Environmental features and subjective well-being in Italy: a local level analysis

Luigi Biggeri[1], Tiziana Laureti[2,3], and Luca Secondi[2]
[1]University of Florence, Firenze, ITALY
[2]University of Tuscia, Viterbo, ITALY
[3]Corresponding author: Tiziana Laureti, e-mail:laureti@unitus.it

Abstract

The community environment where people live in is embedded in the factors affecting subjective well-being. Hitherto, the role played by physical and social environment characteristics has been little explored mainly due to the paucity of data at disaggregated level linking these two aspects. This paper aims at investigating the role of local community characteristics on life satisfaction in Italy by using individual level data. The evidence suggests that even controlling for a range of factors, social features of the local community, such as trust in neighbours and service accessibility, significantly influence the entire distribution of life satisfaction.

Keywords: local community, quantile regression models, subjective well-being.

1.Introduction

Measuring well-being at local level is essential for improving policy making as well as for monitoring and understanding local community trends and outcomes. Besides, when defining policies it is important to have a good understanding of the state of the local community and the level of satisfaction of the inhabitants regarding their daily lives, by considering their subjective well-being (SWB).

When citizens express their opinions regarding life satisfaction (LS), they refer to the place in which they live and work. In fact, people build their sense of well-being by responding to their local community and neighborhood. It is therefore crucial to comprehend the drivers of LS at a local level by considering those variables that represent the physical and social environment where they live in (Russ-Eft, 1979). In this way policy makers are able to identify areas on which to focus in order to enhance overall SWB and quality of life.

Though there is by now a considerable literature on the causes and correlates of SWB (Stutzer and Frey, 2012), the links between local community characteristics and SWB are relatively unexplored due in part to a lack of "environmental" data at a level of detail to match the individual-by-individual resolution of LS measures.

A rather small number of studies have focused on the effects of natural environment by referring to community level data on air pollution and noise (van Praag and Baarsma, 2005; Rehdanz and Maddison, 2008; MacKerron and Mourato, 2009). In a somewhat different perspective, various papers aim to evaluate the effects of factors in the neighborhood (social, economic and physical features) that contributes to residents' LS through neighborhood satisfaction (see, among others, Sirgy and Cornwell, 2002).

Referring to the well-established approach for assessing SWB drivers (Frey and Stutzer, 2005; Helliwell, 2008; Luttmer 2005), this paper aims at investigating the role of local community characteristics on LS in Italy by using individual level data. In addition to the physical characteristics of an area, we explore the social dimension that characterizes the neighborhood by accounting for differences in local air quality and noise levels as well as for quality of community services and community cohesion.

To obtain a more complete picture of the relationship between local environmental features and LS we use quantile regression models that are able to detect additional patterns (location, scale and skewness shifts) related to the effects of the covariates.

The remainder of the paper is structured as follows. Section 2 presents the methodological framework underlying our approach while Section 3 describes the data source and the empirical implementation. Section 4 discusses the results and the final section concludes.

2. Methodological framework

An increasing number of highly-developed countries, including Italy, has been collecting LS data by using sample surveys as a part of their official statistics.

Usually the satisfaction towards the different aspects of life and of local community is measured asking to the respondent to reply to a question using a standard n-points scale ranging from 0 (completely dissatisfied) to n (completely satisfied).

Provided that reported overall LS is a valid and empirically adequate measure for human well-being (Frey and Stutzer, 2005), it can be modeled as a function of socio-demographics (D), individuals' health status (H) and economic conditions (E), physical (P) and social community (S) characteristics that are thought to impact on an individual's SWB:

$$LS_i = \alpha + \mathbf{\beta D}_i + \mathbf{\rho H}_i + \mathbf{\gamma E}_i + \mathbf{\delta P}_i + \mathbf{jS}_i + \varepsilon_i \tag{1}$$

To estimate LS functions ordered logit or probit estimation techniques as well as OLS regressions are frequently applied. However, data obtained through LS surveys tend to be skewed so that the large majority of responses are in the upper range. Moreover, from a policy perspective, it is interesting to understand what happens throughout the entire distribution of LS and at its extremes.

Quantile regression models (QRMs) are of special interest to studies dealing with distributions that have been found to be relative skewed like the LS distribution (Binder and Coad 2011; Yuan and Golpewar, 2012), because allow estimating the potential differential effect of a covariate on various quantiles in the conditional distribution[1].

In this way, QRMs allow us to obtain a more complete picture of the relationship between local community features and LS being able to model both location shifts and shape shifts. The QRMs specifies the conditional quantile as a linear function of covariates (Koenker, 2005). In our case, we can write the θth quantile as:

$$Q_\theta\left(y_i \middle| \mathbf{x}_i\right) = \mathbf{x}_i'\mathbf{\beta}_\theta + \varepsilon_{i\theta}$$

where $y_i \quad (i = 1,..., n)$ is the dependent variable (LS), $\mathbf{x}_i$ is the sequence of the k-vector of regressors in **D**, **H**, **E**, **P**, **S** while $\mathbf{\beta}_\theta$ is an unknown vector of regression parameters associated with the θth quantile and $\varepsilon_{i\theta}$ is an unknown error term. The θth regression quantile, $0 < \theta < 1$, is the solution to the minimization of the sum of absolute deviation residuals:

$$\min_{\beta \in R^K}\left\{\sum_{i:y_i \geq \mathbf{x}_i'\beta} \theta\left|y_i - \mathbf{x}_i'\mathbf{\beta}\right| + \sum_{i:y_i < \mathbf{x}_i'\beta} (1-\theta)\left|y_i - \mathbf{x}_i'\mathbf{\beta}\right|\right\}$$

which is solved by linear programming methods. When θ is continuously increased from 0 to 1, we obtain the entire conditional distribution of y conditional on **x**.

3. Data source and variables

Information on LS, socio-demographics, individuals' economic conditions, physical and social features of the local community are taken from the 2011 wave of the sample survey "Aspect of Daily Life", carried out yearly by the Italian National Statistical Institute (ISTAT), collecting information on individual and household daily

[1] In particular, median regression estimates the effect of a covariate on the conditional median, so it represents the central location even when the distribution is skewed.

life. As these data can be used to produce direct accurate estimates only at the national or regional level (NUTS 1-2 levels) we are not able to match individual-level LS data with objective measures regarding physical and socio-economic environment at community level. Therefore, we refer to perceived indicators of the physical and social environment where individuals live in to be able to explore the effects of covariates at a local level. In fact, in this survey the head of the household only answers the questions on environmental problems and neighborhood characteristics. Therefore our analysis consider exclusively the households' respondents, for a total number of 19,636.

The distribution of LS in Italy, which is measured on an integer scale of 0–10, is negatively skewed (skewness=-1.05) with an average of 7.1 that varies across Italian regions (the highest LS is for Trentino Alto Adige – mean 7.65 while the lowest value is for Campania – mean 6.77).

Referring to the literature and considering the results obtained from preliminary analyses, physical and social features of the local community are captured by the following variables: i) *Urban (natural) environment*: presence of air pollution, noise, unpleasant odor, availability of green areas; ii) *Quality of community service*: street lighting, road paving, dirt in the streets; iii) *Service accessibility*: public transportation, police, pharmacy; iv) Presence of crime; v) *Community cohesion* (proxied by trust in neighbors); vi) Importance of participating in community life through local political structures or associations.

To control for heterogeneity across individuals we include both socio-demographics (gender, age, education, marital status, family size, number of children) and personal economic characteristics (being unemployed, satisfaction with economic dimension, comparison with the economic situation of the previous year, home ownership, home size) as well as health status (perception of own health status, suffering from chronic disease) and area of residence (proxied by type of dwelling distinguished in villa, rural, residential or popular dwelling and home with garden). In addition, we control for individuals' social relationships and leisure (relationships with friends, took a holiday in the previous year), general trust (whether adults agreed most people could be trusted) and environmental attitudes (proxied by habits of recycling paper and glass).

4. Results

We estimate Eq.(1) using QRMs, which allows us to obtain interesting results concerning the effects of covariates at different points across the LS distribution (0.1, 0.25, 0.50, 0.75, 0.90 quantiles).

Focussing on selected results due to space availability, Table 1 shows QRMs estimates for the 0.50 quantile of different model specifications. Demographics and socio-economic variables as well as the perception of own health status play an important role in explaining LS in all the estimated models even when environmental variables in terms of both physical characteristics and social community characteristics are introduced (Model 3).

Table 1: Estimation results for different specifications of QRMs (0.50 quantile)

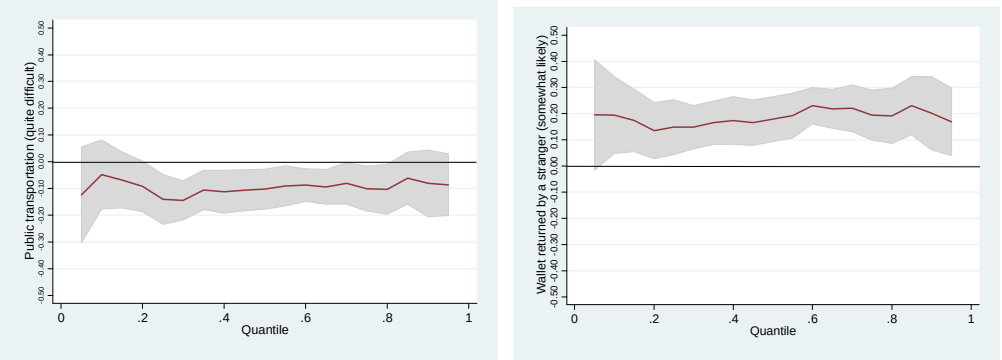
Variable	***Model 1***			***Model 2***			***Model 3***		
	Coef.	**St.Err. (SE)**	**Sig.**	**Coef.**	**SE**	**Sig.**	**Coef.**	**SE**	**Sig.**
Age	-0.022	0.005	***	-0.02	0.005	***	-0.031	0.006	***
Age^2	2.42E-04	4.28E-05	***	2.32E-04	4.60E-05	***	3.11E-04	5.36E-05	***
Gender	0.033	0.032		0.063	0.038	*	0.065	0.038	*
Marital status *(ref.: single)*									
Married	0.311	0.041	***	0.314	0.042	***	0.342	0.046	***
Divorced - widowed	-0.03	0.041		-0.064	0.046		-0.010	0.046	
Children *(0: No; 1: Yes)*	-0.053	0.026	**	-0.052	0.027	*	-0.059	0.027	**
Education *(ref. Up to the middle school)*									
Diploma	-0.021	0.022		-0.016	0.029		-0.034	0.032	
Degree/PhD	-0.009	0.029		0.01	0.038		-0.065	0.044	
Professional status *(0: unemployed; 1: employed)*	0.067	0.028	**	0.069	0.032	**	0.071	0.037	**
Health status *(ref. very bad/bad)*									
quite (sufficiently) good	1.163	0.063	***	1.158	0.068	***	1.044	0.071	***
good /very good	1.682	0.068	***	1.672	0.074	***	1.484	0.081	***
Suffering from chronic disease *(0: No; 1:Yes)*	-0.089	0.03	***	-0.103	0.032	***	-0.121	0.033	***

Variable	*Model 1*			*Model 2*			*Model 3*		
	Coef.	**St.Err. (SE)**	**Sig.**	**Coef.**	**SE**	**Sig.**	**Coef.**	**SE**	**Sig.**
Frequency with which meets with friends *(ref. all days)*									
One or more times a week	-0.141	0.031	***	-0.144	0.037	***	-0.163	0.040	***
Few times a year	-0.274	0.038	***	-0.288	0.041	***	-0.280	0.045	***
Never - I have no friends	-0.561	0.069	***	-0.561	0.067	***	-0.465	0.064	***
Took a holiday in the previous year *(0: No; 1:Yes)*	0.201	0.028	***	0.204	0.028	***	0.164	0.029	***
Judgment on the household economic resources *(ref. excellent)*									
Adequate	-0.392	0.177	**	-0.424	0.166	**	-0.426	0.110	***
Poor	-0.867	0.182	***	-0.868	0.17	***	-0.802	0.110	***
Totally inadequate	-1.289	0.206	***	-1.286	0.183	***	-1.215	0.125	***
Comparison with economic situation of prev. year *(ref. Much improved)*									
A little improved	-0.017	0.197		-0.002	0.175		-0.184	0.156	
Same condition	-0.225	0.194		-0.197	0.167		-0.375	0.141	***
A little worse	-0.295	0.196		-0.258	0.168		-0.467	0.141	***
Much worse	-0.463	0.207	**	-0.421	0.173	**	-0.636	0.150	***
House: number of rooms	0.018	0.007	**	0.015	0.009	*	0.003	0.009	
Ownership of the house *(0: No; 1:Yes)*	0.173	0.031	***	0.171	0.035	***	0.173	0.033	***
Dirt in the street *(ref. None)*									
Few				-0.079	0.028	***	-0.053	0.032	*
Some				-0.095	0.034	***	-0.035	0.041	
A lot				-0.033	0.047		0.013	0.063	
I don't know				-0.473	0.281	*	-0.189	0.223	
Air pollution *(ref. None)*									
Few				-0.048	0.035		-0.078	0.035	**
Some				-0.062	0.044		-0.083	0.044	**
A lot				-0.108	0.065	*	-0.157	0.064	**
I don't know				-0.017	0.071		-0.038	0.093	
Noise *(ref. None)*									
Few				-0.023	0.037		-0.005	0.036	
Some				-0.029	0.044		-0.011	0.044	
A lot				-0.096	0.072		-0.098	0.062	
I don't know				0.032	0.241		0.112	0.328	
Unpleasant odours *(ref. None)*									
Few				-0.017	0.03		0.025	0.035	
Some				-0.001	0.042		0.021	0.047	
A lot				-0.016	0.065		0.027	0.076	
I don't know				0.334	0.143	**	0.425	0.177	**
Availability of green areas *(0: No; 1: Yes)*				0.056	0.03	*	0.004	0.030	
Crime risk *(ref. None)*									
Few							-0.028	0.034	
Some							-0.032	0.044	
A lot							-0.054	0.077	
I don't know							-0.297	0.067	***
Poor street lighting *(ref. None)*									
Few							-0.072	0.034	**
Some							-0.034	0.037	
A lot							-0.032	0.056	
I don't know							0.197	0.296	
Poor condition of the road paving *(ref. None)*									
Few							0.066	0.038	*
Some							0.045	0.039	
A lot							0.042	0.044	
I don't know							-0.110	0.196	
Public transportation *(ref. Easy to reach)*									
Difficult							-0.083	0.031	***
Quite difficult							-0.103	0.039	***
Very difficult							-0.074	0.055	
I don't know							-0.133	0.070	*
Importance of participating in community life							0.063	0.008	***
General trust *(0:people worthy of trust; 1: must be careful)*							-0.164	0.025	***
Ability to influence local and national decisions							0.029	0.008	***
Police *(ref. Easy to reach)*									
Quite Difficult							-0.026	0.032	
Very difficult							0.124	0.060	**
I don't know							-0.061	0.104	
Pharmacy *(ref. Easy to reach)*									
Quite Difficult							-0.077	0.039	*
Very difficult							-0.210	0.079	***
I don't know							-0.641	0.363	*
Wallet returned by a neighbour *(ref. Not at all - Not very likely)*									
Somewhat likely							0.123	0.040	***
Very likely							0.246	0.040	***
Wallet returned by a stranger *(ref. Not at all - Not very likely)*									
Somewhat likely							0.179	0.044	***
Very likely							0.272	0.120	**
Habits of recycling paper *(ref. Yes, always)*									
Sometimes							0.099	0.070	
Never							-0.094	0.073	
Habits of recycling glass *(ref. Yes, always)*									
Sometimes							-0.110	0.075	
Never							0.117	0.070	*
Type of dwelling *(ref. Villa)*									
Residential							-0.041	0.037	
Popular							-0.164	0.049	***
Rural (country)							-0.069	0.087	
Home with garden *(0: No; 1: Yes)*							0.049	0.031	
Regional dummy variables	YES			YES			YES		

Notes: *Model1*: $LS_i = f(D,H,E)$; *Model 2*: $LS_i = f(D,H,E,P)$; *Model 3*: $LS_i = f(D,H,E,P,S)$; * Significant at the 10% level. **Significant at the 5% level.*** Significant at the 1% level.

As far as the physical characteristics of the community are concerned, at least two interesting consideration emerges from Table 1, regarding the perception of air pollution and the presence of dirt in the streets, respectively. The presence of dirt in the streets strongly affect LS when we considered only perceptions regarding the natural environment (Model 2), with an increasing magnitude as the dirt increase. On the other hand, when social features of the community as well as the presence and accessibility of community services are accounted for (Model 3), this effect seems to decrease, suggesting a stronger influence of social aspects on LS.
In contrast, the perceived level of air pollution has a stronger (and negative) effect on LS when social characteristics (services available and accessibility) of the local community are introduced (Model 3) rather than in Model 2.
At the 0.50 quantile, the easy of reaching public transportation and pharmacies, the importance attributed by inhabitants to their involvement in the social community life and trust in neighbors represent factors that significantly and positively influence LS.
Taking advantage of the characteristics of QRMs we evaluated the effect of each covariate along the entire conditional distribution of the dependent variable. Figure 1 provides a graphical view of QRM estimates of two selected variables (graph a, b) with the grey-shaded area depicts the bootstrap 95% confidence interval. By using the Wald test we formally verify whether the effect of each variable statistically differs across quantiles (Hao and Naiman, 2007).

Figure 1: *(a)* Public transportation: quite difficult to reach; *(b)* Wallet returned by a stranger: somewhat likely.



(a) *(b)*

Concerning the community's service accessibility, we found a significant and negative influence of the difficulty of reaching public transportation, between the 0.25 and 0.75 quantile of LS distribution, whose influence (measured by the magnitude of the coefficient) at these quantiles is significantly different from that at the median. Moreover, a high difficult of reaching a pharmacy is strongly and negatively associated with LS throughout the entire distribution. However, on the basis of the Wald test, the effect at the selected quantiles (0.10, 0.25, 0.75 and 0.90) is not significantly different from that at the 0.50 quantile thus suggesting a pure location effect (shift).
Regarding the quality of community services, the perception of poor street lighting negatively affects - from the 0.25 quantile - the residents' LS.
The increase of noise in the area where individuals live is significantly and negatively related with LS for individuals most satisfied with their lives: greater is the perception of noise, stronger is the dissatisfaction with life for those individuals.
The importance of participating in community life is positively related to LS, but the effect decreases to the increase of the quantiles thus indicating a negative scale shift. Moreover, the degree of residents' involvement in decision making significantly increase LS from 0.50 quantile, while a belief that a stranger would return own lost wallet positively and significantly affect LS throughout the entire distribution.

To capture regional differences, dummy variables indicating in which region the individual lives were introduced. However, we also estimated separate models for the 20 Italian regions with the aim of analyzing the determinants of LS in each region. Besides the confirmed importance played by individual, socio-economic and health-related characteristics, the analyses at regional level showed that physical and social features of the local community have different effects across regions. As an example, we found that the LS of residents in Campania are strongly and negatively influenced by the presence of (some or a lot) air pollution as well as by the presence of unpleasant odors. Focusing on the northern part of Italy, we found that the individuals' LS in Lombardy is still negatively affected by the presence of (a lot) air pollution and by the presence of noise. However, regarding social features of the community, the LS of the residents in this region is negatively affected by the difficulty of reaching public transportation and a pharmacy, while inhabitants' LS are positively influenced by the perception of own involvement in the community decision making.

5. Concluding remarks

QRMs proved to be a suitable tool for understanding the effects of the physical and social features of the local community. We have explored this relationship by using cross-sectional data from the "Aspect of Daily Life" for the year 2011, which provides information on many important life domains of a representative sample of the Italian population, finding interesting results. Considering perceived measures of natural environmental quality and socio-economic features of the local community we found that the social aspects, such as community cohesion and services, strongly affects LS.
However, objective measures of local environmental quality would be preferable and further research should address the issue of measuring and analyzing factors affecting LS at a local level.

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