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# "A Well-Being Indicator for the Italian Provinces [a]"


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# A Well-Being Indicator for the Italian Provinces [a]

Giorgio Calcagnini[b], Francesco Perugini[c]

**Abstract**

In recent years a large amount of works has been carried out with the aim to provide alternative meausures of progress and well-being to GDP. Given the multidimensional aspect of the phenomenon, most of these studies differs in terms of their theoretical approach as well as their purpose and statistical methodology used to define what well-being is and how to measure it. In this paper we construct a well-being indicator for the Italian (NUTS-3) provinces, following the approach used in Segre *et al.* (2001) for the construction of the regional (NUTS-2) QUARS indicator. The resulted well-being indicator shows a high degree of heterogeneity not only between provinces located in the North and the South part of Italy, but also among adjacent territories. An empirical model has been tested against possible well-being determinants. Our findings suggest that social capital, social security programs, income, and grant-making activities by Bank Foundations positively affect provincial well-being.

Keywords: Well-being measure, Italian provinces, Civil society, Territorial disparities, Bank Foundation

JEL Classification: I31; R1; R11; G23

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# 1 Introduction

For more than a half century, the most widely accepted measure of a country's economic progress has been the Gross Domestic Product (GDP). Over the last several years this indicator have been widely criticized on the basis that it is not a measure of the degree to which society's goals are met, rather a measure of the mere volume of marketed economic activity, which is only one means to that end (Stiglitz *et al.*, 2010). The main problem with using the GDP indicator is how to measure well-being and economic progress.[1]

Consequentely, other relevant indicators of social progress have been proposed in the economic literature.[2] These differ on a number of aspects with regards to the methodology adopted for their construction, to the collection of relevant informations used for measuring well-being. Some of these indexes take the standard GDP and corrects it in order to reflect people's well-being (like, for intance, the Index of Sustainable Economic Welfare (ISEW) or the Genuine Progress Indicator (GPI)); others integrate GDP by including both economic and social elements (the Human Development Index (HDI)); others go even more beyond GDP, by identifying additional dimensions and indicators to portrait the levels of well-being (the Better Life Index (BLI) or the Canadian Index of Wellbeing (CIW)).[3]

Significant contributions on the measurement of well-being and quality of life have been carried out for the case of Italy.[4] Among them is the QUARS indicator (the Italian acronym for Regional Quality of Development), promoted by the Italian campaign "Sbilanciamoci!", which is a measure of well-being at regional (NUTS-2) level (Segre *et al.*, 2011).[5] Differently from others, the QUARS indicator identifies key dimensions and variables regarding various aspects of economic progress, environmental sustainability and social welfare through a consultation process with organizations active at national level. By doing so the QUARS indicator learns the civil society's priorities in terms of what well-being and progress are and on how to measure them. As a result, the QUARS indicator overcomes the problem of identification that arises when there is a lack of a consensus on a collective vision of progress and well-being (Rondinella 2014, 2015).

This study adds to the existing debate on the meaning of well-being and quality of life and on how to measure these phenomena by constructing a composite indicator for the Italian NUTS-3 provinces. To set up the overall indicator of well-being we follow the methodology and variables used for the construction of the regional QUARS indicator. However, focusing at a more disaggregated territorial level our indicator provides additional informations, which are not revealed by the regional QUARS, to public authorities for designing and delivering specific policy responses to economic, environmental and social needs at local level (OECD 2014, Taralli 2015). Indeed, it is widely known that the socio-economic heterogeneity between the North and the South of Italy, but also between adjacent territories is a relevant element within the Italian context. Our analysis show that well-being can greatly change among provinces of the same region.[6]

Furthermore, the purpose of this study is to obtain an indicator, similar to the provincial BES indicator (the Italian Equitable and Sustainable Well-being)[7], which is based on vari-

[1] See Bleys (2012) for a critical discussion on alternative well-being indicators to GDP.

[2] See, for instance, Ciommi *et al* (2013), or Fleurbaey (2009) for a critical review of the literature.

[3] For an extensive review of these well-being indexes see Burchi and Gnesi (2015).

[4] See Ferrara and Nisticò (2014), Gigliarano *et al.*, (2014), and the articles in Maggino and Zumbo (2012) volume, among others.

[5] "Sbilanciamoci!" involves associations, NGOs and networks active on social issues, solidarity, environment, civil rights promotion, education and health monitoring, consumer protection and alternative economic activities, from fair trade to ethical banking (Rondinella *et al.*, 2014).

[6] Chelli and Gigliarano (2016) find similar results with the BES indicator.

[7] The provincial BES is still an on-going project carried on by ISTAT, the Italian National Statistics. ISTAT aims to adapt the existing regional BES to large cities and provinces. Currently, only 29 Statistical Offices of Italian Provinces and Metropolitan areas, located in 14 different Italian regions, are contributing to the development of the prototype BES indicator at NUTS-3 level made from the province of Pesaro and Urbino, the project leader. More details on the project can be found in ISTAT (2015), Taralli (2015), and Taralli *et al.* (2015). Preliminary results for the BES at provincial level are in Chelli and Gigliarano (2016).

ables that consider civil society expressions as the central element for identyfying well-being (Giovannini and Rondinella, 2011). As such, our well-being measure departs from previous existing attempts such as, for instance, Casmiri *et al.*, (2013) that constructs a related Human Development Index (HDI) or Nuvolati (2003), since it overcomes the problem of identification which often emerges when there is no collective agreement on what well-being and progress are and on how to measure them.

Third, this paper contributes to the empirical literature on well-being as it tries to shed some light on the mechanism through which well-being can be determined. Previuos studies investigated the relationship between life satisfaction and well-being with some economic economic variables such as income, social capital, and household wealth (see Bartolini *et al.* (2013), Headey and Wooden (2004), and Sarracino (2012), among others), while others looked at how social security programs or philantrophy activities and volunteering have enhanced individuals well-being (Haller and Hadler (2006), and Konrath (2014)). Within this latter wave of the literature, the contribution of this paper is to analyze the role of the Italian Bank Foundations (*Fondazioni di origine bancaria*, hereinafter BFs) as a source of well-being. The BFs were created in 1990 to enable the privatization of an important part of the Italian banking system and quickly became important subjects in no-profit sector because they were designated the exclusive purpose of promoting social and economic development of the territory, beyond a profit-making intent (Barbetta, 2013). Indeed, it is widely recognized that BFs play an important role in encouraging initiatives of social utility by guaranteeing financial support through direct or grant-making activities, in creating a stable and exclusive relationship with a multitude of actors and the local communities, and in establishing a network for sharing knowledge and expertise (Barbetta 2013). Furthermore, recent studies show that BFs can exert a positive impact on social capital endowment and on income growth (Calcagnini *et al.*, 2016). Therefore, we also expect BFs to have a direct effect on well-being and the quality of life, a channel that, to our knoledge, has not been investigated before.

Based on these reasoning, the remainder of the paper is organized as to reach the above three goals. First, Section 2 is devoted to the definition and the measurement of the QUARS well-being indicator for the 110 NUTS-3 Italian provinces. The sensitivity analysis, carried out in Section 3, shows that our well-being indicator is robust towards variations in normalization procedure and aggregation methodologies. Second (Section 4), present an empirical model and the estimation results for addressing possible well-being determinants, and for testing wheter grant-making activities by BFs have a positive impact on individual's well-being. Third (Section 5), we assess the degree of heterogeneity of the well-being indicator accross provinces by comparing it with the regional QUARS indicator. Finally, Section 6 provides some conclusions.

## 2 The QUARS indicator

Our starting point is the QUARS indicator described in Segre *et al.*, (2011). The QUARS indicator is a synthetic measure of well-being for the Italian regions that gets legitimacy through a broad consultation of civil society organisations that joined Sbilanciamoci! campaign. The consultation process aimed at identify civil society priorities, i.e., the widely accepted variables to form the QUARS indicator. As a result, the QUARS indicator overcomes the problem of identification which often emerges when there is no collective agreement on what well-being and progress are and on how to measure them.

The process led to 41 identified variables, divided into seven groups: environment, economy and labour, rights and citizenship, education and culture, health, gender equity and democratic participation). Once the data were collected, they have been aggregated in the following steps: for each of the seven groups, the selected variables were first standardized, so that they were comparable with each other, and then they were merged by using a simple arithmetic mean to form the final QUARS indicator.[8,9]

To construct our well-being indicator for the Italian NUTS-3 provinces we follow the same procedure, that is we first standardized the variables and then merge them using equal weighting. Finally, as in Segre *et al.* (2011), we standardize the data so that the distribution is centered around the zero mean, with positive values representing a score above the average of the provinces, and negative values a score below the average.[10]

The main problem of focusing at a more disaggregated level is the lack of data. Indeed, some of the data used in Segre *et al.*, (2011) are from ISTAT survey, which are carried out at regional level only. Nevertheless, we were able to preserve the seven original groups constituting the regional QUARS indicator with a total of 26 variables.[11]

Table 1: The Quars and its dimensions (standardized values)

| Rank | Provinces | Regions | QUARS | Envir | Econ | Righ. | Heal. | Educ. | Gend. | Part. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Parma | Emilia-Romagna | 1.85 | 1.18 | 0.93 | 0.16 | 1.34 | 2.68 | 0.87 | 1.46 |
| 2 | Trieste | Friuli-Venezia Giulia | 1.80 | 0.34 | 1.01 | 0.14 | 1.42 | 2.29 | 1.78 | 1.43 |
| 3 | Ferrara | Emilia-Romagna | 1.77 | 1.56 | 1.17 | -0.05 | 1.24 | 1.96 | 1.34 | 1.02 |
| 4 | Valle d'Aosta/Vallée d'Aoste | Valle d'Aosta/Vallée d'Aoste | 1.64 | 2.87 | 0.84 | 1.23 | -0.67 | 0.53 | 1.55 | 1.28 |
| 5 | Ravenna | Emilia-Romagna | 1.63 | 1.06 | 1.07 | 0.24 | 1.09 | 1.52 | 1.70 | 0.93 |
| 6 | Bologna | Emilia-Romagna | 1.57 | 0.27 | 0.94 | -0.07 | 1.11 | 1.99 | 1.91 | 1.15 |
| 7 | Forlì-Cesena | Emilia-Romagna | 1.52 | 1.19 | 0.75 | 0.69 | 1.08 | 1.38 | 1.46 | 0.56 |
| 8 | Siena | Toscana | 1.48 | 0.51 | 0.59 | 0.18 | 1.13 | 2.11 | 1.09 | 1.28 |
| 9 | Udine | Friuli-Venezia Giulia | 1.43 | 1.15 | 1.00 | 0.47 | 0.65 | 0.43 | 1.29 | 1.67 |
| 10 | Ancona | Marche | 1.35 | 0.21 | 0.74 | 1.62 | 0.65 | 1.10 | 1.53 | 0.46 |
| 11 | Belluno | Veneto | 1.34 | 1.89 | 1.29 | 0.50 | 0.78 | -0.44 | 1.01 | 1.23 |
| 12 | Trento | Trentino-Alto Adige/Südtirol | 1.26 | 1.27 | 0.75 | 0.69 | 0.17 | 0.66 | 0.64 | 1.68 |
| 13 | Bolzano/Bozen | Trentino-Alto Adige/Südtirol | 1.11 | 1.36 | 0.18 | 0.17 | -0.03 | -0.37 | 0.93 | 2.91 |
| 14 | Rimini | Emilia-Romagna | 1.10 | -0.12 | -0.15 | 1.44 | 1.36 | 1.50 | 0.28 | 0.83 |
| 15 | Firenze | Toscana | 1.10 | 0.29 | 0.37 | 0.11 | -0.47 | 2.59 | 1.25 | 0.98 |
| 16 | Pordenone | Friuli-Venezia Giulia | 1.08 | 0.93 | 1.07 | 0.38 | 0.98 | -0.19 | 1.12 | 0.75 |
| 17 | Modena | Emilia-Romagna | 1.06 | 0.61 | 1.02 | -0.45 | 1.25 | 0.57 | 1.56 | 0.39 |
| 18 | Perugia | Umbria | 1.05 | 0.31 | 0.64 | 0.32 | 0.85 | 1.27 | 0.78 | 0.74 |
| 19 | Pisa | Toscana | 1.03 | 0.64 | 0.74 | -0.67 | 0.67 | 1.95 | 0.79 | 0.68 |
| 20 | Reggio nell'Emilia | Emilia-Romagna | 0.96 | 0.92 | 1.17 | 0.74 | 0.63 | -0.15 | 0.63 | 0.53 |
| 21 | Piacenza | Emilia-Romagna | 0.90 | 0.25 | 0.82 | 0.33 | 0.82 | 0.24 | 0.27 | 1.47 |
| 22 | Rovigo | Veneto | 0.90 | 0.89 | 1.14 | 0.36 | 0.72 | -0.46 | 1.15 | 0.39 |
| 23 | Gorizia | Friuli-Venezia Giulia | 0.83 | -2.52 | 1.10 | 1.18 | 0.53 | 0.61 | 1.14 | 1.81 |
| 24 | Pesaro e Urbino | Marche | 0.82 | 0.26 | 0.67 | 1.09 | 0.03 | 0.60 | 0.29 | 0.88 |
| 25 | Genova | Liguria | 0.80 | -0.85 | 0.22 | 0.50 | 1.14 | 0.65 | 1.14 | 0.93 |
| 26 | Cremona | Lombardia | 0.74 | 0.21 | 1.18 | -0.67 | 0.46 | 0.67 | 0.46 | 1.12 |
| 27 | Terni | Umbria | 0.73 | -0.41 | 0.97 | 0.26 | 1.31 | 0.40 | 0.37 | 0.48 |
| 28 | Venezia | Veneto | 0.70 | 0.83 | 0.88 | 0.46 | -0.04 | 0.11 | 0.59 | 0.42 |
| 29 | Mantova | Lombardia | 0.69 | 1.29 | 1.05 | -0.13 | 0.56 | -0.71 | 0.08 | 1.06 |
| 30 | Macerata | Marche | 0.68 | 0.00 | 0.77 | 0.52 | -0.21 | 0.94 | 0.72 | 0.45 |
| 31 | Verona | Veneto | 0.65 | 0.53 | 0.63 | -0.36 | 1.11 | 0.28 | 0.24 | 0.60 |
| 32 | Vercelli | Piemonte | 0.61 | 0.54 | 1.28 | 0.23 | -0.71 | 0.48 | 0.55 | 0.46 |
| 33 | La Spezia | Liguria | 0.58 | 0.94 | 1.03 | 0.69 | -0.01 | -0.43 | -0.28 | 0.77 |
| 34 | Sondrio | Lombardia | 0.58 | -0.21 | 0.52 | 1.19 | 0.87 | -0.46 | 0.07 | 0.72 |
| 35 | Verbano-Cusio-Ossola | Piemonte | 0.55 | 1.40 | 0.63 | 0.82 | 0.28 | -0.46 | -0.80 | 0.71 |
| 36 | Savona | Liguria | 0.54 | -0.88 | 0.64 | -0.39 | 0.88 | 0.12 | 0.83 | 1.33 |
| 37 | Padova | Veneto | 0.52 | 0.25 | 0.60 | -0.14 | -0.03 | 0.97 | 0.15 | 0.63 |
| 38 | Arezzo | Toscana | 0.52 | -0.05 | 0.99 | -0.17 | 0.10 | 0.46 | 0.82 | 0.26 |
| 39 | Alessandria | Piemonte | 0.51 | 0.59 | 0.86 | -0.22 | 0.32 | 0.20 | 0.34 | 0.29 |
| 40 | Rieti | Lazio | 0.46 | -0.06 | 0.35 | 1.85 | 0.10 | -0.13 | -0.32 | 0.38 |
| 41 | Cagliari | Sardegna | 0.46 | 0.04 | -0.70 | 0.61 | 1.35 | 0.90 | 0.35 | -0.43 |
| 42 | Biella | Piemonte | 0.44 | 0.95 | 0.99 | 0.58 | -1.88 | -0.17 | 0.77 | 0.80 |
| 43 | Grosseto | Toscana | 0.42 | -0.04 | 0.30 | 0.68 | -0.09 | 0.02 | 0.05 | 1.05 |
| 44 | Cuneo | Piemonte | 0.42 | 0.45 | 0.89 | 0.20 | 0.83 | -0.81 | -0.35 | 0.76 |
| 45 | Pavia | Lombardia | 0.39 | 0.02 | 0.98 | -0.92 | 0.44 | 0.78 | 0.24 | 0.27 |
| 46 | Bergamo | Lombardia | 0.37 | 0.63 | 1.18 | -0.53 | 0.46 | -0.55 | -0.01 | 0.55 |
| 47 | Sassari | Sardegna | 0.29 | -0.23 | -0.83 | 0.38 | 1.14 | 0.56 | 0.37 | -0.04 |
| 48 | Treviso | Veneto | 0.24 | 0.00 | 0.81 | 0.22 | 0.53 | -0.58 | -0.11 | 0.23 |
| 49 | Pistoia | Toscana | 0.18 | 0.55 | 0.83 | -0.60 | 0.43 | -0.62 | -0.16 | 0.40 |
| 50 | Torino | Piemonte | 0.17 | 0.14 | 0.27 | 0.06 | -1.53 | 0.94 | 1.04 | -0.13 |
| 51 | L'Aquila | Abruzzo | 0.14 | -0.30 | 0.01 | 0.15 | 0.43 | 1.65 | -0.58 | -0.72 |
| 52 | Novara | Piemonte | 0.13 | 0.63 | 0.76 | -1.55 | 0.29 | -0.26 | 0.50 | 0.22 |
| 53 | Brescia | Lombardia | 0.12 | 0.22 | 0.73 | -0.11 | 0.63 | -0.47 | -0.86 | 0.44 |

*Table 1: continues in the next page*

[8]The standardisation methodology transformed each indicator as follows:

$$z_{i,j} = \frac{x_{i,j} - \mu_i}{\sigma_{x_j}} \tag{1}$$

where $x_{i,j}$ is the value of indicator $j$ for the region $i$; $\mu_i$ is the average value of indicator $j$; $\sigma_{x_j}$ is the standard deviation fo the indicator $j$; and $z_{i,j}$ is the standardized value of indicator $j$ for the region $i$.

[9]As noted in Segre *et al.* (2011) there are some limitations in using this approach (Nardo *et al.* 2005, OECD 2008). The main problem is that the QUARS indicator does not allow to determine a region's performance in absolute terms, but only in relation to the other regions.

[10]Since some variables, such as newspaper diffusion, correspond to increases in overall well-being, whereas increases in other variables, such as unemployment, correspond to decreases in overallwell-being, we made the necessary directional adjustment. In other words, we change the sign of the normalised value by multiply by -1 if the variable is negatively correlated with the multidimensional phenomenon.

[11]Data descriptions and source of the datat are in Appendix 1.

*Table 1: continues from previous page*

| Rank | Provinces | Regions | QUARS | Envir | Econ | Righ. | Heal. | Educ. | Gend. | Part. |
|---|---|---|---|---|---|---|---|---|---|---|
| 54 | Chieti | Abruzzo | 0.10 | 0.70 | -0.07 | 0.78 | -0.25 | 0.34 | -0.52 | -0.53 |
| 55 | Frosinone | Lazio | 0.07 | -0.59 | 0.11 | 2.36 | -0.17 | 0.42 | -1.29 | -0.50 |
| 56 | Potenza | Basilicata | 0.07 | 0.47 | -0.43 | 0.55 | 0.92 | -0.12 | -0.47 | -0.61 |
| 57 | Livorno | Toscana | 0.06 | -0.88 | 0.63 | -1.15 | -0.65 | 0.24 | 0.99 | 1.13 |
| 58 | Fermo | Marche | 0.06 | -0.36 | 0.40 | 0.38 | -0.59 | -0.40 | 0.45 | 0.38 |
| 59 | Pescara | Abruzzo | 0.02 | -0.83 | -0.45 | 0.49 | -0.18 | 0.55 | 0.39 | 0.13 |
| 60 | Nuoro | Sardegna | 0.01 | 1.12 | 0.24 | -0.32 | -0.20 | -0.25 | -0.35 | -0.17 |
| 61 | Ascoli Piceno | Marche | 0.00 | 0.10 | -0.09 | 1.16 | -0.11 | -1.06 | 0.71 | -0.69 |
| 62 | Vicenza | Veneto | -0.01 | 0.10 | 1.04 | -0.04 | -0.56 | -1.22 | 0.10 | 0.52 |
| 63 | Varese | Lombardia | -0.10 | -0.84 | 0.54 | -0.79 | 0.16 | -0.30 | 1.06 | -0.30 |
| 64 | Imperia | Liguria | -0.11 | -1.27 | -0.17 | -0.03 | 0.63 | -1.03 | 0.79 | 0.56 |
| 65 | Massa-Carrara | Toscana | -0.13 | -0.98 | -0.15 | 0.13 | -0.88 | 0.09 | 1.03 | 0.15 |
| 66 | Lecco | Lombardia | -0.18 | -0.83 | 0.93 | -0.01 | -0.52 | -0.53 | -0.29 | 0.38 |
| 67 | Asti | Piemonte | -0.22 | 0.68 | 0.70 | -0.42 | -0.76 | -0.91 | -0.42 | 0.11 |
| 68 | Prato | Toscana | -0.24 | -2.80 | 0.06 | 0.00 | 0.22 | -0.37 | 1.39 | 0.39 |
| 69 | Como | Lombardia | -0.27 | -0.46 | 0.46 | -0.45 | -0.20 | -0.94 | 0.09 | 0.26 |
| 70 | Lucca | Toscana | -0.29 | -0.86 | 0.40 | 0.32 | -1.19 | -0.07 | -0.58 | 0.62 |
| 71 | Lodi | Lombardia | -0.30 | 0.76 | 1.27 | -1.67 | -0.37 | -0.78 | -0.60 | -0.02 |
| 72 | Teramo | Abruzzo | -0.36 | -0.42 | 0.02 | 1.24 | -0.45 | -1.13 | -0.61 | -0.32 |
| 73 | Roma | Lazio | -0.43 | -1.65 | -0.75 | -0.32 | -1.83 | 2.46 | 0.53 | -0.46 |
| 74 | Matera | Basilicata | -0.47 | 1.19 | -1.14 | 0.20 | -0.30 | -0.45 | -1.08 | -0.61 |
| 75 | Benevento | Campania | -0.51 | -0.17 | -0.90 | -0.30 | 0.62 | 0.41 | -0.94 | -1.12 |
| 76 | Monza e della Brianza | Lombardia | -0.51 | -2.37 | 0.96 | -1.00 | 0.41 | -0.49 | 0.70 | -0.61 |
| 77 | Viterbo | Lazio | -0.56 | 0.03 | -0.46 | 0.46 | -1.79 | 0.11 | -0.85 | -0.10 |
| 78 | Oristano | Sardegna | -0.60 | 0.07 | -1.02 | -0.10 | -0.56 | -0.20 | -0.45 | -0.52 |
| 79 | Campobasso | Molise | -0.63 | -0.29 | -0.82 | 1.17 | -2.57 | 0.65 | -0.35 | -0.72 |
| 80 | Catanzaro | Calabria | -0.66 | -0.16 | -0.83 | -0.35 | 0.97 | -0.27 | -0.93 | -1.52 |
| 81 | Lecce | Puglia | -0.66 | -0.65 | -1.51 | 0.07 | 0.60 | 0.17 | -1.31 | -0.46 |
| 82 | Enna | Sicilia | -0.69 | 1.31 | -1.52 | 0.32 | -0.47 | -1.11 | -0.81 | -0.97 |
| 83 | Messina | Sicilia | -0.74 | -0.35 | -0.78 | -1.17 | 0.30 | -0.12 | -0.14 | -1.18 |
| 84 | Carbonia-Iglesias | Sardegna | -0.80 | 0.28 | -1.53 | 1.52 | 0.04 | -1.98 | -0.74 | -1.34 |
| 85 | Milano | Lombardia | -0.81 | -2.69 | 0.00 | -0.66 | -2.12 | 0.94 | 1.14 | -0.39 |
| 86 | Olbia-Tempio | Sardegna | -0.83 | -0.84 | -1.55 | 1.99 | -1.18 | -1.25 | -0.73 | -0.32 |
| 87 | Foggia | Puglia | -0.85 | -1.23 | -1.68 | 1.23 | 1.26 | -0.69 | -1.26 | -1.58 |
| 88 | Ragusa | Sicilia | -0.86 | -0.25 | -1.50 | -0.51 | 0.89 | -1.50 | 0.02 | -1.17 |
| 89 | Latina | Lazio | -0.91 | -0.83 | -0.66 | 1.04 | -1.46 | -0.83 | -0.97 | -0.53 |
| 90 | Reggio di Calabria | Calabria | -1.00 | -1.00 | -1.02 | -0.01 | 0.14 | -0.88 | -0.72 | -1.17 |
| 91 | Palermo | Sicilia | -1.00 | 0.43 | -1.80 | -0.80 | -0.07 | -0.47 | -0.37 | -1.59 |
| 92 | Isernia | Molise | -1.01 | -0.75 | -0.49 | 0.63 | -3.58 | 0.46 | -0.42 | -0.55 |
| 93 | Cosenza | Calabria | -1.02 | -0.82 | -1.22 | -0.74 | 0.16 | 0.15 | -1.04 | -1.23 |
| 94 | Brindisi | Puglia | -1.03 | -0.84 | -0.73 | -0.65 | -0.35 | -1.26 | -0.26 | -0.74 |
| 95 | Catania | Sicilia | -1.09 | -0.54 | -1.30 | -0.57 | 0.23 | -0.45 | -1.28 | -1.16 |
| 96 | Taranto | Puglia | -1.10 | -0.26 | -0.59 | -0.44 | -0.67 | -1.14 | -0.65 | -1.36 |
| 97 | Salerno | Campania | -1.10 | 0.05 | -1.18 | -1.06 | -0.52 | 0.17 | -1.55 | -1.04 |
| 98 | Ogliastra | Sardegna | -1.18 | 1.73 | -2.34 | -1.88 | -1.28 | -0.90 | 0.27 | -1.10 |
| 99 | Avellino | Campania | -1.20 | -0.19 | -1.20 | -1.06 | -0.09 | -0.01 | -2.15 | -0.91 |
| 100 | Bari | Puglia | -1.27 | -0.24 | -1.24 | -0.01 | -1.22 | -0.69 | -1.14 | -1.39 |
| 101 | Siracusa | Sicilia | -1.42 | -0.26 | -1.59 | -0.19 | -0.41 | -1.26 | -1.34 | -1.55 |
| 102 | Caltanissetta | Sicilia | -1.49 | -0.33 | -2.16 | 0.00 | -0.02 | -1.55 | -1.41 | -1.49 |
| 103 | Trapani | Sicilia | -1.60 | -0.91 | -1.41 | -0.67 | -0.17 | -1.50 | -1.15 | -1.66 |
| 104 | Barletta-Andria-Trani | Puglia | -1.62 | -0.22 | -0.93 | -2.51 | 1.95 | -1.64 | -2.52 | -1.68 |
| 105 | Crotone | Calabria | -1.64 | -0.58 | -1.78 | -0.88 | -0.38 | -1.48 | -0.86 | -1.67 |
| 106 | Agrigento | Sicilia | -1.65 | -0.75 | -2.02 | -0.58 | 0.09 | -1.14 | -1.64 | -1.67 |
| 107 | Vibo Valentia | Calabria | -1.70 | -1.35 | -1.12 | -0.92 | -0.86 | -0.67 | -1.45 | -1.54 |
| 108 | Caserta | Campania | -1.96 | -0.16 | -1.24 | -0.42 | -1.93 | -0.98 | -2.50 | -1.90 |
| 109 | Medio Campidano | Sardegna | -2.78 | 1.66 | -1.12 | -5.80 | -2.62 | -1.91 | -2.15 | -1.01 |
| 110 | Napoli | Campania | -2.99 | -3.44 | -1.93 | -1.98 | -2.54 | -0.10 | -1.93 | -2.02 |
| | | Absolute mean difference of rank | | 23 | 16 | 26 | 24 | 20 | 15 | 12 |

*Table 1: end from previous page*

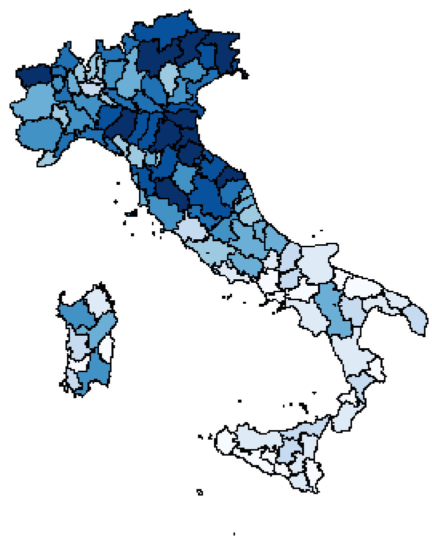
Table 1 reports the QUARS indicator for the Italian provinces and its composition in the seven dimensions. There are some interesting points to be noted. First of all, the distribution of the well-being indicator is negatively skewed: 61 provinces (about 55% of the total) have a value above the average zero-mean (the median value is 0.07). Among them, there is a strong predominancy of provinces located in the North of Italy (38). Southern provinces with a well-being value above the average are only 7.[12] This result seems to confirm the existence of the dualism between the Northern provinces and the Southern ones, which is well documented in the economic literature.[13]

Second, in the first 10 positions there are 5 out of 9 provinces belonging to the Emilia-Romagna region and 2 out of 4 to the Friuli-Venezia Giulia region, both in the North of Italy. The first Southern province in the rank is Cagliari (in the 41th position).

[12] According to ISTAT classification Italy is divided into five macroregions or areas: the North-West (which comprises the regions of Piemonte, Valle d'Aosta, Lombardia and Liguria), the North-East (Trentino-Alto-Adige, Veneto, Friuli-Venezia Giulia and Emilia-Romagna), the Centre (Toscana, Umbria, Marche and Lazio), the South (Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria), and the Islands (Sicilia and Sardegna). For simplicity, in the rest of the paper the South area includes the Islands. Also, we use the term North for indicating the sum of the North-West and the North-East areas. A geographical representation of the boundaries at the three hierarchical levels (areas, regions, and provinces) is depicted in Figure 8 in Appendix 6.

[13] See for instance the seminal paper of Putnam (1993), and Brida *et al.* (2014) among others.

Figure 1: The QUARS indicator - values are devided in decile (darker areas denote higher values of the indicator)



Third, looking at the single dimensons of the final QUARS indicator, we observe a strong predominancy of provinces located in the North with a score above the average in the "economy and labour", the "gender equity", and the "democratic participationin" dimensions. Within the other dimensions, the geographical distribution between Northern and Southern provinces is more mixed in the ranking, still Northern provinces are more represented among those positions with values above the average.

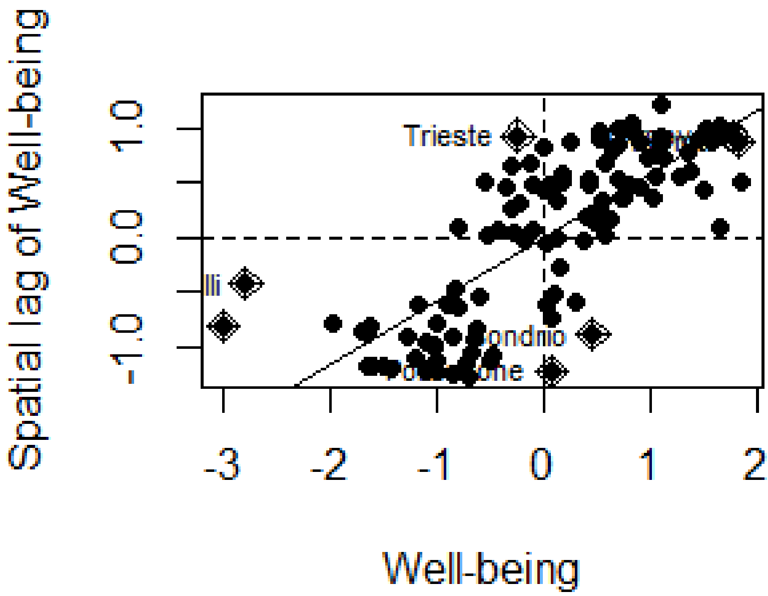
Fourth, the choice of the variables used for the construction of the QUARS indicators suggests that it is well-balanced in its dimensions. For this purpose, we compute the average absolute mean differences of ranks between the QUARS overall indicator and each one of its dimensions, and report the results in the last row of the Table. The average absolute mean differences of ranks is a measure of dispersion and try to capture how far, on average, are ranked the provinces in each dimension from the rank of the overall well-being indicator.[14] So, for instance, in the "rights and citizenship" dimension the value is 26, the highest among all dimensions, meaning that on average provinces within this dimension are 26 position away from the rank in the QUARS overall indicator (equivalent to about 23% of the total number of observation). This might suggest that this dimension is to some extent unbalanced with rispect to the overall QUARS indicator. A result that can be explained by the presence of a large number of Southern provinces at the top of the ranking but also by the limited number of variables that has been aggregated to form this dimension.[15] However, in other dimensions, like for instance in the "economy and labour", "education and culture", "gender equity", and "democratic participation", the absolute mean differences of rank versus the QUARS are similar to Segre *et al.* (2011), suggesting that overall, despite the number of variables have been reduced due to data availability, this has not generated dimensions with odd compositions.[16]

[14]The average absolute mean differences of ranks is calculated as $\frac{1}{n}\sum_{i=1}^{n}\left|x_i^d - x_i^Q\right|$, where $n$ is the number of provinces $i$, $x_i^d$ is the rank of province $i$ in the dimension $d$, and $x_i^Q$ is the rank of province $i$ in the overall QUARS $Q$ indicator.

[15]In Segre *et al.* (2011), the average absolute mean differences of ranks between the regional QUARS and the rights and citizenshipis dimension is 2.4, corresponding to 12% of the observations.

[16]In the "enviroment" dimension, our absolute mean differences of rank is lower than in Segre *et al.* (2011): 23, corresponding to about 21% of the total number of observation, versus about 26% of the total number of

Figure 2: QUARS - Moran scatterplot of provincial well-being




The geographical pattern of the QUARS indicator can be easely assesed by looking at Figure 1, where the distribution of the well-being indicator has been divided in decile. The darker areas, associated with higher values of the indicator, are mainly located in the North. The map clearly reveals the existence of two macro regions and their frontier is geographically represented by the regions in the Center of Italy, with a larger number of lighter areas located in the South.[17]

Statistical indicators, like the one we constructed, do not supply a correct meausure of geographic concentration of an economic phenomenon because they do not take into account spatial correlation in the data. So high values can be found in provinces irrespective of their locations, either they are close or distant to each others.

To overcome this limitation, we employ the spatial data analysis with the commonly used Moran's I test to measure how the well-being indicator is spatially correlated. This statistics compares the value of the observed variable at any location with the value of the same variable at neighbouring locations. The coefficients range between $-1$ and 1: the value '1' means perfect positive spatial autocorrelation (high values or low values cluster together), while '-1' suggests perfect negative spatial autocorrelation, and '0' implies perfect spatial randomness.[18]

observation in Segre *et al.* (2011).

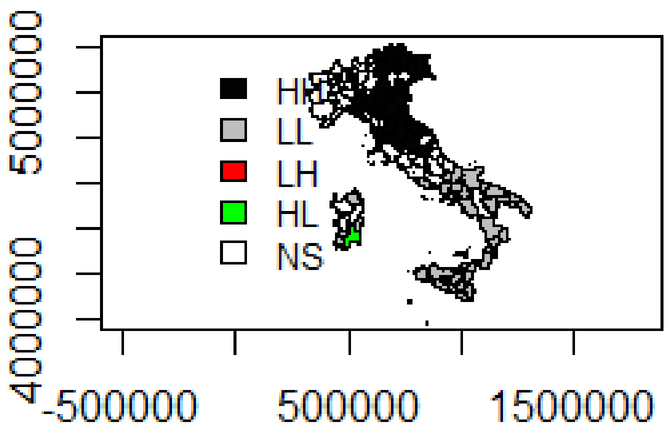
[17] The geographical distribution of the seven dimensions are reported in Appendix 2.

[18] The Moran's I autocorrelation coefficient is an extension of Pearson product-moment correlation coefficient and it is computed as:

$$I = \frac{n}{\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij}} \frac{\sum_{i=1}^{N}\sum_{j=1}^{N} w_{ij}\left(x_i - \overline{x}\right)\left(x_j - \overline{x}\right)}{\sum_{i=1}^{N}\left(x_i - \overline{x}\right)^2} \quad (2)$$

where $w_{ij}$ is the weight between observation $i$ and $j$; $x_i$ and $x$ are the variable in the $ith$ location and the

Figure 3: QUARS - Moran cluster map




The Moran's I test shows a high degree of spatial autocorrelation of the QUARS indicator: the magnitude of Moran's I test is high (I = 0.581) and strongly significant, which is well above its expected value ($I_0$) under the null hypothesis of no spatial autocorrelation, E[I] = ($I_0$) = -0.009.[19] This result suggests that well-being appears to be somewhat clustered in nature.[20]

Figure 2 provides a more disaggregated view of the nature of spatial autocorrelation by means of a Moran scatterplot, which plots the well-being value of a province against its spatial lag, i.e. a weighted average of its neighbors. The four different quadrants of the scatterplot identify four types of local spatial association between a province and its neighbors: going clockwise from top right we have HH ('High-High'), LH ('Low-High') LL ('Low-Low'), and HL ('High-Low').

In Quadrant I, HH, the Moran scatterplot represents the high well-being provinces that are surrounded by high well-being neighbors. In Quadrant III, LL, we can find the group of low well-being provinces, which are surrounded by low well-being neighbors. In Quadrants II (LH) and IV (HL), we can find the group of low/high well-being provinces surrounded by high/low well-being neighbors. Quadrants I and III belong to positive forms of spatial

mean of the variable, respectively; and $n$ is the total number of observations (see Anselin (1995) for more details).

[19]The expectation value of I is given by: $E(I) = I_0 = -\frac{1}{n-1}$, where $n$ is the total number of observations.

[20]We select a k-nearest neighbors weighting matrix with 10 as the critical cut-off for each province, so that each province has the same number of neighbors, that is 10. The choice is motivated by the fact that with this type of weighting matrix the number of neighbours is not allowed to vary, as it might be the case with, for instance, simple contiguity matrices and with distance-based weight matrices. This is of particular relevance in our study as we deal with Italian provinces, which are more irregular areal units than, for instance, the US States (Anselin, 2002). We also apply a classical row-standardization method, so that the sum in each row of the weighting matrix equal one. Spatial autocorrelation is detected also with values of $k$ equal to 5, 8, and 15.

dependence, while Quadrants II and IV represent negative spatial dependence. Provinces surrounded by a white square denote that the values of the Moran's I are not statistically significant at 10% level. It can be seen that most of the provinces are located in the HH and the LL quadrants, denoting the presence of autocorrelation in the data.

The result of the Moran scatterplot can also be represented in a map as in Figure 3. This shows those provinces with a significant Moran statistic classified by type of spatial correlation: black for the HH association, grey for LL. Provinces with HL and LH are not showned in the map since the Moran statistic is not statistically significant. Overall, Figure 2 and Figure 3 confirm the existence of two clusters, one in the North and the other in the South of Italy, however neither the North nor the South represent an homogeneous area.

# 3 Sensitivity Analysis

It is known that, besides the issue related to the selection of indicators, the problem of summarizng a set of socio-economic variables raises several important problems. The researcher needs to find the best suitable method in order to construct a composite index depending on a variety of factors, ranging from the type of indicator, the type of aggregation, the type of comparison, or the type of weight used for constructing the indicator (OECD, 2008). Needless to say, these procedures are associated with subjective judgments and therefore reveal a high degree of arbitrariness.

In this Section we carry out a sensitivity analysis in order to assess the impact of the methodology used for the costruction of our well-being indicator.[21] In particular, we focus: a) on the method the selected variables are treated regarding a1) the normalization procedure; a2) the weighting and aggregation schemes; and b) on the dimensionality issue, that is, we asses how the final result of our QUARS indicator is sensitive to the inclusion/exclusion of one of its components.

## 3.1 Normalization, weights, and aggregation schemes

Regarding the normalization method (a1), we compare the results obtained with the standardize method used for the construction of our well-being indicator against the min-max trasformation.[22] With this trasformation, the resulting indicator have an identical range [0, 1]. Our first alternative well-being indicator is therefore aimed at only comparing the normalization procedure. In the rest of the paper we call it the "minmax" well-being indicator.

With rispect to the weighting and aggregation methodology (a2), once the varibles are normalized, we aggregate them to form the overall indicator using three different approaches. Besides the standard averaging procedure (arithmetic mean) used in the previous Section we employ: i) the geometric average; ii) the Principal Component Analisys (PCA) ; and iii) the MPI, Mazziotta-Pareto Index procedure (De Muro *et al.*, 2012).[23]

The standard averaging procedure that we have followed to construct our final well-being indicator in Section 2 has the implication that the weights of the components are equal and that all the components (dimensions) are perfectly substitutable, i.e., "a deficit in one dimension can be offset (compensated) by a surplus in another" (OECD 2008, p.33). The geometric aggregation (i) allows some degree of non compensability between individual variables and/or dimensions. The PCA approach (ii) seems more "objective", in the sense

[21] Saltelli *et al.* (2008).

[22] With the min-max method the scaled values for each provinces is expressed in the following way:

$$R_i = \frac{x_i - x_{i,\min}}{x_{i,\max} - x_{i,\min}} \tag{3}$$

where $x_{i,\max}$ and $x_{i,\min}$ are the maximum and the minimum values observed for variable $i$, respectively.

[23] Under the geometric average case, variables are normalized with the min-max trasformation, noting that the standardization procedure produce same results. Variables are standardized under the PCA and the MPI cases, as required by the respective procedures (see Johnson and Wichern, 2002, and De Muro *et al.*, 2012.)

that the weights are not assigned *a-priori* but rather by a statistical technique. In this way, weights seems not arbitrary and more "scientific", because they are extracted from the data. The MPI method (iii) use a non-compensatory approach by introducing penalties for provinces with unbalanced values of the variable with the purpose to favourite the provinces that, mean being equal, have a greater balance among the variables values.[24] For instance, if an Italian province has a low value, say, of "Waste collection", and a high value, say, of "Organic farming", then the same province receives a penalty without compensation. The underlying principle of the MPI method is that, in order to obtain a high value in one dimension or in the final well-being indicator, all the individual variables must have high values, assuming that the variables themselves have equal importance.[25]

Overall, the sensitivity analysis will form a set of four composite well-being indicators to be tested in addition to the (aritmetic) mean standardized procedure used in the previuos Section for the construction of our QUARS:

1) minmax (arithmentic mean 0-1 with min-max trasformation),
2) minmaxg (geometric mean 0-1 with min-max trasformation);
3) PCA (Principal Component Analysis);
4) MPI (Mazziotta-Pareto Index).[26]

Regarding the PCA we adopt a two-steps approach (for a similar procedure see Ferrara and Nisticò, 2014). First, we take the standardized values of the seven dimensions used to construct the final well-being indicator as in the previous Section. Then, instead of using a weighted average, we extract by PCA the overall indicator of well-being.[27] According to the so-called Kaiser rule (Kaiser, 1970), we retained only the first Principal Component, which account for as much as 48 percent of the variability of the original data, given that the value of the second eigenvalue is exactly equal to 1, suggesting that the inclusion of a second PC does not provide additional information in terms of percentage of total variance explained that is not already captured by the first PC.[28] Furthermore, the loading factors, i.e., a measure of the correlations between PCs and the seven dimensions, show the highest values on the first retained PC, except for the rights and citizenship dimensions, suggesting that the first PC is able to reduce the dimension of the original data by capturing most of the variation, with minimal loss of information for almost all the dimensions. Finally, two performed diagnostic tests confirm the appropriateness of the overall analysys. The Kaiser-Meyer-Olkin (KMO) statistic of sampling adequacy, that is a measure of the proportion of variance among variables that might be common variance, shows a value of 0.805, suggesting that the sample is adequate (Kaiser, 1970), while the the Bartlett test of Sphericity, a test that compares the observed correlation matrix to the identity matrix, reject the null hypothesis of no correlation at 1% level of significance, indicating that we can perform efficiently the PCA on our dataset.[29]

[24] Casadio *et al* (2012) proposed an alternative unbalance adjustment methods, the Mean-Min Function (MMF).

[25] A complete description of how to contruct the MPI can be found in De Muro *et al* (2012). For an application see Chelli and Gigliarano 2016

[26] Each of these four methods were used for the construction of each one of the seven dimensions as well as for the final overall well-being indicator.

[27] The PCA seeks to reduce the dimension of the data by finding a few orthogonal linear combinations (the Principal Components, PC) of the original variables with the largest variance. The first PC is the linear combination with the largest variance. The second PC is the linear combination with the second largest variance and orthogonal to the first PC, and so on. There are as many PCs as the number of the original variables. The first several PCs explain most of the variance, so that the rest can be disregarded with minimal loss of information.

[28] The magnitude of the eigenvalues provides a measure of the original total variance explained and it is used to choose the number of PCs to retain. According to the so-called Kaiser rule, a PC should be retained if the corresponding eigenvalue is greater than 1, i.e., greater than the variance of a single standardized variable (Kaiser, 1970). In addition, to justify our selection choice we rely on the screen plot of the eigenvalue, which shows a distinct break on the second components (Johnson and Wichern, 2002).

[29] Under the null hypothesis, the dimensions are not correlated, i.e., the correlation matrix is the same as the identity matrix, and the observed dimensions cannot be really transformed by PCA into linear combinations in a lower-dimensional space (Johnson and Wichern, 2002).

Table 2: The Quars - Comparing methods

| Provinces | Regions* | (1) stand | (2) minmax | (3) minmaxg | (4) pca | (5) mpi | Rank difference (1)-(2) | (1)-(3) | (1)-(4) | (1)-(5) |
|---|---|---|---|---|---|---|---|---|---|---|
| Parma | EMR | 1 | 1 | 1 | 2 | 1 | 0 | 0 | -1 | 0 |
| Trieste | FVG | 2 | 3 | 4 | 1 | 5 | -1 | -2 | 1 | -3 |
| Ferrara | EMR | 3 | 2 | 2 | 3 | 2 | 1 | 1 | 0 | 1 |
| Valle d'Aosta/Vallée d'Aoste | VAA | 4 | 8 | 10 | 6 | 10 | -4 | -6 | -2 | -6 |
| Ravenna | EMR | 5 | 4 | 7 | 5 | 4 | 1 | -2 | 0 | 1 |
| Bologna | EMR | 6 | 5 | 3 | 4 | 6 | 1 | 3 | 2 | 0 |
| Forlì-Cesena | EMR | 7 | 6 | 6 | 9 | 3 | 1 | 1 | -2 | 4 |
| Siena | Toscana | 8 | 9 | 5 | 7 | 7 | -1 | 3 | 1 | 1 |
| Udine | FVG | 9 | 7 | 8 | 8 | 9 | 2 | 1 | 1 | 0 |
| Ancona | Marche | 10 | 11 | 9 | 10 | 8 | -1 | 1 | 0 | 2 |
| Belluno | Veneto | 11 | 10 | 13 | 11 | 11 | 1 | -2 | 0 | 0 |
| Trento | TAA | 12 | 12 | 12 | 12 | 12 | 0 | 0 | 0 | 0 |
| Bolzano/Bozen | TAA | 13 | 17 | 51 | 13 | 28 | -4 | -38 | 0 | -15 |
| Rimini | EMR | 14 | 24 | 41 | 20 | 22 | -10 | -27 | -6 | -8 |
| Firenze | Toscana | 15 | 15 | 14 | 14 | 15 | 0 | 1 | 1 | 0 |
| Pordenone | FVG | 16 | 14 | 22 | 18 | 14 | 2 | -6 | -2 | 2 |
| Modena | EMR | 17 | 13 | 17 | 16 | 16 | 4 | 0 | 1 | 1 |
| Perugia | Umbria | 18 | 20 | 11 | 19 | 13 | -2 | 7 | -1 | 5 |
| Pisa | Toscana | 19 | 19 | 16 | 17 | 17 | 0 | 3 | 2 | 2 |
| Reggio nell'Emilia | EMR | 20 | 18 | 19 | 22 | 18 | 2 | 1 | -2 | 2 |
| Piacenza | EMR | 21 | 21 | 21 | 21 | 19 | 0 | 0 | 0 | 2 |
| Rovigo | Veneto | 22 | 22 | 15 | 24 | 21 | 0 | 7 | -2 | 1 |
| Gorizia | FVG | 23 | 16 | 34 | 15 | 63 | 7 | -11 | 8 | -40 |
| Pesaro e Urbino | Marche | 24 | 25 | 18 | 26 | 20 | -1 | 6 | -2 | 4 |
| Genova | Liguria | 25 | 27 | 59 | 25 | 27 | -2 | -34 | 0 | -2 |
| Cremona | Lombardia | 26 | 23 | 31 | 23 | 25 | 3 | -5 | 3 | 1 |
| Terni | Umbria | 27 | 29 | 24 | 28 | 24 | -2 | 3 | -1 | 3 |
| Venezia | Veneto | 28 | 30 | 20 | 31 | 26 | -2 | 8 | -3 | 2 |
| Mantova | Lombardia | 29 | 26 | 35 | 32 | 33 | 3 | -6 | -3 | -4 |
| Macerata | Marche | 30 | 31 | 25 | 29 | 23 | -1 | 5 | 1 | 7 |
| Verona | Veneto | 31 | 28 | 29 | 33 | 31 | 3 | 2 | -2 | 0 |
| Vercelli | Piemonte | 32 | 32 | 28 | 30 | 29 | 0 | 4 | 2 | 3 |
| La Spezia | Liguria | 33 | 35 | 30 | 38 | 35 | -2 | 3 | -5 | -2 |
| Sondrio | Lombardia | 34 | 34 | 58 | 39 | 37 | 0 | -24 | -5 | -3 |
| Verbano-Cusio-Ossola | Piemonte | 35 | 42 | 46 | 45 | 39 | -7 | -11 | -10 | -4 |
| Savona | Liguria | 36 | 41 | 23 | 27 | 32 | -5 | 13 | 9 | 4 |
| Padova | Veneto | 37 | 33 | 36 | 35 | 34 | 4 | 1 | 2 | 3 |
| Arezzo | Toscana | 38 | 36 | 33 | 34 | 30 | 2 | 5 | 4 | 8 |
| Alessandria | Piemonte | 39 | 37 | 39 | 37 | 36 | 2 | 0 | 2 | 3 |
| Rieti | Lazio | 40 | 48 | 48 | 46 | 43 | -8 | -8 | -6 | -3 |
| Cagliari | Sardegna | 41 | 52 | 54 | 49 | 40 | -11 | -13 | -8 | 1 |
| Biella | Piemonte | 42 | 39 | 38 | 36 | 44 | 3 | 4 | 6 | -2 |
| Grosseto | Toscana | 43 | 44 | 42 | 41 | 38 | -1 | 1 | 2 | 5 |
| Cuneo | Piemonte | 44 | 43 | 37 | 44 | 42 | 1 | 7 | 0 | 2 |
| Pavia | Lombardia | 45 | 40 | 32 | 40 | 41 | 5 | 13 | 5 | 4 |
| Bergamo | Lombardia | 46 | 38 | 26 | 43 | 45 | 8 | 20 | 3 | 1 |
| Sassari | Sardegna | 47 | 54 | 60 | 52 | 51 | -7 | -13 | -5 | -4 |
| Treviso | Veneto | 48 | 45 | 49 | 50 | 46 | 3 | -1 | -2 | 2 |
| Pistoia | Toscana | 49 | 49 | 45 | 51 | 50 | 0 | 4 | -2 | -1 |
| Torino | Piemonte | 50 | 46 | 44 | 47 | 52 | 4 | 6 | 3 | -2 |
| L'Aquila | Abruzzo | 51 | 63 | 61 | 61 | 47 | -12 | -10 | -10 | 4 |
| Novara | Piemonte | 52 | 50 | 40 | 48 | 54 | 2 | 12 | 4 | -2 |
| Brescia | Lombardia | 53 | 47 | 53 | 55 | 55 | 6 | 0 | -2 | -2 |
| Chieti | Abruzzo | 54 | 57 | 55 | 64 | 48 | -3 | -1 | -10 | 6 |
| Frosinone | Lazio | 55 | 61 | 63 | 68 | 57 | -6 | -8 | -13 | -2 |
| Potenza | Basilicata | 56 | 64 | 47 | 69 | 53 | -8 | 9 | -13 | 3 |
| Livorno | Toscana | 57 | 53 | 68 | 42 | 59 | 4 | -11 | 15 | -2 |
| Fermo | Marche | 58 | 55 | 27 | 53 | 49 | 3 | 31 | 5 | 9 |
| Pescara | Abruzzo | 59 | 68 | 81 | 58 | 56 | -9 | -22 | 1 | 3 |
| Nuoro | Sardegna | 60 | 62 | 73 | 63 | 66 | -2 | -13 | -3 | -6 |
| Ascoli Piceno | Marche | 61 | 60 | 69 | 65 | 60 | 1 | -8 | -4 | 1 |
| Vicenza | Veneto | 62 | 51 | 52 | 54 | 58 | 11 | 10 | 8 | 4 |
| Varese | Lombardia | 63 | 59 | 43 | 57 | 61 | 4 | 20 | 6 | 2 |
| Imperia | Liguria | 64 | 69 | 62 | 60 | 64 | -5 | 2 | 4 | 0 |
| Massa-Carrara | Toscana | 65 | 70 | 50 | 59 | 62 | -5 | 15 | 6 | 3 |
| Lecco | Lombardia | 66 | 56 | 56 | 62 | 65 | 10 | 10 | 4 | 1 |
| Asti | Piemonte | 67 | 67 | 65 | 70 | 68 | 0 | 2 | -3 | -1 |
| Prato | Toscana | 68 | 58 | 57 | 56 | 75 | 10 | 11 | 12 | -7 |
| Como | Lombardia | 69 | 66 | 66 | 66 | 67 | 3 | 3 | 3 | 2 |
| Lucca | Toscana | 70 | 72 | 74 | 67 | 69 | -2 | -4 | 3 | 1 |
| Lodi | Lombardia | 71 | 65 | 70 | 71 | 71 | 6 | 1 | 0 | 0 |
| Teramo | Abruzzo | 72 | 73 | 67 | 75 | 70 | -1 | 5 | -3 | 2 |
| Roma | Lazio | 73 | 75 | 100 | 73 | 91 | -2 | -27 | 0 | -18 |
| Matera | Basilicata | 74 | 77 | 78 | 80 | 74 | -3 | -4 | -6 | 0 |
| Benevento | Campania | 75 | 76 | 82 | 79 | 73 | -1 | -7 | -4 | 2 |
| Monza e della Brianza | Lombardia | 76 | 71 | 72 | 72 | 79 | 5 | 4 | 4 | -3 |
| Viterbo | Lazio | 77 | 78 | 71 | 76 | 72 | -1 | 6 | 1 | 5 |
| Oristano | Sardegna | 78 | 82 | 83 | 78 | 77 | -4 | -5 | 0 | 1 |
| Campobasso | Molise | 79 | 79 | 96 | 77 | 85 | 0 | -17 | 2 | -6 |
| Catanzaro | Calabria | 80 | 83 | 99 | 84 | 78 | -3 | -19 | -4 | 2 |
| Lecce | Puglia | 81 | 81 | 75 | 82 | 76 | 0 | 6 | -1 | 5 |
| Enna | Sicilia | 82 | 84 | 102 | 88 | 82 | -2 | -20 | -6 | 0 |
| Messina | Sicilia | 83 | 80 | 84 | 81 | 80 | 3 | -1 | 2 | 3 |
| Carbonia-Iglesias | Sardegna | 84 | 101 | 94 | 93 | 83 | -17 | -10 | -9 | 1 |
| Milano | Lombardia | 85 | 74 | 77 | 74 | 101 | 11 | 8 | 11 | -16 |
| Olbia-Tempio | Sardegna | 86 | 92 | 79 | 87 | 87 | -6 | 7 | -1 | -1 |
| Foggia | Puglia | 87 | 91 | 86 | 94 | 88 | -4 | 1 | -7 | -1 |
| Ragusa | Sicilia | 88 | 86 | 90 | 89 | 86 | 2 | -2 | -1 | 2 |
| Latina | Lazio | 89 | 85 | 80 | 85 | 81 | 4 | 9 | 4 | 8 |
| Reggio di Calabria | Calabria | 90 | 97 | 95 | 90 | 93 | -7 | -5 | 0 | -3 |
| Palermo | Sicilia | 91 | 89 | 88 | 95 | 92 | 2 | 3 | -4 | -1 |
| Isernia | Molise | 92 | 88 | 105 | 83 | 98 | 4 | -13 | 9 | -6 |
| Cosenza | Calabria | 93 | 94 | 91 | 91 | 90 | -1 | 2 | 2 | 3 |
| Brindisi | Puglia | 94 | 87 | 76 | 86 | 84 | 7 | 18 | 8 | 10 |
| Catania | Sicilia | 95 | 95 | 89 | 97 | 94 | 0 | 6 | -2 | 1 |
| Taranto | Puglia | 96 | 90 | 87 | 92 | 89 | 6 | 9 | 4 | 7 |
| Salerno | Campania | 97 | 93 | 93 | 96 | 95 | 4 | 4 | 1 | 2 |
| Ogliastra | Sardegna | 98 | 99 | 64 | 98 | 100 | -1 | 34 | 0 | -2 |

*Table 2: continues in the next page*

*Table 2: continues from previous page*

| Provinces | Regions* | (1) stand | (2) minmax | (3) minmaxg | (4) pca | (5) mpi | Rank difference (1)-(2) | (1)-(3) | (1)-(4) | (1)-(5) |
|---|---|---|---|---|---|---|---|---|---|---|
| Avellino | Campania | 99 | 98 | 97 | 99 | 96 | 1 | 2 | 0 | 3 |
| Bari | Puglia | 100 | 96 | 85 | 100 | 97 | 4 | 15 | 0 | 3 |
| Siracusa | Sicilia | 101 | 102 | 98 | 101 | 99 | -1 | 3 | 0 | 2 |
| Caltanissetta | Sicilia | 102 | 103 | 101 | 105 | 103 | -1 | 1 | -3 | -1 |
| Trapani | Sicilia | 103 | 104 | 103 | 103 | 102 | -1 | 0 | 0 | 1 |
| Barletta-Andria-Trani | Puglia | 104 | 100 | 107 | 106 | 108 | 4 | -3 | -2 | -4 |
| Crotone | Calabria | 105 | 105 | 104 | 104 | 105 | 0 | 1 | 1 | 0 |
| Agrigento | Sicilia | 106 | 106 | 106 | 107 | 104 | 0 | 0 | -1 | 2 |
| Vibo Valentia | Calabria | 107 | 107 | 109 | 102 | 106 | 0 | -2 | 5 | 1 |
| Caserta | Campania | 108 | 108 | 108 | 108 | 107 | 0 | 0 | 0 | 1 |
| Medio Campidano | Sardegna | 109 | 109 | 92 | 109 | 110 | 0 | 17 | 0 | -1 |
| Napoli | Campania | 110 | 110 | 110 | 110 | 109 | 0 | 0 | 0 | 1 |
| Percentage of provinces in the first 50 positions with same rank as in column (1) | | | 96% | 90% | 94% | 94% | | | | |
| Average absolute mean difference of rank | | | | | | | 3.3 | 3.3 | 7.7 | 3.3 |

* EMR=Emilia Romagna, FVG=Friuli-Venezia-Giulia, TAA=Trentino-Alto-Adige, VAA=Valle d'Aosta/Vallée d'Aoste

*Table 2: end from previous page*

Table 3: Spearman's rank correlation coefficient matrix

| | stand | minmax | minmaxg | pca | mpi |
|---|---|---|---|---|---|
| stand | 1.0000 | | | | |
| minmax | 0.9895* | 1.0000 | | | |
| minmaxg | 0.9383* | 0.9485* | 1.0000 | | |
| pca | 0.9889* | 0.9923* | 0.9443* | 1.0000 | |
| mpi | 0.9836* | 0.9716* | 0.9490* | 0.9700* | 1.0000 |

* correlation is significant at the 0.01 level

Table 2 compares the provincial ranking position of the standardized QUARS (column 1) computed in the previous Section with the results obtained by applying the methods 1 to 4 mentioned above, which are displayed in column 2-5 rispectively. There are some clear results. First of all, the geographical distribution of the well-being indicator constructed with the standardize procedure is extensively validated by the other methods. For instance, in the first 50 positions there is a large number of provinces maintaining their ranking across methods (at least 90% of them, as reported at the end of Table 2). Furthermore, the average absolute mean differences of rank between column (1) and each of these alternative procedures are very low (the largest value, 7.7, appears under the minmaxg method), suggesting that our well-being indicator is robust to the type of aggregation and to the weights used for its construction. This is also confirmed if we look at the Spearman's rank correlation coefficients (see Table 3), which measures the strength and direction of association between ranks. Values are very high in all cases, indicating the existence of a general tendency for provinces with higher rank in the standardized procedure to have high positions within each single other method.

Overall, the robustness analysis shows that ranking is enough stable and only few provinces show some degree of variability, implying that the overall performance of the QUARS well-being indicator constructed in Section 2 is robust to alternative specification regarding normalization, weighting and aggregation methods.

## 3.2 Dimensionality

Finally we focus on the dimensionaly issue (b), that is, we asses how the final QUARS is sensitive to the inclusion/exclusion of a single dimension. To this purpose, given that our well-being overall indicator is composed by aggregating k dimensions (k=7), we construct k overall indicators by excluding one dimension at a time and constructing the final QUARS using the k-1 remaining dimensions. Column 3 to 9 in Table 4 show the rank for the provinces in each of the "new" seven QUARS indicator. For evaluation purposes, at the end of the

Table we report the average absolute mean differences of ranks between the original QUARS and the provincial rank in each of the k-1 new dimension, the Spearman's rank correlation coefficient, and the percentage of provinces shifting at least five position from the original rank. An interesting feature revealed by Table 4 is the lack of sensitivity to the exclusion of a single dimension. For instance, if we exclude the "enviroment" dimension, the average absolute mean difference of ranks is just close to 5, while the Spearman's rank correlation with the original QUARS is close to 0.98 and the number of provinces that are shifting more than five position in the new ranking is about 34% of the total, a relatively low percentage. Excluding other dimensions leads to smaller structural changes.

# 4 An empirical model of well-being

In this Section we test our well-being indicator against a number of hypotheses that have emerged in the literature as a possible determinant. A controversial issue regards the nexus between income and happiness or subjective well-being, which has been explored extensively in the empirical literature following the seminal contribution of Easterlin (1974).[30] Easterlin found that at a point in time happiness varies directly with income, although such correlation tends to disappear beyond a certain level of income. According to Easterlin (2003) the concave relationship between self-declared happiness and income is related to the concept of adaptation: individuals adapt to their conditions and get used to their circumstances, and so increasing income and the thing it can buy do not necessarely lead to enhanced well-being.[31]

Other researchers explored the relationship between social capital and well-being trend (Bartolini *et al.* 2013, Sarracino 2012, and Stanzani 2015). In these studies social capital seems to gain new relevance in correlate people's well-being and in explaining the happiness-income paradox defined by Easterlin (1974). For instance, Bartolini *et al.* (2013) using data for the US economy between 1975 and 2004, found that well-being did not grow up together with economic growth because the positive effect of income growth was counterbalanced by the declining availability of social capital, which negatively affects well-being.

Researchers also found debt as an important determinant of well-being. For instance, Tay *et al.* (2016) found that decreased debt lead to financial security which is one life domain that influences a person's subjective evaluation of their life. According to some empirical studies overall life satisfaction is positively related to household net wealth. Headey and Wooden (2004) shows that household net wealth, which can be viewed as providing a degree of economic security, is at least as important to well-being as income.

A recent strand of the well-being literature instead found social security programs to improve the overall quality of human life (Haller and Hadler 2006, and Pacek and Radcliff 2008), while other studies explore the link between happiness and philanthropy activities. Results shows that charitable giving can increase givers' psychological well-being (Konrath 2014), but giving money is also good for the receiver as it increased health, prosperity and strong community organizations (Aknin *et al.* 2010, and Brooks 2006).

Among this latter well-being determinants, we are interested to see if grant-making activities by BFs (Banking Foundations, *Fondazioni di origine bancaria*) have an impact on well-being across Italian provinces, a channel that, to our knowledge, has not been explored in the literature. As mentioned in the Introduction, BFs formed in the early 1990s during the process of privatization of the banking sector, as shareholders of the newly-privatized banks. Today, they are recognized as not-for-profit institutions with the aim to ensure that the dividends of banking activities would be reinvested in the local community in the form of grants for projects of social, charitable, and cultural interest. The 88 BFs, which are currently operating across the Italian territory, hold about €40 billions in assets (as of the end of 2015), about 2% of GDP (ACRI, 2016), a relatively small figure compare to inter-

[30]See Bruni and Porta (2005) for a review of the literature.
[31]See also Clark (2016), and Layard (2005) on this point.

Table 4: The QUARS - Sensitivity analysis

| Provinces | Regions | Rank difference dimension not included: envir. | econ. | rights | health | educ | gend. eq. | partec. |
|---|---|---|---|---|---|---|---|---|
| Parma | Emilia-Romagna | -1 | 0 | 0 | -1 | -6 | 0 | -1 |
| Trieste | Friuli-Venezia Giulia | 1 | 0 | -1 | -2 | -3 | -1 | -1 |
| Ferrara | Emilia-Romagna | -1 | 0 | 1 | 0 | 0 | 1 | 2 |
| Valle d'Aosta/Vallée d'Aoste | Valle d'Aosta/Vallée d'Aoste | -9 | 0 | -4 | 3 | 3 | 0 | -2 |
| Ravenna | Emilia-Romagna | 0 | 0 | 0 | 0 | -1 | 0 | 1 |
| Bologna | Emilia-Romagna | 3 | 0 | 2 | 0 | -4 | -2 | -1 |
| Forlì-Cesena | Emilia-Romagna | -2 | 0 | 0 | 0 | -1 | 0 | 2 |
| Siena | Toscana | 2 | 0 | 2 | -1 | -6 | 2 | -1 |
| Udine | Friuli-Venezia Giulia | -1 | 0 | 0 | 1 | 5 | 0 | -2 |
| Ancona | Marche | 2 | 0 | -6 | -1 | -2 | -3 | 2 |
| Belluno | Veneto | -6 | -2 | 1 | -2 | 9 | 1 | 1 |
| Trento | Trentino-Alto Adige/Südtirol | -3 | 0 | -1 | 2 | -1 | 1 | -3 |
| Bolzano/Bozen | Trentino-Alto Adige/Südtirol | -10 | -1 | -2 | -1 | 4 | -1 | -18 |
| Rimini | Emilia-Romagna | 3 | 3 | -9 | -7 | -7 | 2 | 1 |
| Firenze | Toscana | 3 | 0 | 1 | 3 | -19 | -4 | -2 |
| Pordenone | Friuli-Venezia Giulia | -4 | -2 | -1 | 0 | 5 | -2 | 2 |
| Modena | Emilia-Romagna | -1 | -2 | 5 | -5 | 0 | -5 | 5 |
| Perugia | Umbria | 4 | 2 | 0 | 1 | -2 | 3 | 2 |
| Pisa | Toscana | 0 | 2 | 8 | 4 | -11 | 3 | 1 |
| Reggio nell'Emilia | Emilia-Romagna | -5 | -2 | -2 | 1 | 4 | 0 | 1 |
| Piacenza | Emilia-Romagna | 0 | 0 | 1 | -5 | 3 | 4 | -5 |
| Rovigo | Veneto | -5 | -2 | 1 | -2 | 7 | -3 | 2 |
| Gorizia | Friuli-Venezia Giulia | 16 | -3 | -10 | -4 | 1 | -7 | -12 |
| Pesaro e Urbino | Marche | 0 | 1 | -7 | 4 | 1 | 3 | 3 |
| Genova | Liguria | 9 | 5 | -1 | -7 | -2 | -8 | 1 |
| Cremona | Lombardia | -2 | -5 | 7 | -3 | -6 | -2 | -4 |
| Terni | Umbria | 5 | 0 | 0 | -10 | -2 | 1 | 5 |
| Venezia | Veneto | -5 | -2 | -1 | 0 | 3 | -3 | 5 |
| Mantova | Lombardia | -10 | -5 | 4 | -2 | 10 | 5 | -4 |
| Macerata | Marche | 1 | 2 | -2 | 5 | -9 | -5 | 5 |
| Verona | Veneto | 0 | 2 | 7 | -10 | -2 | 2 | 3 |
| Vercelli | Piemonte | -2 | -9 | -2 | 9 | -4 | -5 | 3 |
| La Spezia | Liguria | -9 | -6 | -7 | 3 | 7 | 6 | -4 |
| Sondrio | Lombardia | 4 | 2 | -10 | -8 | 10 | 2 | -2 |
| Verbano-Cusio-Ossola | Piemonte | -12 | 0 | -6 | -1 | 7 | 12 | -3 |
| Savona | Liguria | 10 | 0 | 8 | -7 | 1 | -7 | -10 |
| Padova | Veneto | 1 | 0 | 0 | 4 | -8 | -1 | -3 |
| Arezzo | Toscana | 6 | -5 | 2 | 3 | -5 | -7 | 6 |
| Alessandria | Piemonte | -2 | -3 | 4 | -1 | -2 | 0 | 5 |
| Rieti | Lazio | 5 | 2 | -16 | 2 | 3 | 6 | 1 |
| Cagliari | Sardegna | 4 | 16 | -2 | -8 | -6 | 0 | 14 |
| Biella | Piemonte | -8 | -3 | -3 | 24 | 2 | -6 | -2 |
| Grosseto | Toscana | 5 | 3 | -5 | 4 | 1 | 3 | -7 |
| Cuneo | Piemonte | -1 | 0 | 2 | -2 | 13 | 8 | -1 |
| Pavia | Lombardia | 5 | -1 | 15 | 1 | -6 | -1 | 4 |
| Bergamo | Lombardia | -3 | -4 | 8 | 1 | 8 | 4 | -1 |
| Sassari | Sardegna | 3 | 14 | -2 | -13 | -6 | -5 | 5 |
| Treviso | Veneto | 0 | -5 | -2 | -3 | 4 | -2 | -4 |
| Pistoia | Toscana | -11 | -7 | 2 | -5 | 3 | -2 | -6 |
| Torino | Piemonte | -5 | -2 | -1 | 16 | -12 | -9 | 1 |
| L'Aquila | Abruzzo | 0 | 3 | -2 | -8 | -20 | 2 | 8 |
| Novara | Piemonte | -11 | -7 | 13 | -3 | 0 | -4 | -4 |
| Brescia | Lombardia | -5 | -5 | 1 | -9 | 3 | 6 | -5 |
| Chieti | Abruzzo | -13 | 3 | -7 | 4 | -4 | 1 | 6 |
| Frosinone | Lazio | 2 | 1 | -18 | 3 | -5 | 11 | 2 |
| Potenza | Basilicata | -9 | 9 | -4 | -12 | 0 | 2 | 5 |
| Livorno | Toscana | 11 | -4 | 11 | 10 | -2 | -6 | -7 |
| Fermo | Marche | 2 | 1 | -1 | 10 | 4 | 0 | -2 |
| Pescara | Abruzzo | 7 | 10 | -3 | 3 | -7 | -1 | 0 |
| Nuoro | Sardegna | -11 | 0 | 6 | 2 | 3 | 5 | 3 |
| Ascoli Piceno | Marche | -3 | 6 | -8 | 0 | 12 | -3 | 7 |
| Vicenza | Veneto | -4 | -4 | 4 | 9 | 14 | 5 | 0 |
| Varese | Lombardia | 4 | -1 | 8 | -6 | 0 | -9 | 2 |
| Imperia | Liguria | 10 | 2 | 1 | -10 | 9 | -5 | -1 |
| Massa-Carrara | Toscana | 8 | 2 | 0 | 8 | -4 | -8 | 2 |
| Lecco | Lombardia | 4 | -11 | -1 | 0 | 1 | 5 | -1 |
| Asti | Piemonte | -7 | -6 | 3 | 2 | 6 | 5 | 1 |
| Prato | Toscana | 25 | 1 | 0 | -8 | -2 | -11 | -4 |
| Como | Lombardia | -1 | -3 | 3 | -2 | 5 | -1 | -2 |
| Lucca | Toscana | 1 | -6 | -1 | 7 | -2 | 5 | -7 |
| Lodi | Lombardia | -4 | -15 | 14 | -1 | 3 | 5 | 1 |
| Teramo | Abruzzo | -1 | 1 | -7 | -3 | 5 | 5 | 3 |
| Roma | Lazio | 5 | 5 | 1 | 9 | -19 | -7 | 0 |
| Matera | Basilicata | -11 | 9 | -2 | -4 | 1 | 6 | -1 |
| Benevento | Campania | -1 | 6 | 1 | -9 | -6 | 4 | 7 |
| Monza e della Brianza | Lombardia | 15 | -13 | 6 | -7 | 1 | -8 | 0 |
| Viterbo | Lazio | -1 | -2 | -3 | 7 | -3 | 3 | -7 |
| Oristano | Sardegna | -3 | 3 | 1 | -1 | 0 | 1 | -2 |
| Campobasso | Molise | 0 | 1 | -10 | 12 | -9 | -2 | 1 |
| Catanzaro | Calabria | -2 | -1 | 2 | -8 | -2 | 4 | 6 |
| Lecce | Puglia | 4 | 11 | -1 | -4 | -3 | 6 | -4 |
| Enna | Sicilia | -12 | 8 | -2 | 1 | 6 | 4 | 1 |
| Messina | Sicilia | -1 | -2 | 8 | -3 | -2 | -4 | 4 |
| Carbonia-Iglesias | Sardegna | -8 | 4 | -13 | -3 | 10 | 1 | 1 |
| Milano | Lombardia | 13 | -9 | 4 | 8 | -10 | -14 | -3 |
| Olbia-Tempio | Sardegna | 3 | 3 | -14 | 6 | 7 | 1 | -5 |
| Foggia | Puglia | 7 | 5 | -9 | -11 | 4 | 5 | 5 |
| Ragusa | Sicilia | 0 | 4 | 5 | -8 | 11 | -5 | 2 |
| Latina | Lazio | 3 | -2 | -9 | 7 | 3 | 3 | -3 |

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Table 4: *...continue from previous page*

| Provinces | Regions | Rank difference dimension not included: envir. | econ. | rights | health | educ. | gend. eq. | partec. |
|---|---|---|---|---|---|---|---|---|
| Reggio di Calabria | Calabria | 3 | -2 | -3 | -5 | 1 | -2 | 1 |
| Palermo | Sicilia | -5 | 4 | 5 | -1 | 0 | -4 | 4 |
| Isernia | Molise | 2 | -5 | -7 | 19 | -5 | -2 | -5 |
| Cosenza | Calabria | 4 | 3 | 6 | -4 | -3 | 3 | 3 |
| Brindisi | Puglia | 3 | -2 | 4 | 3 | 7 | -3 | -1 |
| Catania | Sicilia | 2 | 2 | 4 | -4 | 1 | 4 | 1 |
| Taranto | Puglia | 1 | -3 | 2 | 6 | 6 | 0 | 3 |
| Salerno | Campania | 0 | 2 | 9 | 4 | -2 | 8 | 1 |
| Ogliastra | Sardegna | -8 | 10 | 13 | 9 | 5 | -5 | 0 |
| Avellino | Campania | 1 | 1 | 7 | -1 | -3 | 11 | -1 |
| Bari | Puglia | 1 | 0 | -1 | 6 | 2 | 2 | 1 |
| Siracusa | Sicilia | 1 | -1 | -1 | 0 | 1 | 0 | 0 |
| Caltanissetta | Sicilia | -1 | 1 | -3 | 0 | 1 | 0 | 0 |
| Trapani | Sicilia | 1 | -2 | -1 | -3 | -1 | -2 | 0 |
| Barletta-Andria-Trani | Puglia | -3 | -2 | 9 | -4 | 1 | 4 | 0 |
| Crotone | Calabria | 0 | 1 | 2 | 0 | 0 | -3 | 0 |
| Agrigento | Sicilia | 2 | 3 | -1 | -1 | 0 | 2 | 0 |
| Vibo Valentia | Calabria | 6 | 0 | 1 | 4 | 0 | 1 | 0 |
| Caserta | Campania | 0 | 0 | -1 | 4 | 0 | 1 | 0 |
| Medio Campidano | Sardegna | -1 | 0 | 1 | 0 | 0 | 0 | -1 |
| Napoli | Campania | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Average absolute mean difference of rank | | 4.4 | 3.3 | 4.3 | 4.6 | 4.5 | 3.6 | 3.0 |
| Spearman's rank correlation | | 0.981 | 0.989 | 0.983 | 0.981 | 0.981 | 0.989 | 0.991 |
| percentage of provinces shifting at least five positions | | 27% | 18% | 33% | 34% | 33% | 21% | 14% |

national standards or within the context of domestic institutional investors, Over the last fifteen years they have been providing on average funds for almost €1 billion per year to local communities, an amount that it is irrelevant in the context of total government expenditure. However, BFs are recognized as a vital source for promoting the development of the local communities and improving the quality of life (Barbetta 2013). Indeed, BFs exercise a direct impact on economic activity, especially in those sectors of the economy mostly penalized by the market. In a recent paper, using provincial data for the 2001-2011 period, Calcagnini et al., (2016) showed that grant-making activities by BFs have a positive and statistically significant effect on social capital and economic growth. In that study, social capital has been measured by taking into account the role of BFs sector of interventions. Here, instead, we measure social capital by aggregating variables that identify various social aspects, as recognized in the literature, such as social interaction, trust in people and institutions, and civic partecipation, and then use grant-making activities by BFs as an explicit well-being determinant in our estimation model, our main goal.

More specifically, our choice selection of the variables to construct a social capital (SC) measure follows previous studies (see, for instance, Guiso *et al.* (2004) Cartocci (2007), Micucci and Nuzzo (2005), and Rizzi and Popara (2006) among others). We select a total of four variables: the number of blood bag donation (as an indicator of civicness and people's propensity to cooperate); bicycle lanes (to proxy for social inclusion and interactions); the lenght of first-instance ordinary court proceeding; and the number of car thefts[32] (two measures related to trust).[33] These four variables have been aggregated by means of the PCA (Johnson and Wichern, 2002). In the PC analysis the first eigenvalue explains 48 percent of the variability of the original data, while the second eigenvalue is less than unity. Therefore, following the Kaiser rule (Kaiser, 1970), we retained only the first Principal Component. Also, the loading factors show the highest values on the first retained PC, while the Bartlett's test confirm the appropriateness of the overall analysys (the null hypothesis of no correlation is rejected at 1 percent level of significance). Finally, the KMO measure of

[32]As noted in Buonanno *et al.* (p.154, 2009), a major problem when dealing with official data on crime rates is that they crucially depend on report rates, which in the Italian context vary significantly across crimes and space. For instance, thefts and robberies not only show a high degree of underreporting, but also display a high heterogeneity in report rates across provinces. By contrast, car thefts do not suffer from underreporting (more than 94% of car thefts are reported) and, more importantly, the rate of report is very similar (almost identical) across provinces.

[33]Data description and the source of the four variables are in Appendix 3 (Table 9).

sampling adequacy indicates the suitability of the data for PCA (KMO values is above 0.66). The geographical distribution of the obtained SC indicator divided in decile is in Figure 7 in Appendix 3. As expected provinces located in the North and the Centre of Italy have an higher endowment of social capital compare to provinces located in the South.[34]

To test the above mentioned well-being determinants we specified the following cross-sectional model, with our well-being indicator ($WB$) as the dependent variable:

$$\begin{aligned} WB_i = \alpha_0 + \alpha_1 SC_i + \alpha_2 VA_i + \alpha_3 VA_i^2 + \alpha_4 SocExp_i \\ + \alpha_5 BFgrants_i + \alpha_6 WR_i + \alpha_7 Loans_i + F_i + \epsilon_i \end{aligned} \tag{4}$$

In equation (4) the subscript $i$ refers to provinces, $SC$ is the social capital indicator, $VA$ denotes real per-capita Value Added.[35] To proxy for social security programs we use $SocExp$, which is the amount of per-capita expenditure for social security services managed by municipalities. To test the impact of hosehould wealth on well-being we use $WR$, which is the amount of household real wealth (dwellings and lands), while to test wheter debt affects well-being we use the variable $Loans$, that is the amount of bank loans to the private sector as a share of VA. Finally, $BFgrants$, denotes the amount of Bank Foundations (BFs) grants over Value Added (VA), $F$ controls for geographical area fixed effects,[36] and $\epsilon$ is an i.i.d. error term.[37]

In equation (4) the dependent variable, $WB$, has been constructed with variables taken between 2005 and 2011 (see Table 8 in Appendix 1) while, to account for possible endogeneity, the independent variables are taken in the first year data for which the $SocExp$ variable is available, that is 2003 (see Table 10 in Appendix 4), except for the SC indicator which is made up by averaging data across the years from 2001 and 2003, in order to account for the high variability in the data (see Table 9 in Appendix 3). The number of available observations for model estimation are 97 (equal to the number of observations for the SC variable), however to deal with outliers the number of observations in the model is reduced to 91.[38]

Estimation results are in Table 5. In column (1) the parameter coefficients are all statistically significant and have the expected signs. Social capital ($SC$) as well as income ($VA$) and social expenditure ($SocExp$) exert a positive impact on well-being. Column (2), however, reveals a non-linear significant statistical effect of income on well-being, suggesting that beyond a certain income level, well-being does not increase significantly with additional income, a result that confirm Easterlin (1974) findings.

In column (3) and (4) we add BFs grants to the model specification. The nonlinear relationship (showed in column (3)), which is mainly due to measurement problems, disappears once we control for province dummy (column (4)).[39] It seems that BFs play an important role

[34]To test the robustness of our result we compare with the social capital measure of Cartocci (2007), which follows the approach of Putnam (1993) seminal paper. Indeed, the Spearman's rho correlation coefficient with Cartocci's index is over 0.74, implying that there is a tendency for provinces with higher values in Cartocci's ranking to have higher values in our ranking.

[35]To deflate VA we use the consumer price index (CPI) which is measured in the main cities of regions (NUTS-2) and provinces (NUTS-3).

[36] For geographical area we select North-West (which comprises 24 provinces), North-East (22), Center (20), and the South (34).

[37]A detailed description of the variables used and the source of the data is in Appendix 4 (Table 10, and Table 11).

[38]We have not included the province of Siena (which is an observation distant from the rest for the $BFs$ variable), the province of Napoli (for the $WB$ variable), the province of Messina (for the SC variable), the province of Oristano (for the $SocExp$ variable), and the provinces of Milano and Rome (for the $Loans$ variable. In all cases, the Walsh's non-parametric outlier test (Walsh, 1959) indicates that all the mentioned observations are outliers at 10% significance level, the level that should be used in our case given that the number of observations in the sample is less than 220.

[39]The explanation for the non-linear relationship between $BFgrants$ and $WB$ is likely due to the fact that $BFs$ do not always provide a grant breakdown by province. BFs activities and grant-making focus mainly on their local communities, so the grant distribution mirrors the geographical BFs location. Nevertheless, almost 40% of the total BFs grants are distributed to provinces that are not those where BFs are located. The original dataset we use in this paper that has been provided by ACRI, the Italian Association of Foundations and

Table 5: Estimation Results (Dependent Variable: *Well-Being*)

| Variables | (1) OLS | (2) OLS | (3) OLS | (4) OLS | (5) OLS | (6) OLS | (7) SAR |
|---|---|---|---|---|---|---|---|
| SC | 0.113* | 0.118* | 0.125** | 0.135** | 0.121* | 0.131** | 0.117** |
| | (0.067) | (0.061) | (0.055) | (0.062) | (0.063) | (0.061) | (0.051) |
| VA | 0.055* | 0.523*** | 0.495*** | 0.497*** | 0.500*** | 0.4946*** | 0.492*** |
| | (0.032) | (0.124) | (0.123) | (0.127) | (0.129) | (0.127) | (0.104) |
| VA$^2$ | | -0.012*** | -0.012*** | -0.012*** | -0.012*** | -0.014*** | -0.000*** |
| | | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (-0.000) |
| SocExp | 0.432*** | 0.433*** | 0.322** | 0.357** | 0.313** | 0.353** | 0.343*** |
| | (0.151) | (0.141) | (0.134) | (0.149) | (0.142) | (0.151) | (0.103) |
| BF grants | | | 0.621*** | 0.414*** | 0.438*** | 0.411*** | 0.421*** |
| | | | (0.170) | (0.111) | (0.110) | (0.112) | (0.090) |
| BF grants$^2$ | | | -0.211*** | | | | |
| | | | (0.049) | | | | |
| WR | | | | | 0.002 | | |
| | | | | | (0.002) | | |
| Loans | | | | | | 0.001 | |
| | | | | | | (0.004) | |
| W*$WB$ | | | | | | | 0.121 |
| | | | | | | | (0.094) |
| Constant | -1.061* | -5.403*** | -5.167*** | -5.069*** | -5.599*** | -5.091*** | |
| | (0.566) | (1.184) | (1.191) | (1.264) | (1.361) | (1.273) | |
| Area dummy | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Province dummy* | No | No | No | Yes | Yes | Yes | Yes |
| Observations | 91 | 91 | 91 | 91 | 91 | 91 | 91 |
| Adjusted R-squared | 0.704 | 0.742 | 0.786 | 0.797 | 0.798 | 0.793 | |
| Jarque-Bera test | -4.184 | -0.589 | 35194.917*** | 2267.319*** | 2905.251*** | 2233.412*** | |
| AIC | 131.488 | 120.172 | 104.834 | 84.133 | 83.995 | 85.914 | 112.520 |
| BIC | 149.064 | 140.259 | 129.942 | 106.731 | 109.104 | 111.023 | 172.776 |
| Diagnostic for spatial dependence *(numbers into brackets refer to the p-values)* | | | | | | | |
| LMerr | | | | | | | 0.461 |
| | | | | | | | (0.497) |
| LMlag | | | | | | | 1.635 |
| | | | | | | | (0.200) |
| RLMerr | | | | | | | 1.648 |
| | | | | | | | (0.199) |
| RLMlag | | | | | | | 2.822* |
| | | | | | | | (0.093) |
| LR test (OLS vs. SAR) | | | | | | | 1.617 |

Robust standard errors in parentheses - *** p<0.01, ** p<0.05, * p<0.1
* Provinces are: Alessandria, Asti, Biella, Cuneo, Grosseto, Lucca, Massa Carrara, Padova, Rovigo, Torino, and Venezia.

in determining well-being. However, hosehould wealth, $WR$ and debt, $Loans$, do not affect well-being (column (5) and in column (6)) as the coefficients are statistically not significant.

Finally, given the existence of spatial autocorrelation in our well-being indicator (see Figure 2), in column (7) we use two Lagrange Multiplier tests, as well as their robust counterparts, to test the presence of two possible forms of autocorrelation on model in colum (4): the LM tests for an omitted spatial lag (LMlag), and an omitted spatial error (LMerr) (Anselin, 1988). Model in column (4) is indeed our preferred specification: the coefficients for all the variables are statistically significant, and the Bayesian information criterion (BIC) shows the lowest value across models.

Results shows that the Robust LMlag (RLMlag) is statistically significant at 10% level, while the RLMerr fails to detect spatial correlation in the OLS residuals. Therefore, following Anselin's (2005) model selection decision rule, we proceed to estimate a Spatial Autoregressive Model (SAR), which corresponds to the presence of a spatially lagged dependent variable ($\rho$W*$WB$) as an additional control on the right hand side of equation (4), with $\rho$ being the parameter of the spatial autoregressive process, and W the spatial weighting matrix which describes the spatial configuration of the provinces in the sample, i.e., the indication of whether one province is a spatial neighbor of another. As such, the SAR model posits that the dependent variable also depends on the dependent variable observed in neighboring units (LeSage and Pace, 2009). We used 10-nearest neighbors weighting matrix (see footnote 20) and carried some robustness checks for different values of k. We fail to detect spatial correla-

Savings Banks, classifies grants by BFs of origin, not by province of destination. Therefore, some provinces show an improper high level of the ratio between grants and VA to which does not correspond a proportional level of well-being. Another explanation, not necessarily alternative to the previous one, is that, as recently outlined in Ferri et al. (2015), $BFs$ grant-making activities have large margins of improvements in terms of their effectiveness, which finds evidence in a nonlinear relationship between $BFs$ size and their operational effectiveness.

tion when we select k=5, k=8, k=15. Also, the Lagrange Multiplier tests are statistically not significant when we select a weighting matrix based on 150 km centroid distances between each pair of provinces, noting that, all the 91 observations have at least one neighbor within 143 km. The weak spatial correlation observed in the residual is probably due to the reduced number of observation in the model. Indeed, estimation results (see column (7)) show that the coefficient on the spatial lag dependent variable ($\rho$), is statistically not significant, suggesting that a positive shock to a province will not spread through the provincial system. This is also confirmed by the non significant Likelihood Ratio (LR) test, which tests whether, under the null hyphotesis $\rho$=0.[40]. The values of 1.617 suggests that the OLS model in column (4) is preferred to the SAR.

# 5 A comparison with the regional QUARS

The socio-economic divide between the Northern and the South part of Italy is a well-known phenomenon and it is extensively documented in the literature.[41] Although there is a lack of consensus on the causes of persisiting disparities, some of the determining factors have been associated with the industrialial trasformation that took place in the North of Italy as opposed to the South, the different social capital endowment, the role played by institutions, the particular structure and composition of the labour market, and so on.

Studies have also highlighted that such economic divide is not homegeneous but disparities are a crucial characteristic of the Italian economic development that can be found not only at regional level, but also amongst provinces.[42] For instance, Paci and Saba (1998) using regional data documented the process of convergence in terms of per-capita income and labour productivity between northern and southern regions which occured at certain phases during the 1953-1998 period. Their analysis shows that such process did not reduce the degree of inequality between regions.

Disparities emerge when data are observed at provincial level too. For instance, Cosci and Mattesini (1995) show that although a convergence process took place between 1951-'90 in terms of per-capita income, this only occured between provinces located in the North and Centre of Italy and only during the seventies between provinces located in the South. Moreover, Iuzzolino *et al* (2011) show that internal disparities in terms of per-capita income are sometimes quite substantial, even between adjacent territories.[43]

Some studies recognized the importance of sub-national level when analysing the geography of well-being. For instance, Rampichini and D'Andrea (1997) argue that simple nationality cannot be used as an explanatory variable to account for differences in life satisfaction as they might depend on characteristics internal to each country. They argue that regions should be considered as the macro-level since people living in the same region share a common socio-economic, political and cultural environment which contributes, alongside individual characteristics, to life satisfaction. A similar point is also made by Schyns (2002), which can be extended to regions. Within the same country people will have different access to collective provisions (education, wealth, health care, political climate, etc.) depending on their region. Therefore, the well-being of individuals living in the same country would differ by region.[44]

In this Section we highlight divergences in well-being at provincial level that might not be accounted for by the regional data and present some statistical measures to assess the degree

[40] The LR test compares the null model (the restricted or no spatial effect, the OLS model) to the alternative (the unrestricted, the SAR in this case)

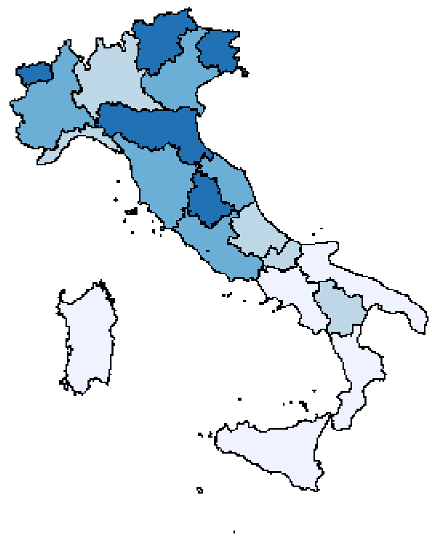
[41] For a review, see Daniele and Malanima (2015), Felice (2011) and Pianta (2012) among others.

[42] The anomaly of the Italian case is well documented by Iuzzolino *et al* (2011), who analyzes the data of 147 regions in 14 countries between 1955 and 2005.

[43] Well-being or social capital endowment differences at sub-national level have also being documented. See for instance Casmiri *et al* (2013), Degli Antoni (2006), and Rizzi and Popara (2006).

[44] Aslam and Corrado 2012, also present a regional study of subjective well-being in Europe and find a statistically significant relationship between subjective life satisfaction and regional factors.

Figure 4: The Regional Quars - Geographical distribution (values are devided in quartile, darker areas denote higher values of the indicator)



of heterogeneity of well-being within regions. To this purpose, we calculated the QUARS synthetic indicator of well-being by aggregating provincial data at regional level.[45,46] The standardized results are in Table 6 column 2, while the geografical distribution of the data devided in quartile is plotted in Figure 4. As in Figure 1, the map shows that regions with higher endowment of well-being (darker areas) are mostly located in the North of Italy. One important thing to be noted is the strong rank similarities among our results and the QUARS indicator of Segre *et al* (2011), which is reported in Table 6 column 4. Only few regions are moving places.[47] A result that also confirms the reliabilty of our provincial QUARS indicator, which is constructed by aggregating 26 variables instead of 41 as in Segre *et al* (2011).[48]

[45] We follow the same methodology used for the construction of the provincial QUARS in Section 2: in each of the seven dimensions the variables were first standardized, and then they were merged with a simple arithmetic mean to form the final QUARS. For comparison reason, the values of the final QUARS are finally standardized.

[46] The weighted average of provincial data do not differ from the official regional data. However, in some cases we were not able to aggregate the provincial data nor to recover the information from the official sources, being the variables, in these latter cases, indexes. More specifically, for variable n.3 (Environmental illegality) listed in Table 8 in Appendix 1, which is an index, we do not aggregate the provincial data but we take the regional ones from the official source Legambiente; variable 5 (Eco management) is also an index, so data are again from Legambiente and are dated 2008; for variable n.16 (School ecosystem), data are from Legamebinte and are dated 2009. Finally, for variable n.9 (Income inequality), data have been aggregated using a weighted average of provincial data, using the number of taxpayers as weights. The values of the obtained Gini index are very similar to those calculated by ISTAT.

[47] The Spearman's rank correlation coefficient between our result and the QUARS indicator of Segre *et al.* (2011) is about 0.92.

[48] Besides the number of variables used, differenecs between our regional QUARS and the QUARS in Segre *et al.* (2011) are also due to the year data are collected: in most cases, we use 2011 data while Segre *et al* (2011) used data from 2003 to 2009. Also, because data at provincial level are in some cases not available, some of the differences with Segre *et al* (2011) are due to differences in the variable used. More specifically: for variable 3 (Environmental illegality) listed in Table 8 in Appendix 1 we do not take into account enviromental crime as in Segre *et al* (2011); for variable n.7 (Sustainable mobility) we do not take into account CO2 emissions from transport, and we replace the "use of rail, cars and bikes to go to work or school" with "public transport (number of passengers using public transport), and car ownership rate"; for variable n.12 (Migramt integration) we do not take into account the attractiveness of a province; for variable n.15 (Avoidable mortality) we replace the "average of per capita number of days of life lost due to causes that may be actively opposed by the public health system and that led to death at an age between 5 and 69 years" indicator with the "number of avoidable mortality for persons aged 0-74 years"; for variable

Table 6: Comparing the Regional QUARS

| Regions | QUARS (stand) | Regions | QUARS Segre *et al* (2011) | Regions | QUARS (minmax) |
|---|---|---|---|---|---|
| Emilia-Romagna | 1.56 | Trentino-Alto Adige | 1.42 | Emilia-Romagna | 1.00 |
| Umbria | 1.28 | Toscana | 1.21 | Umbria | 0.91 |
| Trentino-Alto Adige | 1.08 | Emilia-Romagna | 1.05 | Trentino-Alto Adige | 0.87 |
| Valle d'Aosta | 1.06 | Valle d'Aosta | 0.96 | Friuli-Venezia Giulia | 0.85 |
| Friuli-Venezia Giulia | 0.88 | Umbria | 0.90 | Valle d'Aosta | 0.84 |
| Toscana | 0.54 | Marche | 0.88 | Toscana | 0.73 |
| Marche | 0.43 | Friuli-Venezia Giulia | 0.67 | Marche | 0.71 |
| Veneto | 0.40 | Veneto | 0.47 | Veneto | 0.70 |
| Piemonte | 0.34 | Piemonte | 0.32 | Piemonte | 0.68 |
| Lazio | 0.24 | Lombardia | 0.27 | Liguria | 0.64 |
| Liguria | 0.19 | Abruzzo | 0.27 | Lazio | 0.61 |
| Abruzzo | -0.04 | Liguria | 0.13 | Abruzzo | 0.56 |
| Molise | -0.33 | Sardegna | -0.34 | Lombardia | 0.50 |
| Basilicata | -0.35 | Lazio | -0.62 | Basilicata | 0.47 |
| Lombardia | -0.35 | Molise | -0.79 | Molise | 0.46 |
| Sardegna | -0.84 | Basilicata | -0.80 | Sardegna | 0.37 |
| Calabria | -1.07 | Puglia | -1.16 | Calabria | 0.28 |
| Puglia | -1.39 | Sicilia | -1.52 | Puglia | 0.20 |
| Sicilia | -1.48 | Calabria | -1.64 | Sicilia | 0.18 |
| Campania | -2.16 | Campania | -1.68 | Campania | 0.00 |

Regional ranks are also summarized in Figure 5. This depicts the boxplot of the well-being overall indicator with the regions labelled on the horinzontal axis (they are ordered according to the geographical location, starting with the Northern regions first). The boxplot enable us to study the distributional characteristics of a group (regions) of well-being values as well as the level of the values. In the boxplot, the segment inside each regional rectangle, whose height is delimited by the third quartile at the top, and the first quartile at the bottom, shows the median, while "whiskers" above and below the box show the locations of the minimum and maximum. It is clear how some regions have a higher degree of well-being variability, like for instance Sardegna, Camapania, Toscana or Lombardia. Other regions, like Veneto, Emilia Romagna, Marche and Lazio, also show high dispersion in the data so that the value from one province may overcome the value of a province of a different region. In other words, although rank at regional level is unambiguous, well-being provincial data shows a high degree of heterogeneity within regions, and this is especially true for regions located in the South of Italy.

Well-being disparities can also be assessed through the Theil's index, a well-known meausure of inequality, using each province as an observation (Theil, 1967).[49] The Theil index has an

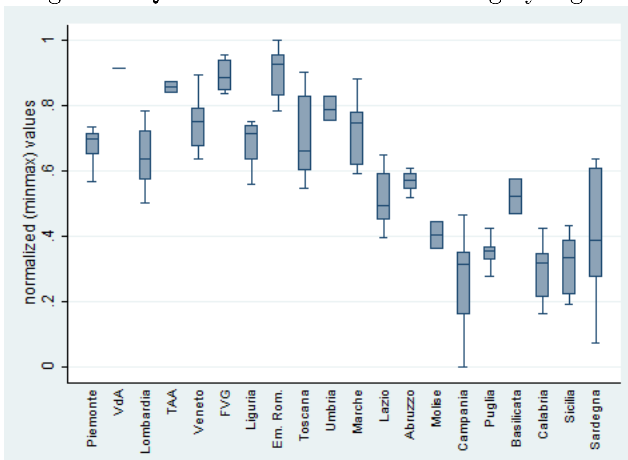
n.18 (Higher education) we also take into account the number of undergraduated students; for variable n.19 (Student migration) we consider the numebr of undergraduated and graduated students instead of the number of undergraduates studying; finally, for variable n.21 (Theater and music) we use the number of tickets sold instead of "per capita expenditure for theatrical and musical performances".

[49]The Theil's T statistic is given by:

$$T = \sum_{p=1}^{n} \left[ \left( \frac{1}{n} \right) \left( \frac{wb_p}{\mu_{wb}} \right) \ln \left( \frac{wb_p}{\mu_{wb}} \right) \right] \tag{5}$$

where $n$ is the number of provinces in the population, $wb_p$ is the well-being indicator of the province indexed by $p$, and $\mu_{wb}$ is the population's average well-being index. If every province has exactly the same well-being value, $T$ will be zero; this represents perfect equality and is the minimum value of Theil's T. If one

Figure 5: QUARS indicator of well-being by region




interesting property: it can be decomposed into between- and within-group inequalities. The groups, in our case, correspond to the twenty regions.

A decomposition of the Theil coefficient for inequalities in well-being calculated with the minmax trasformation method is presented in Table 7.[50] The Theil coefficient for the provinces is relatively low, 0.0735. However, if we compute the same coeffcent for the Value Added variable the Theil Index is less than half of that (0.033), suggesting that well-being indicator may provide a more accurate description of socio-economic disparities than a mere indicator of economic activity.[51] Using the BES indicator, Chelli and Gigliarano (2016) also found that within the same region well-being can be very different between provinces.

Table 7 also reveals that 77.9% of the total inequality in well-being between provinces is explained by well-being disparity between regions, while the remaining 22.1% by inequality within regions. Regions with the largest internal differences are mostly located in the South of Italy. Indeed, of this 22.6%, the Southern regions account for almost 16 percentage points, with Sardegna representing the largest share of it (over 8.53%).

We finally compute the coefficient of variation (CV), a popular dispersion index that standardize variances across distributions, often referred in the well-being literature as a measure of inequality.[52] The data suggests that some regions stand out in terms of the within-region dispersion of well-being. These regions are located mostly in the South of Italy. However, there are also regions with high CV value, like for instance the Lombardia region in the North, and the Toscana, Marche, and Lazio regions in the Centre.

# 6 Conclusion

Useful measures of progress and well-being have been proposed over the past few years as alternatives and complements to GDP. Hovever, much of the existing literature on well-being indicators lacked the general consensus on what well-being and progress are defined and how

province has all of the well-being, T will equal *ln n*; this represents utmost inequality and is the maximum value of Theil's T statistic.

[50]Well-being data used for the calculation of the Theil Index are reported in Table 6 column 6. In this case we use the minmax trasformation since the Theil Index cannot be computed on negative or zero values, like in the standardize case, because of the logarithmic terms in their formulas. Some solutions have been suggested when negative values are present (see for instance Stich 1996 or Corwell 2000).

[51]The Theil Index varies between 0 (perfect equality) and *log* N (perfect inequality), where N is the size of the population. The Index can be normalized by dividing by *log* N to fall into a 0 to 1 range.

[52]The coefficient of variation (CV) is obtained by dividing the standard deviation of a variable by its mean, expressed as a percentage.

Table 7: Quars index - Decomposition of the Theil coefficient and Coefficient of Variation (CV)

| | Theil Index | share of total (%) | Coeff. of Var. (CV) |
|---|---|---|---|
| Between provinces | 0.0735 | 100.0% | |
| between regions | 0.0572 | 77.9% | |
| within regions | 0.0163 | 22.1% | |
| *of which:* | | | |
| Piemonte | 0.0002 | 0.33% | 8.1 |
| Valle d'Aosta | 0.0000 | 0.00% | 0.0 |
| Lombardia | 0.0011 | 1.50% | 14.2 |
| Trentino-Alto Adige/Südtirol | 0.0000 | 0.01% | 3.3 |
| Veneto | 0.0004 | 0.58% | 11.2 |
| Friuli-Venezia Giulia | 0.0001 | 0.11% | 6.3 |
| Liguria | 0.0003 | 0.35% | 12.5 |
| Emilia-Romagna | 0.0005 | 0.63% | 9.2 |
| Toscana | 0.0015 | 2.09% | 18.0 |
| Umbria | 0.0000 | 0.04% | 6.8 |
| Marche | 0.0006 | 0.81% | 16.4 |
| Lazio | 0.0006 | 0.88% | 20.2 |
| Abruzzo | 0.0001 | 0.07% | 6.5 |
| Molise | 0.0001 | 0.10% | 15.1 |
| Campania | 0.0012 | 1.69% | 70.3 |
| Puglia | 0.0003 | 0.35% | 13.9 |
| Basilicata | 0.0001 | 0.13% | 15.5 |
| Calabria | 0.0012 | 1.62% | 35.9 |
| Sicilia | 0.0017 | 2.31% | 29.6 |
| Sardegna | 0.0063 | 8.53% | 49.9 |

they are measured. In this work we have overcome this limitation by contructing a synthetic measure of well-being for the Italian provinces, following the methodology, approach, and variables used for the construction of the regional QUARS (Segre *et al.*, 2011). In that, values and priorities to be pursued have been identified and legitimated through a consultation process with the civil society organizations.

Despite the multidimensionality aspect of the phenomenon and the difficulty of summarazing heterogeneous information in a synthetic indicator, the analysis shows that well-being disparities are still persistent between the North and the South of Italy and that this result is robust towards variations in indicators and in aggregation methodologies. However, territorial disparities also emerge within regions and these are quite relevant in some cases. This study therefore contributes to the literature on well-being as it provide further statistical informations to support local governments in the decision-making process (OECD 2014, Taralli 2015).

Finally, the econometric analisys investigated the impact of some economic determinants on well-being. As expected, social capital endowment, social security programs, and the level of income has a positive and significant effect on well-being, while household net wealth and financial security are statistically not significant. More interestingly is the positive effect that BFs grant-making activities may exert on the quality of life and on individuals well-being, thus suggesting a prominent role of BFs in influencing other relevant socio-economic aspects and the quality of human life besides social capital and economic growth (Calcagnini *et al.*, 2016).

# Appendix 1

Table 8: Indicators used in the QUARS

| Dimensions | | Variables | Definitions | Unit of measure | Year | Source |
|---|---|---|---|---|---|---|
| | 1 | Population density | Ratio of the number of people living in a region to its surface area | People per km 2 | 2011 | Istat |
| Environment | 2 | Water and soil pollution | Fertilizers (nitrogen, phosphorus and potassium) in usable agricultural area (SAU) | Hundreds of kilograms per ha of SAU | 2011 | Istat |
| | 3 | Environmental illegality | Synthetic index on cycle of the cement and waste treatment | Number of infringements reported per 10.000 inhabitants | 2011 | Legambiente |
| | 4 | Waste collection | Share of Municipal waste (kg per inhabitant) being collected separately | Per hundred of Municipal waste | 2011 | Istat |
| | 5 | Eco managment | Synthetic index on purchases by the government of high-energy ef?ciency and eco-label products, use of organic food in canteens, use of recycled paper in public of?ces, Agenda 21 implementation process | Index | 2011 | Legambiente |
| | 6 | Organic farming | Simple average between area of organic farming (in ha) over total of agricultural area (in %) and number of biological farms over total of farms (in %). | In percentage | 2011 | Istat |
| | 7 | Sustainable mobility | Synthetic index, simpe average of standardize variables: car accidents (per 100.000 inhabitants), public transport (number of passengers using public transport per inhabitants), and car ownership rate (number of passenger cars registered per 1.000 inhabitants). | Index | 2011 | Istat |
| Economy | 8 | Unemployment | Percentage ratio of the population aged 15 and over seeking employment to the labour force. | In percentage | 2011 | Istat |
| | 9 | Income inequality | Gini index | Index | 2011 | Bank of Italy |
| Rights | 10 | Housing | Number of evictions | Per 1,000 households | 2011 | Italian home office |
| | 11 | Risk of exclusion for disabled | Number of cooperatives of type B (i.e., social cooperatives that provide economic activities for the integration of disadvantaged people into employment). | Per 100,000 inhabitants | 2005 | Istat |
| | 12 | Migrant integration | Synthetic index which considers family reunions (number of non-EU citizen holding a residence permits for family reunion reason), and participation rates for primary, lower and upper secondary school (ratio of foreign students enrolled to the resident foreign population in the corresponding age classes). | Index | 2011 | Istat |

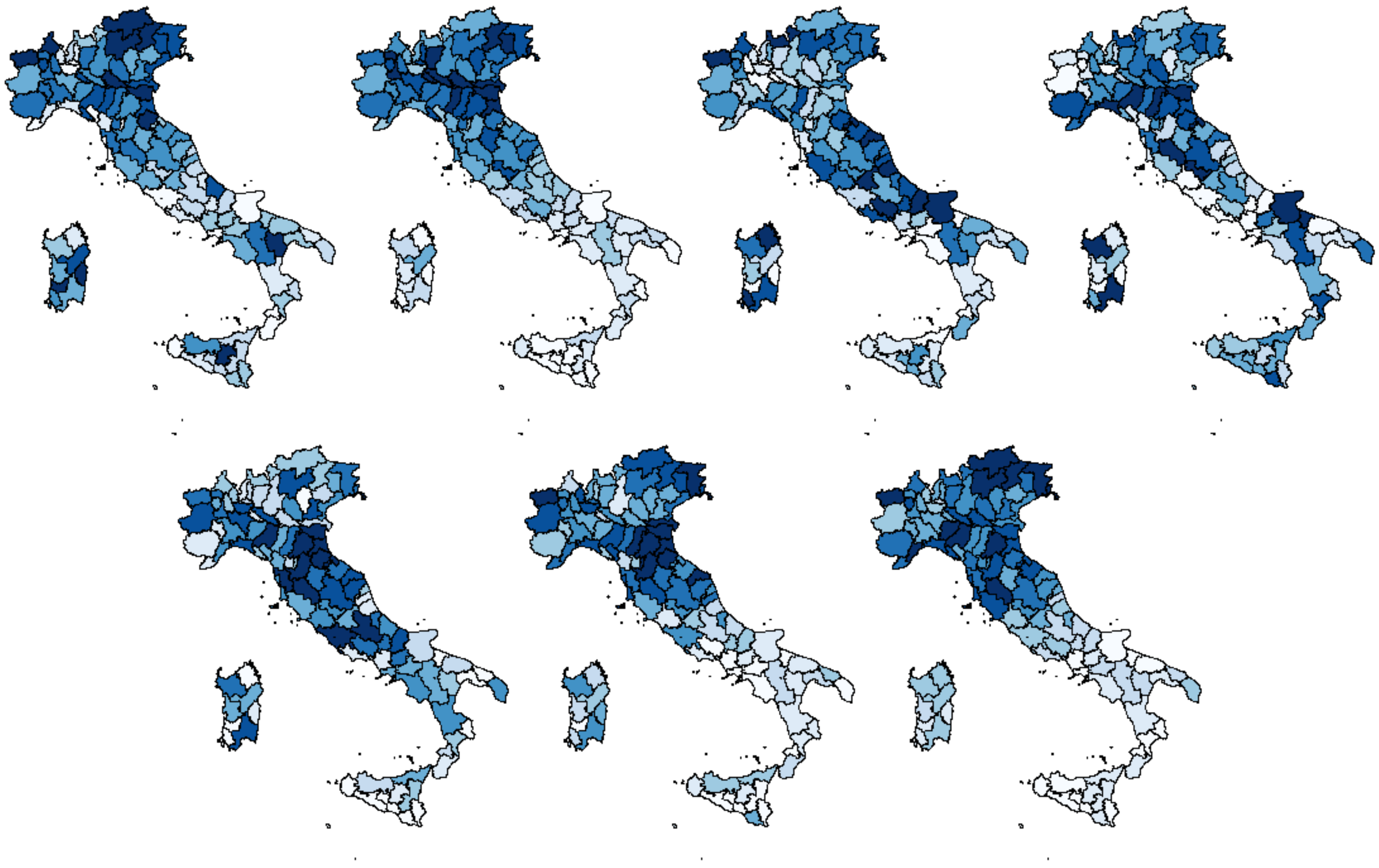
*... continue on next page*

Table 8: *...continue from previous page*

| Dimensions | | Variables | Definitions | Unit of measure | Year | Source |
|---|---|---|---|---|---|---|
| Health | 13 | Integrated home assistance | Share of elderly (65 aged and over) assisted at home | In percentage | 2011 | Istat |
| | 14 | Hospital migration | Share of hospitalizations occurred in the province other than the one of residence (i.e., ratio between the number of hospital discharges in other provinces for resident patients and the total number of hospital discharges for resident people in the province). | In percentage | 2011 | Istat |
| | 15 | Avoidable mortality | Number of avoidable mortalities (i.e., a mortality that should not have occurred in case of effective and early treatment) for person aged 0-74 (average male and female cases). | Per 100,000 inhabitants | 2007 | Era |
| | 16 | School ecosystem | Synthetic index on the quality of structures for primary and secondary education | Index | 2011 | Legambiente |
| Education | 17 | Secondary education | Participation rates for upper secondary school (ratio of students aged between 14 and 18 enrolled to the resident population in the corresponding age classes). | In percentage | 2011 | Istat |
| | 18 | Higher education | Share of undergraduated and graduated population | In percentage | 2011 | MIUR |
| | 19 | Students migration | Percetage ratio of the number of undergraduated and graduated in the province other than the one of residence, less the number of undergraduated and graduated in the province with another province of residence, to the total number of undergraduated and graduated students in the province | In percentage | 2011 | MIUR |
| | 20 | Libraries | Number of public libraries | Per 100,000 inhabitants | 2011 | Istat |
| | 21 | Theater and music | Number of tickets sold for theatre performances, cinemas, concerts, fairs, sports performances and other events | Per 1,000 inhabitants | 2011 | Istat |
| Gender equity | 22 | Female activity rate | Spread in males and females employment rates of the population aged 20-64 years calculate as the percentage ratio of employed individuals to the population of the same age class. | In percentage | 2011 | Istat |
| | 23 | Municipal creches | Coverage of crèches and care services for children aged less than 2 year | Per 100 children | 2011 | Istat |
| Participation | 24 | Number of Voluntary Associations | Non-profit Istitutions: voluntary organizations | Per 10.000 inhabitants | 2011 | Istat |
| | 25 | Newspaper diffusion | Circulation of (non-sporting) daily newspapers | Per 100 inhabitants | 2011 | Audipress |
| | 26 | Political participation | Turnout at the polls (average voter turn-out for the general elections held in 2008; and voter turn-out for the European parliament election held in 2009) | In percentage | 2008 - 2009 | Italian home office |

## Appendix 2

Figure 6: Geographical distribution of the seven QUARS dimensions. First row from left: enviroment, economy and labour, rights and citizenship, health. Second row from left: education and culture, gender equity, and democratic participation. Values are devided in decile (darker areas denote higher values of the indicator).



# Appendix 3

Figure 7: Geographical distribution of the Social Capital (SC) indicator in decile - (darker areas denote higher values)

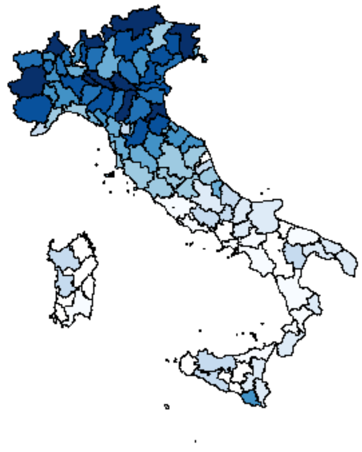


Table 9: Variables used for the construction of the Social Capital (SC) indicator

| Variables description | Source | Years |
|---|---|---|
| Number of car thefts (per 100,000 inhabitants) | Istat | Av. across years 2001-2002-2003 |
| Length of first-instance ordinary court proceedings (in days) | Istat | Av. across years 2001-2002-2003 |
| Bicycle lanes (Km per 100 km2 of surface) | Istat | Av. across years 2001-2002-2003 |
| Number of blood bag donations (per millions of inhabitants) | Cartocci (2007) | 2003 |

# Appendix 4

Table 10: Variables used for model estimations

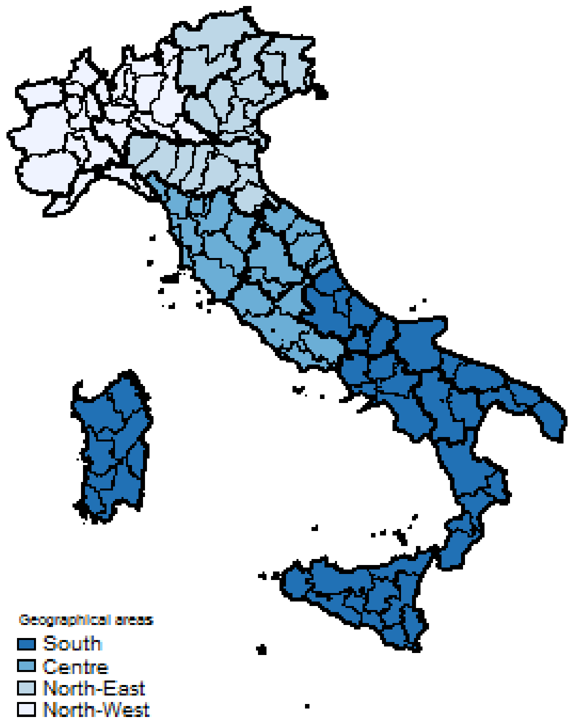
| Variables | Description | Source | Years | Unit of measure |
|---|---|---|---|---|
| SC | Social capital index | Various sources | 2001-2003 | Index |
| VA | Per-capita real Value Added | Unioncamere | 2003 | Millions of Euros |
| SocExp | Per-capita expenditure for social security services by municipalities | Istat | 2003 | Hundreds of Euro |
| BFs grants | Bank Foundation grants over VA | Acri | 2003 | Per thousands of VA |
| Loans | Amount of loans to the private sector (firms and households) as a share of VA | Bank of Italy | 2003 | Per thousands of VA |
| WR | Hosehold real wealth (dwellings and land) | Unioncamere | 2003 | Millions of Euro |

Table 11: OLS Model Variables - Summary statistics

| variable | N | min | max | mean | p50 | sd |
|---|---|---|---|---|---|---|
| Well-being | 91 | -1.697 | 1.850 | 0.191 | 0.288 | 0.884 |
| SC | 91 | -2.597 | 2.967 | 0.092 | 0.313 | 1.341 |
| VA | 91 | 10.141 | 26.131 | 18.393 | 19.257 | 4.031 |
| SocExp | 91 | 0.120 | 2.850 | 0.907 | 0.830 | 0.531 |
| BFs grants | 91 | 0.000 | 3.842 | 0.817 | 0.433 | 0.932 |
| Loans | 91 | 31.484 | 130.030 | 72.226 | 71.174 | 21.205 |
| WR. | 91 | 107.174 | 298.090 | 208.116 | 209.510 | 40.808 |

# Appendix 5

Figure 8: Italy: Geographical areas. Regions (delimeted by black thick borders) and Provinces (black thin borders)



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