipal waste. This indicator is related to the provision of local services and its management is under responsibility and strict control of the local politicians. It can directly improve the well-being of citizens because waste strongly affects the environmental quality of the served municipality. It is an important aspect considered within the DEF in the choice of the BES indicators to evaluate policy action. Specifically, we computed *WB\_index2* by adding the variable waste to the initial set of indicators. Using *WB\_index2* as the dependent variable in Equation (5), we run OLS and 2SLS regressions to examine the robustness of the positive effect of female presence in political bodies on local well-being performance. The results reported in Table 7 show that the positive correlation between a larger representation of women in local politics and better well-being performance is confirmed regardless of the definition of the well-being index assumed.

## 6.3. A panel data analysis

In this section, we build on the (short) dynamic nature of our database which includes observations for municipalities over the two years 2014 and 2015 to run some robustness checks of the above results. Firstly, we estimate a pooled OLS/2SLS regression model over the two years 2014 and 2015. Results are displayed in Table 8. In columns (1)–(3), the OLS estimates confirm a significant and positive impact of female political bodies on municipal well-being. Re-estimating the pooled regression model with the 2SLS approach, we find that the OLS results are confirmed with a statistically significance of 1 % level. The Kleibergen-Paap rk tests point out that the instrument used in the 2SLS regression analysis is strong. Overall, the panel data analysis conducted with the two years available validates the results of the cross-sectional analysis.

Secondly, we estimate Equation (5) using as dependent variable the well-being index registered in 2015 and the female structure of political bodies of municipalities in 2014. This check allows us to take into account the fact that several municipalities voted in 2014 and renewed their government staff during the second semester of the year. Thus, it could take some time for the effects of their policy action to become manifest. Accordingly, Table 9 reports results of the impact of the political structure of the municipalities prevailing in 2014 on the well-being achieved in the subsequent year 2015. The evidence emerged with regard to the baseline model is confirmed also in this case.

**Table 6**  
OLS Estimates of local well-being index sub-components and women in politics - Year 2014.

	ypc	ypc	ypc	work	work	work	work	ineq	ineq	ineq	car	car	car
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
femcoun	3571.474*** (504.788)			-12.256*** (1.649)			-2.554*** (0.843)			-12.240*** (1.760)			
femexec		2095.017*** (359.449)			-7.523*** (1.231)			-1.621*** (0.599)			-6.963*** (1.246)		
femayor			556.059*** (121.064)			-1.957*** (0.362)			-0.721*** (0.220)			-1.614*** (0.449)	
Obs. No.	6019	6019	6016	6019	6019	6016	6019	6019	6016	6019	6019	6016	
R <sup>2</sup>	0.431	0.424	0.406	0.276	0.267	0.244	0.269	0.268	0.267	0.467	0.457	0.441	

Notes: Regressions include a constant and control variables. Standard errors, clustered at the provincial level, are in parenthesis. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

6.4. Heterogeneous effects

We considered that Italy is not a homogeneous country but has pronounced differences between Northern and Central and Southern Regions with respect to general socio-cultural and economic conditions [65,66]. Thus, we performed a macro-regional analysis to verify if heterogeneity affected our main findings. We considered the two separate sub-samples of municipalities, distinguishing those located in the North from those located in the Center and South of Italy. By running OLS and 2SLS regressions, we tested the equality of the impact of female politicians on local well-being performance among municipalities with different geographical locations.

In addition, gender differences have been observed at the level of labor market dynamics [67] with potential effects on inclusiveness and participation of women in society in broad terms, also at the political level [68]. Accordingly, we investigated the presence of heterogeneity in the estimated impact of our key variables when we split the sample between councils where the female participation rate in the labor market was above or below (and equal to) the corresponding national mean value recorded by the 2011 Italian Census.

The results of the above checks are displayed in Table 10. They confirm the presence of a North-South divide which is statistically significant. Female politicians appointed in Northern municipalities exert a lower impact on the well-being index performance, especially when 2SLS estimates are considered. It can be suggested that, once account is taken of measures to contrast discrimination and/or actions in support of female empowerment that can strongly affect the political participation of women, it is likely that in more culturally conservative areas, such as municipalities prevalently located in the Center and South of Italy, only the most talented or motivated women enter the political arena and, afterward, they have the biggest impact [69]. By contrast, different performances between the political action of women elected in municipalities with different rates of female labor force participation are less marked. However, both OLS and 2SLS results suggest that executive bodies with a larger share of woman are more effective in providing well-being in areas characterized by lower activity rate. This evidence does not support the hypothesis of a strict correlation between the economic and political inclusiveness of women in society.

Finally, we explore the possibility of heterogeneous impact of female politicians on providing higher level of well-being according to the gender structure of the remaining interacting political bodies within the municipality. Gagliarducci and Paserman [70] first investigated the presence of gender interactions within hierarchies. They showed that municipalities are likely to incur in early termination of the legislature when they are governed by a female mayor backed by an entirely male council or if they had never experienced a political female leadership before. Some evidence that group dynamics matters also for local expenditure allocation is offered by Casarico et al. [37]. They find that female mayors tend to invest more in environment as the female share in the municipal council increases; no interaction is detected according to the gender composition of the executive. Following these suggestions, we analyzed the presence of heterogeneous impact of femcoun, femexec and femayor when they interact. Specifically, we separately estimate the effect of femcoun and femexec in the sub-sample of municipalities run by male and female mayor. Then, we test the presence of significant differences among the estimated coefficients. Moreover, we evaluate if a different effect of femcoun, femexec and femayor on well-being emerges when distinguishing municipalities on the basis of female presence above or below 33 % in councils or executive bodies. Results of this investigation is resumed in Table 11. Statistically significant differences among sub-groups suggest that femcoun is more effective in providing well-being when there is a larger presence of women in the executive. Mixed evidence emerges as to the effects of the interaction between femexec and a more feminized femcoun. Moreover, according to OLS estimates, both femcoun and femexec underperform when the municipality is run by a female; however, 2SLS estimates do not confirm these

**Table 7**  
Estimates of municipal well-being performance including waste (WB\_index2) and women in politics - Year 2014.

	Dependent variable: <i>WB_index2</i>					
	OLS (1)	OLS (2)	OLS (3)	2SLS (4)	2SLS (5)	2SLS (6)
femcoun	0.201*** (0.027)			0.705*** (0.088)		
femexec		0.126*** (0.020)			0.644*** (0.085)	
femayor			0.034*** (0.006)			1.130*** (0.307)
First Stage Instrument: Genderquota				0.043*** (0.003)	0.047*** (0.004)	0.027*** (0.007)
Obs. No.	5532	5532	5530	5532	5532	5530
R <sup>2</sup>	0.417	0.409	0.386			
Kleibergen-Paap rk LM stat.				45.93***	39.79***	10.70**
Kleibergen-Paap rk Wald F stat.				191.35	124.71	13.58

Notes: Regressions include a constant and control variables. Standard errors, clustered at the provincial level, are in parenthesis. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

**Table 8**  
Panel data estimates of municipal well-being performance and women in politics.

	Dependent variable: <i>WB_index</i>					
	POOLED OLS			POOLED 2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)
femcoun	0.185*** (0.026)			0.718*** (0.093)		
femexec		0.112*** (0.019)			0.670*** (0.098)	
femayor			0.030*** (0.006)			1.068*** (0.275)
First Stage Instrument: genderquota				0.038*** (0.003)	0.041*** (0.004)	0.026*** (0.006)
Obs. No.	12177	12177	12170	12177	12177	12170
R <sup>2</sup>	0.579	0.572	0.557			
Kleibergen-Paap rk LM stat.				45.122***	40.123***	13.319***
Kleibergen-Paap rk Wald stat.				164.79	106.00	16.81

Notes: Regressions include a constant and control variables. Standard errors, clustered at the provincial level, are in parenthesis. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

**Table 9**  
Estimates of local well-being index of year 2015 and women in politics in year 2014.

	Dependent variable: <i>WB_index2015</i>					
	OLS (1)	OLS (2)	OLS (3)	2SLS (5)	2SLS (7)	2SLS (9)
femcom	0.189*** (0.026)			0.649*** (0.084)		
femexec		0.114*** (0.019)			0.584*** (0.084)	
femmayor			0.030*** (0.006)			1.009*** (0.253)
First Stage Instrument: genderquota				0.041*** (0.003)	0.046*** (0.004)	0.027*** (0.006)
Obs. No.	6019	6019	6016	6019	6019	6016
R <sup>2</sup>	0.445	0.434	0.413			
Kleibergen-Paap rk LM stat.				46.15***	41.75***	14.13***
Kleibergen-Paap rk Wald F stat.				169.8	122.9	18.57

Notes: Regressions include a constant and control variables. Standard errors, clustered at the provincial level, are in parenthesis. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

scenarios. Finally, there is some evidence that a female mayor backed by a council with a larger share of women is less effective in providing well-being to citizens; however, no reliable evidence is achieved by the 2SLS estimates since the instrumental variable is weak.<sup>21</sup>

### 7. Concluding remarks

The role of women in politics has been investigated with regard to several political and performance outcomes (composition of public spending, quality and efficiency of public institutions, gender empowerment, etc.) while the effects on quality of life and overall well-being of citizens have been overlooked. This paper has attempted to fill this gap by analyzing whether the gender of elected politicians affects the performance of Italian local governments in providing citizens with

<sup>21</sup> Estimates are available on request.

**Table 10**

Heterogeneity analysis of local well-being index and women in politics – Geographical area and labour market participation - Year 2014.

	Dependent variable: WB_index					
	femcoun OLS (1)	femexec OLS (2)	femayor OLS (3)	femcoun 2SLS (4)	femexec 2SLS (5)	femayor 2SLS (6)
North	0.025** (0.011)	0.078 (0.086)	0.019*** (0.027)	0.066 (0.074)	0.001 (0.002)	0.096 (0.109)
Center-South	0.200*** (0.040)	0.668*** (0.105)	0.122*** (0.008)	0.637*** (0.124)	0.036*** (0.008)	1.757* (0.878)
Equality test (p-value)	17.97***	18.64***	13.78***	15.61***	16.06***	3.52*
Obs. No. North/Center-South	3553/2466	3597/2565	3553/2466	3597/2565	3553/2466	3597/2565
High Activity Rate	0.069** (0.020)	0.270** (0.091)	0.047*** (0.014)	0.219** (0.077)	0.009** (0.003)	1.233** (0.617)
Low Activity Rate	0.109*** (0.021)	0.501*** (0.095)	0.061*** (0.013)	0.504*** (0.109)	0.020** (0.006)	0.329** (0.155)
Equality test (p-value)	1.63	3.05*	0.56	4.65*	3.08*	1.96
Obs. No. High/Low	2971/3048	2971/3048	2971/3048	2971/3048	2970/3046	2970/3046

Notes: Regressions include a constant and control variables. Standard errors, clustered at the provincial level, are in parenthesis. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

**Table 11**

Heterogeneity analysis of local well-being index and women in politics - Gender interactions within hierarchies - Year 2014.

	Dependent variable: WB_index					
	femcoun OLS (1)	Femcoun 2SLS (2)	femexec OLS (3)	Femexec 2SLS (4)	femayor OLS (5)	Femayor 2SLS (6)
femexec < 33 %	0.155*** (0.025)	0.581*** (0.014)			0.041** (0.013)	-1.751 (1.116)
femexec ≥ 33 %	0.150*** (0.025)	1.029*** (0.249)			0.011** (0.004)	-1.572 (1.247)
Equality test (p-value)	0.03	7.98**			4.89**	0.01
Obs. No. below/over 33 %	2803/3216	2803/3216			2800/3216	2800/3216
femcoun < 33 %			0.110*** (0.018)	0.483*** (0.108)	0.032*** (0.007)	0.809** (0.312)
femcoun ≥ 33 %			0.064*** (0.017)	1.252*** (0.346)	0.023*** (0.006)	1.179** (0.480)
Equality test (p-value)			8.46**	5.31**	1.26	0.45
Obs. No. below/over 33 %			3625/2394	3625/2392	3623/2393	3623/2393
femayor = 0	0.199*** (0.027)	0.665*** (0.086)	0.130*** (0.022)	0.653*** (0.098)		
femayor = 1	0.134*** (0.030)	0.598** (0.190)	0.034** (0.016)	0.951** (0.389)		
Equality test (p-value)	6.03**	0.12	12.82***	0.58		
Obs. No. femayor 0/1	5162/854	5162/854	5162/854	5162/854		

Notes: Regressions include a constant and control variables. Standard errors, clustered at the provincial level, are in parenthesis. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

equitable and sustainable well-being.

We examined female representation effects by considering the gender composition of the political bodies of local governments: the executive, the council, and the mayor. Citizen’s well-being was measured according to the principles of the “Going beyond GDP” project developed in Italy, and to the domain priorities declared in the 2016 reform of the national budget law. In fact, Italy was the first country in the European Union to include welfare objectives in economic planning.

Our empirical analysis found that the rise of women in politics significantly improves the provision of well-being to local citizen, especially when municipal council and executive bodies are concerned. The main results were robust to the endogeneity of female representation instrumented by the adoption of a gender quota indicator. By adopting a different definition of well-being performance, we proved the robustness of our findings. Confirmation of our results are obtained also by using a pooled panel data estimation method, even if our data are available over a short time span of two years. The impact of female politicians is more marked in regions from the Center and in the South of Italy, where gender stereotypes are more entrenched. Less marked heterogeneous impacts are detected in areas with different female

activity rate. Both features represent areas of future research to shed light on possible explanations. Mixed evidence is obtained by analyzing the effect of gender interactions among political bodies within municipalities. Overall, these results add evidence to that of studies which have proved a positive nexus between female representation, on the one hand, and political and societal outcomes on the other.

The introduction of the “beyond GDP” initiative into the process of planning and designing national economic public policies also at local level is widely encouraged across countries. Governments’ programmatic actions should include welfare objectives in economic programs. This study has proposed useful and replicable tools with which to assess the relative performances of local governments in fulfilling wellbeing provision. It has also provided insight into how to adopt and support a gendered structure of political bodies, also through affirmative actions, in order to provide more effective governance. In fact, a growing presence of women in politics not only serves the egalitarianism principle but effectively improves the well-being of citizens. The introduction of double preference voting conditional on gender as well as the adoption of gender quota (whether on a list of candidates, in an assembly or as part of a government) and/or electoral lists alternating women and men



can be devised as useful policies to contrast female under-representation in politics. At the same time, these policies promote the spread of role models for female leadership and influential offices in politics to advance women’s empowerment.

**Authors statement**

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

**Declaration of competing interest**

None.

**Data availability**

Data will be made available on request.

**Appendix A**



**Figure A.1.** Italian regions by macro areas  
Source: Authors’ elaboration

**Appendix B**

**Table B.1**

Variables definition and summary statistics - Year 2015

Variable	Definitions	Definition	Obs.	Mean	Std. Dev.	Min	Max
WB_index	Well-being index: 4 indicators	Well-being index: 4 indicators	6162	0.661	0.141	0.208	0.961
WB_index2	Well-being index: 5 indicators	Well-being index: 5 indicators	5652	0.681	0.141	0.216	0.944
femcoun	Share of women in municipal council	Share of women in municipal council	6162	0.281	0.144	0	1
femexec	Share of women in municipal executive	Share of women in municipal executive	6162	0.271	0.202	0	1
femayor	Gender of the mayor (dummy: 1 = female, 0 = otherwise)	Gender of the mayor (dummy: 1 = female, 0 = otherwise)	6158	0.141	0.348	0	1
fempop	Share of female on total population (%)	Share of female on total population (%)	6162	50.671	1.581	26.32	60.44
educated	Share of educated (university) on total population (%)	Share of educated (university) on total population (%)	6162	24.069	8.723	0	100

(continued on next page)

**Table B.1** (continued)

Variable	Definitions	Definition	Obs.	Mean	Std. Dev.	Min	Max
oldage	Ratio between elderly (>65) and young (<15) people	Ratio between elderly (>65) and young (<15) people	6162	213.632	179.857	28.47	5100
density	Municipal population density (1000/sq. km)	Municipal population density (1000/sq. km)	6162	0.325	0.662	0.001	12.223
heritage	Employees in high-tech manufacturing and service industries in total local unit employees (%)	Cultural heritage resources	6162	27.451	116.959	0	4356
houseserv	Ratio between employees of business services in the municipality in total employees of the municipality over employees of business services in Italy in total number of employees in Italy (%)	Index of availability of services in the dwelling	6162	0.991	0.016	0.660	1
htspec	Endowment of cultural assets measured as number of archaeological, architectural and museum assets per 100 square kilometers	High-tech specialization (by employees)	6162	1.749	3.927	0	64.72
servspec	Arithmetic mean of the percentage ratios of the number of occupied dwellings provided with a) indoor drinking water, b) indoor toilet, c) bathtub or shower and hot water to total occupied dwelling	Location quotient of services	6162	0.633	0.348	0	3.44
coastal	Coastal Municipality (dummy: 1 = coastal; 0 = otherwise)	Coastal Municipality (dummy: 1 = coastal; 0 = otherwise)	6162	0.062	0.241	0	1
altim	Altrimetic zone: Inland hill	Altrimetic zone: Inland hill	6162	0.336	0.472	0	1
macro-area	Geographical area: North-West	Geographical area: North-West	6162	0.448	0.497	0	1
genderquota	Duration of gender quota law (number of days/365)	Duration of gender quota law (number of days/365)	6162	1.631	0.760	0	2.118

Legend: Variables and basic indicators to develop the Well-being indeces are derived from “A *misura di Comune*” database, released by ISTAT. As exceptions, data source of genderquota is Historical Electoral Archive of the Ministry of the Interior and *femmayor* is Municipal Administrators’ Registry of the Ministry of the Interior.

**Table B.2**  
OLS and 2SLS Estimates of local well-being performance and women in politics - Year 2014

	WB_index	WB_index	WB_index	First Stage:	WB_index	First Stage:	WB_index	First Stage:	WB_index
	OLS	OLS	OLS	femcom	2SLS	femgiun	2SLS	femayor	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
femcom	0.197*** (0.027)				0.678*** (0.086)				
femexec		0.117*** (0.020)					0.610*** (0.087)		
femmayor			0.031*** (0.006)						1.054*** (0.265)
genderquota				0.041*** (0.003)		0.046*** (0.004)		0.027*** (0.006)	
fempop	-0.004** (0.002)	-0.004** (0.002)	-0.004* (0.002)	0.002 (0.002)	-0.005** (0.002)	0.004* (0.002)	-0.006*** (0.002)	0.005* (0.003)	-0.009** (0.004)
educated	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.000 (0.000)	0.001*** (0.000)	0.000 (0.000)	0.001*** (0.000)	-0.000 (0.001)	0.001** (0.001)
oldage	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000*** (0.000)	0.000 (0.000)	-0.000*** (0.000)	0.000 (0.000)
density	-0.002 (0.015)	-0.006 (0.015)	-0.003 (0.016)	-0.001 (0.006)	0.000 (0.012)	0.024*** (0.009)	-0.016 (0.011)	0.004 (0.014)	-0.005 (0.011)
heritage	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.000 (0.000)	0.000*** (0.000)
houseserv	1.783*** (0.343)	1.792*** (0.344)	1.886*** (0.372)	0.482*** (0.169)	1.490*** (0.276)	0.807*** (0.246)	1.324*** (0.258)	0.419 (0.394)	1.374*** (0.384)
htspec	0.003*** (0.000)	0.002*** (0.000)	0.003*** (0.001)	0.000 (0.000)	0.003*** (0.000)	0.001 (0.001)	0.002*** (0.001)	0.000 (0.001)	0.002** (0.001)
servspec	0.004 (0.007)	0.004 (0.007)	0.006 (0.008)	0.008 (0.006)	0.000 (0.007)	0.016* (0.008)	-0.004 (0.008)	-0.013 (0.015)	0.020 (0.017)
coastal	-0.047*** (0.018)	-0.051*** (0.018)	-0.052*** (0.019)	-0.018* (0.010)	-0.031* (0.017)	-0.004 (0.012)	-0.040** (0.016)	-0.035** (0.016)	-0.006 (0.026)
altim	-0.007 (0.008)	-0.005 (0.009)	-0.006 (0.009)	0.004 (0.006)	-0.010 (0.007)	-0.008 (0.007)	-0.002 (0.008)	-0.002 (0.010)	-0.005 (0.012)
macro-area	0.145*** (0.019)	0.151*** (0.019)	0.153*** (0.020)	0.037*** (0.009)	0.123*** (0.016)	0.019 (0.013)	0.136*** (0.016)	0.037** (0.015)	0.109*** (0.020)
constant	-1.209*** (0.307)	-1.194*** (0.304)	-1.276*** (0.327)	-0.407** (0.163)	-0.999*** (0.261)	-0.827*** (0.246)	-0.770*** (0.246)	-0.573 (0.356)	-0.671* (0.379)
Obs. No.	6019	6019	6016	6019	6019	6019	6019	6016	6016
R <sup>2</sup>	0.441	0.430	0.408						
Kleibergen-Paap rk LM stat.					46.15***		41.75***		14.13***
Kleibergen-Paap rk Wald stat.					169.8		122.9		18.57

Notes: Standard errors, clustered at the provincial level, are in parenthesis. \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.

## APPENDIX C

The number of municipalities has slightly changed in the recent years due to institutional modifications concerning the merging or creation of municipalities. The total amounts of Italian municipalities registered in 2014 and 2015 were, respectively, 8057 and 8047 of which about 19 % belonged to Special Statute Regions; in 2021 there were 7904 municipalities.

Not all the Italian municipalities are included in our estimation sample. Specifically, we decided to examine solely Italian municipalities belonging to the Ordinary Statute Regions to ensure a common institutional framework. Special Statute Regions adopt own specific electoral rules, enjoy more autonomy and a broader set of powers in organizing lower levels of government. Consequently, we exclude local governments located in the 5 Italian Special Statute Regions.

Moreover, we excluded municipalities with missing information. In what follows, we offer details on data refinements in 2014; similar procedure was adopted for year 2015. In the estimation sample we have data on 6019 municipalities out of 6666 municipalities belonging to Ordinary Regions in 2014, that is more than 90 % of eligible municipalities (Source: ISTAT - *Annuario Statistico Italiano*). Since we analyze the gender structure of political bodies, of course, we have not data on municipalities incurred in early termination of legislature. In 2014, 77 municipalities interrupted the political mandate because of “Mafia infiltration” e.g., suspect of criminality (Source: *Municipal Administrators’ Registry of the Ministry of the Interior*).<sup>22</sup> They can be labelled as law quality institutions municipalities [71].

We also compared the distribution by population of all municipalities belonging to Italian Ordinary Statute Regions and those within our sample. Using 2014 data from ISTAT - *Annuario Statistico Italiano*, Table C1 shows that missing municipalities from our sample are equally distributed among smaller municipalities and medium ones. Larger municipalities are less represented (for example, Rome is missing but it can be considered an outlier because of its territorial and demographic dimension). To sum up, there is not an under representation of small municipalities which are usually assumed as “low-quality institutions” [72]. Instead, looking at municipalities distribution by Italian macro-regions (Table C2), we observe that missing municipalities are more likely to belong to the South area, a circumstance often associated with low quality institutions [73]. Thus, it cannot be excluded that the missed municipalities are of low-quality institutions and that our estimates could be upward biased.

Table C.1

Distribution of municipalities by population. Ordinary Statute Regions and this study’s sample - Year 2014

	Small municipalities (0–5000 inh.)	Medium municipalities (5000–250000 inh.)	Large municipalities (more than 500000 inh.)	Tot.
Ordinary Statute Regions in Italy	4596	2060	10	6666
Ordinary Statute Regions in this study sample	4150	1861	8	6019
Missing municipalities in this study sample	446	199	2	647
Missing municipalities in sample: % on total OSR municipalities	9.7 %	9.7 %	20.0 %	9.7 %

Table C.2

Distribution of municipalities by Macro-regions. Ordinary Statute Regions and this study’s sample - Year 2014

	North	Center	South	Tot.
Ordinary Statute Regions in Italy	3891	986	1789	6666
Ordinary Statute Regions in this study sample	3553	883S	1583	6019
Missing municipalities in this study sample	338	103	206	647
Missing municipalities in sample: % on total OSR municipalities	8.7 %	10.4 %	11.5 %	9.7 %

## References

- Narbón-Perpiñá I, Balaguer-Coll M, Tortosa-Ausina E. Evaluating local government performance in times of crisis. *Local Govern Stud* 2019;45(1):64–100.
- North DC. *Institutions, institutional change and economic performance*. Cambridge University press; 1990.
- Economides G, Egger PH. The role of institutions in economic outcomes: editorial introduction. *Eur J Polit Econ* 2009;3(25):277–9.
- Bjørnskov C, Dreher A, Fischer JA. Formal institutions and subjective well-being: revisiting the cross-country evidence. *Eur J Polit Econ* 2010;26(4):419–30.
- Bennett DL, Nikolaev B, Aidt TS. Institutions and well-being. *Eur J Polit Econ* 2016; 45:1–10.
- Espasa M, Esteller-Moré A, Mora T. Is decentralization really welfare enhancing? Empirical evidence from survey data (1994–2011). *Kyklos* 2017;70(2):189–219.
- Park S. Gender and performance in public organizations: a research synthesis and research agenda. *Publ Manag Rev* 2021;23(6):929–48.
- Ceciarini S. Women in politics: local and European trends. Brussels: Council of European Municipalities and Regions (CEMR); 2019.
- Baltrunaite A, Bello P, Casarico A, Profeta P. Gender quotas and the quality of politicians. *J Publ Econ* 2014;118:62–74.
- Cella M, Manzoni E. Gender bias and women’s political performance. *Eur J Polit Econ* 2022;102314.
- Balaguer-Coll MT, Ivanova-Toneva M. The impact of women’s leadership in local governments: the case of Spain. *Int Publ Manag J* 2021;24(4):455–75.
- Hessami Z, da Fonseca ML. Female political representation and substantive effects on policies: a literature review. *Eur J Polit Econ* 2020;63:101896.
- Balaguer-Coll MT, Prior D, Tortosa-Ausina E. On the determinants of local government performance: a two-stage nonparametric approach. *Eur Econ Rev* 2007;51(2):425–51.
- Narbón-Perpiñá I, De Witte K. Local governments’ efficiency: a systematic literature review part II. *Int Trans Oper Res* 2018;25(4):1107–36.
- Touchton M, Sugiyama NB, Wampler B. Democracy at work: moving beyond elections to improve well-being. *Am Polit Sci Rev* 2017;111(1):68–82.
- Pérez-López G, Prior D, Zafra-Gómez JL, Plata-Díaz AM. Cost efficiency in municipal solid waste service delivery. alternative management forms in relation to local population size. *Eur J Oper Res* 2016;255(2):583–92.
- Narbón-Perpiñá I, De Witte K. Local governments’ efficiency: a systematic literature review part I. *Int Trans Oper Res* 2018;25(2):431–68.
- Stiglitz JE, Sen A, Fitoussi J-P. Report by the Commission on the measurement of economic performance and social progress. Paris: Commission on the Measurement of Economic Performance and Social Progress; 2009.
- Florek K, Łukaszewicz J, Perkal J, Steinhaus H, Zubrzycki S. *Taksonomia wroclawska, "Przegląd antropologiczny"*. 1951. t. XVII, Poznan.

<sup>22</sup> See: <https://dait.interno.gov.it/elezioni/anagrafe-amministratori>.

- [20] HDR. Technical notes: Calculating the human development indices - graphical presentation. 2021/22 HDR Available at: [https://hdr.undp.org/sites/default/files/2021-22\\_HDR/hdr2021-22\\_technical\\_notes.pdf](https://hdr.undp.org/sites/default/files/2021-22_HDR/hdr2021-22_technical_notes.pdf); 2021.
- [21] Nardo M, Saisana M, Saltelli A, Tarantola S. Handbook on constructing composite indicators: methodology and user guide. Paris: OECD Publishing; 2008.
- [22] Boetti L, Piacenza M, Turati G. Decentralization and local governments' performance: how does fiscal autonomy affect spending efficiency? *FinanzArchiv/ Public Finance Analysis* 2012;68(3):269–302.
- [23] Agasisti T, Dal Bianco A, Griffini M. The public sector efficiency in Italy: the case of Lombardy municipalities in the provision of the essential public services. *Econ Publica* 2016;1:59–84.
- [24] D'Inverno G, Carosi L, Ravagli L. Global public spending efficiency in Tuscan municipalities. *Soc Econ Plann Sci* 2018;61:102–13.
- [25] Braga M, Scervini F. The performance of politicians: the effect of gender quotas. *Eur J Polit Econ* 2017;46:1–14.
- [26] Besley T, Case A. Political institutions and policy choices: empirical evidence from the United States. *J Econ Lit* 2003;41:7–73.
- [27] Chattopadhyay R, Duflo E. Women as policy makers: evidence from a randomized policy experiment in India. *Econometrica* 2004;72(5):1409–43.
- [28] Clots-Figuera I. Women in politics: evidence from the Indian states. *J Publ Econ* 2011;95(7–8):664–90.
- [29] Beaman L, Duflo E, Pande R, Topalova P. Female leadership raises aspirations and educational attainment for girls: a policy experiment in India. *Science* 2012;335(6068):582–6.
- [30] Svaleryd H. Women's representation and public spending. *Eur J Polit Econ* 2009;25(2):186–98.
- [31] Funk P, Gathmann C. Gender gaps in policy making: evidence from direct democracy in Switzerland. *Econ Pol* 2015;30(81):141–81.
- [32] Brolo F, Troiano U. What happens when a woman wins an election? *J Dev Econ* 2016;122:28–45.
- [33] Ferreira F, Gyourko J. Does gender matter for political leadership? The case of US mayors. *J Publ Econ* 2014;112:24–39.
- [34] Bagues M, Campa P. Can gender quotas in candidate lists empower women? Evidence from a regression discontinuity design. *J Publ Econ* 2021;194:104315.
- [35] Rigon M, Tanzi G. Does gender matter for public spending? Empirical evidence from Italian municipalities. *Bank of Italy Temi di Discussione*; 2012 (Working Paper) No 862.
- [36] Andreoli F, Manzoni E, Cella M. Women at work: gender quotas, municipal elections and local spending. *Eur J Polit Econ* 2022;75:102175.
- [37] Casarico A, Lattanzio S, Profeta P. Women and local public finance. *Eur J Polit Econ* 2022;72:102096.
- [38] Ciommi M, Gentili A, Ermini B, Gigliarano C, Chelli FM, Gallegati M. Have your cake and eat it too: the well-being of the Italians (1861–2011). *Soc Indicat Res* 2017;134(2):473–509.
- [39] Durand M. The OECD better life initiative: how's life? and the measurement of well-being. *Rev Income Wealth* 2015;61(1):4–17.
- [40] Ciommi M, Gigliarano C, Chelli F, Gallegati M. Behind, beside and beyond GDP: alternative to GDP and to macro-indicators. *E-Frame EU-Project. Deliverable* 2013; 3(1).
- [41] Stiglitz J, Fitoussi J-P, Durant M. Beyond GDP: measuring what counts for economic and social progress. Paris: OECD Publishing; 2018.
- [42] Exton C, Shinwell M. Policy use of well-being metrics: describing countries experiences. *OECD Statistics Working Papers* 2018/07. Paris: OECD; 2018.
- [43] Ciommi M, Gigliarano C, Emili A, Taralli S, Chelli FM. A new class of composite indicators for measuring well-being at the local level: an application to the Equitable and Sustainable Well-being (BES) of the Italian provinces. *Ecol Indicat* 2017;76:281–96.
- [44] Charles V, Emrouznejad A, Johnson MP. Indices for the betterment of the public. *Soc Econ Plann Sci* 2020;70:100767. <https://doi.org/10.1016/j.seps.2019.100767>.
- [45] Harbison FH, Maruhn J, Resnick JR. Quantitative analyses of modernization and development. Industrial relations section. New Jersey: Princeton University; 1970.
- [46] UNDP. Human development report 2019. 2019. Technical notes.
- [47] Mariani F, Ciommi M. Aggregating composite indicators through the geometric mean: a penalization approach. *Computation* 2022;10(4):64.
- [48] Agovino M, Casaccia M, Ciommi M, Ferrara M, Marchesano K. Agriculture, climate change and sustainability: the case of EU-28. *Ecol Indicat* 2019;105:525–43.
- [49] Senetra A, Szarek-Iwaniuk P. The implementation of the Wroclaw taxonomic method for the identification and evaluation of problem areas in the Warmia and Mazury Region in Poland. A case study. *Soc Econ Plann Sci* 2019;67:43–57.
- [50] Feldmeyer D, Wilden D, Jamshed A, Birkmann J. Regional climate resilience index: a novel multimethod comparative approach for indicator development, empirical validation and implementation. *Ecol Indicat* 2020;119:106861.
- [51] Punzo G, Trunfio M, Castellano R, Buonocore M. A multi-modelling approach for assessing sustainable tourism. *Soc Indicat Res* 2022;163:1399–443.
- [52] Marino D, Tebala D. Rural areas and well-being in EU countries + UK: a taxonomy and a cluster analysis. *Sustainability* 2022;14:15213.
- [53] Mazziotta M, Pareto A. Synthesis of indicators: the composite indicators approach. In: *Complexity in society: from indicators construction to their synthesis*. Cham: Springer; 2017. p. 159–91.
- [54] Silvio-Pometa J. Typological study using the wroclaw taxonomic method (a study of regional disparities in Venezuela). Paris: UNESCO; 1973. Technical report, SHC/WS/316.
- [55] Casadio Tarabusi E, Guarini G. An unbalance adjustment method for development indicators. *Soc Indicat Res* 2013;112:19–45.
- [56] Kendall MG. Rank correlation methods. London: Griffin & Co; 1948.
- [57] Chelli FM, Ciommi M, Ermini B, Gentili A, Gigliarano C, Gallegati M. San Matteo e la provvidenza. I luoghi e i tempi dello sviluppo italiano. *Rivista giuridica del Mezzogiorno. Trimestrale della Svimez* 2018;(3):643–72.
- [58] Costanzo L, Ferrara A. Well-being indicators on landscape and cultural heritage: the experience of the bes project. In: Maggino F, editor. *A new research agenda for improvements in quality of life*. Cham: Springer; 2015. p. 1–15.
- [59] Black J, Erickson L. Women candidates and voter bias: do women politicians need to be better? *Elect Stud* 2003;22(1):81–100.
- [60] Schwindt-Bayer L, Malecki M, Crisp B. Candidate gender and electoral success in single transferable vote systems. *Br J Polit Sci* 2010;40(3):693–709.
- [61] Baltrunaite A, Casarico A, Profeta P, Savio G. Let the voters choose women. *J Publ Econ* 2019;180:104085.
- [62] De Paola M, Scoppa V, Lombardo R. Can gender quotas break down negative stereotypes? Evidence from changes in electoral rules. *J Publ Econ* 2010;94(5):344–53.
- [63] Lassebie J. Gender quotas and the selection of local politicians: evidence from French municipal elections. *Eur J Polit Econ* 2020;62:101842.
- [64] Staiger D, Stock JH. Instrumental variables regression with weak instruments. *Econometrica* 1997;65(3):557–86.
- [65] Capello R. What makes southern Italy still lagging behind? A diachronic perspective of theories and approaches. *Eur Plann Stud* 2016;24(4):668–86.
- [66] Ermini B, Recchioni MC, Gigliarano C. Toward a complex spatial history? Tracing the (non-stationary) economic disparities between Northern and Southern Italy. In: Chelli FM, Ermini B, Salvati L, editors. *Local-scale economics: statistical indicators and latent patterns of labour market areas in Italy*. New York: Nova Publisher; 2021. p. 67–92.
- [67] Struffolino E, Raitano M. Early-career complexity before and after labour-market deregulation in Italy: heterogeneity by gender and socio-economic status across cohorts. *Soc Indicat Res* 2020;151(1):231–57.
- [68] Cabeza-García L, Del Brio EB, Oscanoa-Victorio ML. Gender factors and inclusive economic growth: the silent revolution. *Sustainability* 2018;10(1):1–14.
- [69] Porter C, Serra D. Gender differences in the choice of major: the importance of female role models. *Am Econ J Appl Econ* 2020;12(3):226–54.
- [70] Gagliarducci S, Paserman MD. Gender interactions within hierarchies: evidence from the political arena. *Rev Econ Stud* 2012;79(3):1021–52.
- [71] Daniele G, Geys B. Organised crime, institutions and political quality: empirical evidence from Italian municipalities. *Econ J* 2015;125(586):F233–55. 2015.
- [72] De Benedetto MA. Council size, government spending and efficiency. Evidence from a quasi-experimental design for Italian municipalities. *Politico Econ* 2018;34(3):297–326.
- [73] Nifo A, Vecchione G. Measuring institutional quality in Italy. *Rivista Economica del Mezzogiorno, Trimestrale della Svimez* 2015;1–2:157–82. 2015.
- [74] Van der Kolk H. Local electoral systems in western europe. *Local Govern Stud* 2007;33(2):159–80.
- [75] Evans M. Democracy, legitimacy and local government electoral reform. *Local Govern Stud* 2014;40(1):41–63.

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