Happy & smart: citizens' well-being as a new paradigm for the Smart City

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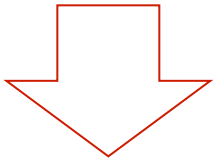
MOTIVATIONS

- The world's urban population will double from 2010 (2.6 billion) to 2050 (5.2 billion) (United Nations, 2011). Cities will face challenges concerning growth, performance, competitiveness, and residents' livelihoods (McKinsey & Company, 2013).

- Needs to transform cities into “smart cities,” “intelligent cities,” or even “creative cities”, referring to new socioeconomic environments in which citizens, enterprises, and governments can more efficiently access services and resources (Letaifa, 2015).



- Policy makers must design new strategies to enhance city performance and sustainability.

LITERATURE INSIGHTS

- Literature converged on the belief that the **subjective well-being of a society** is a measure for its success. The rationale is that people move to and live in places where they perceive high levels of quality of life. Therefore, it becomes important to understand the nature of residents' happiness and to suggest smart policies to improve it (Letaifa, 2015).

- Some papers investigate the role of primarily **economic and not economic factors** on reported well-being. Demographic characteristics account for a large part of the individual happiness (Ballas, 2013).

- Once personal characteristics are accounted for, unexplained place-level variability of estimated life satisfaction remains high, suggesting that the **role of geography** is important in explaining well-being (Pittau et al., 2010; Aslam and Corrado, 2013; Glaeser et al., 2014)

LITERATURE INSIGHTS

- **What indicators for a Smart City?** Literature (Giffinger et al. 2007, Lombardi et al. 2014, Letaifa 2015) and the media (in Italy, e.g., iCityRate and Smart city index) converge in identifying a wide range of indicators of city smartness, which can mostly be classified in the following domains.

  - **Smart People:** human capital level, life-long learning…
  - **Smart Governance:** participation in politics, transparency of information, level of red tape…
  - **Smart Environment:** presence of green areas, air/water pollution, traffic, ..
  - **Smart Economy:** level of competitiveness, income level…
  - **Smart Living:** availability of cultural activities, access to broad-band, public transportation…

AIMS

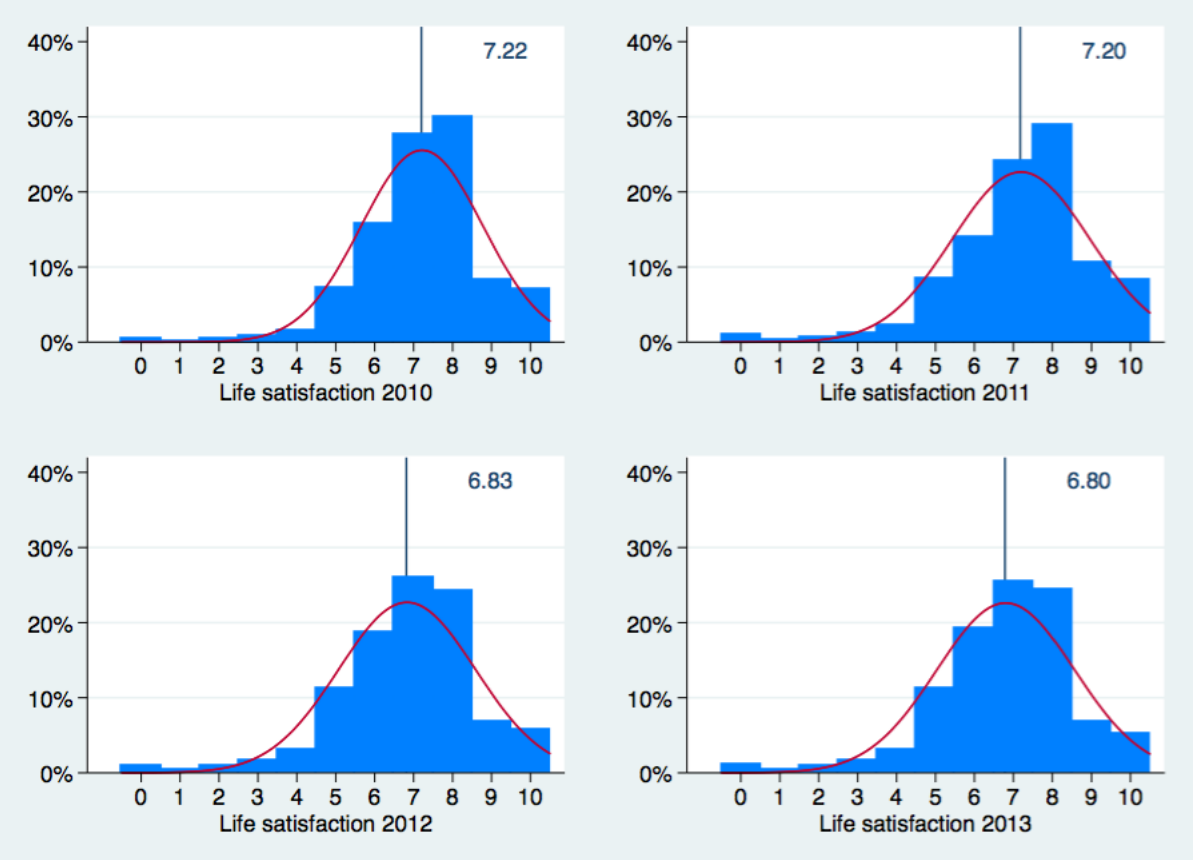
To investigate aspects that make a city a smart city and improve the subjective well being of the community:

- To explore relationships between the characteristics of the places where people live and their happiness
- To disentangle the effects of individuals' characteristics and perceptions of the place on subjective well-being
- To evaluate to what extent differences among metropolitan areas persist

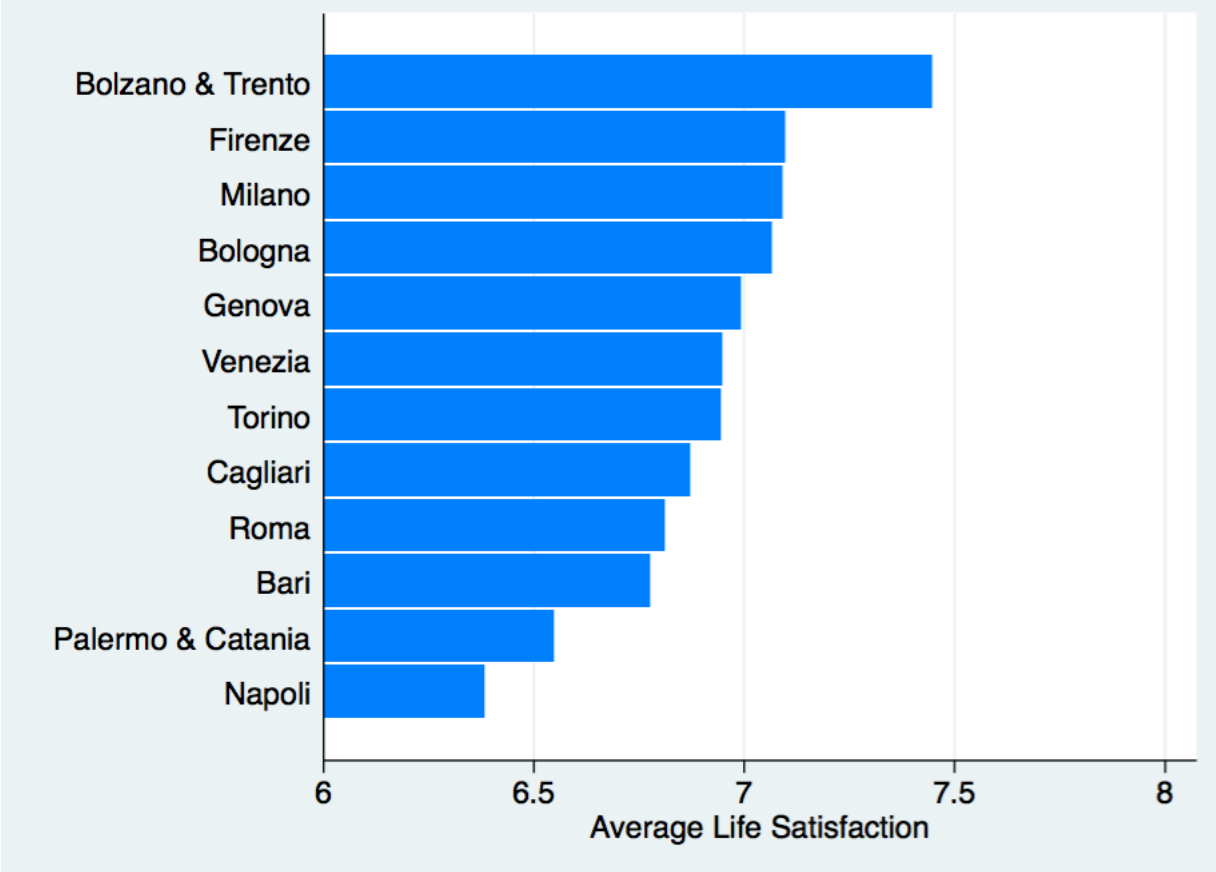
DATA

- Data are provided by he Multipurpose survey on households: aspects of daily life (HADL), carried out by the Italian Office of Statistics (ISTAT).
- Focus on the period 2010 – 2014
- Identification of the metropolitan cities
- 31680 observations, equally distributed in the four years.
- Individual level data (SWB, economic and non economic factors, socio demographic characteristics) and metropolitan level data (income, education, health…) .

SOME EVIDENCE:
dynamics of SWB in metropolitan areas



SOME EVIDENCE:
SWB within metropolitan areas



MODEL:
a multilevel approach

- Allows us to model the geographical component in an otherwise individual level model. It enables us to see how living in a different city affects the levels of life satisfaction and to quantify this geographical component.

- Moreover, we can investigate whether and how the geographical environment changes the effect of individual level characteristics on life satisfaction.

- Finally, within this kind of models we could also explore the direct effect of some macro-characteristics, at the metropolitan level, on life satisfaction.

MODEL:
a multilevel approach

$$Y_{ijt} = \beta_{000} + \beta_{p00} X_{pijt} + \beta_{0q0} Z_{qjt} + \gamma_t + u_{mj} X_{mijt} + u_{0j} + e_{ijt}$$

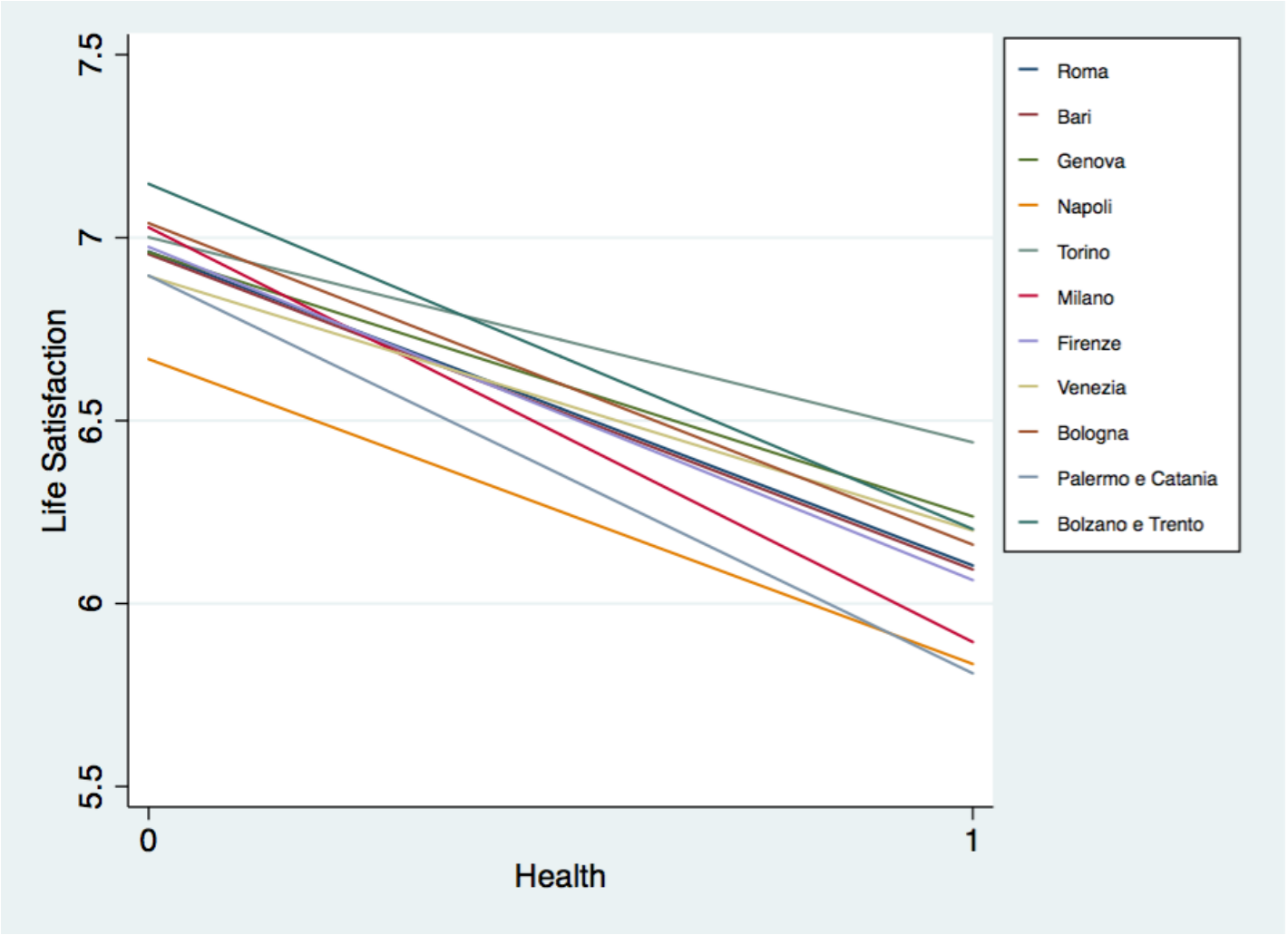
A 2 levels model (with γ_t year fixed-effects) with i individuals (level 0), j cities(level 1), t years, a matrix X_{pij} of p individual-level explanatory variables and a matrix Z_{qj} of q city-level explanatory variables.

The residual is decomposed in an individual-level residual, e_{ij}, a city-level residual, u_{0j} and a city-level residual of the slopes of part of $(m < p)$ the individual-level explanatory variables, X_{mij}.

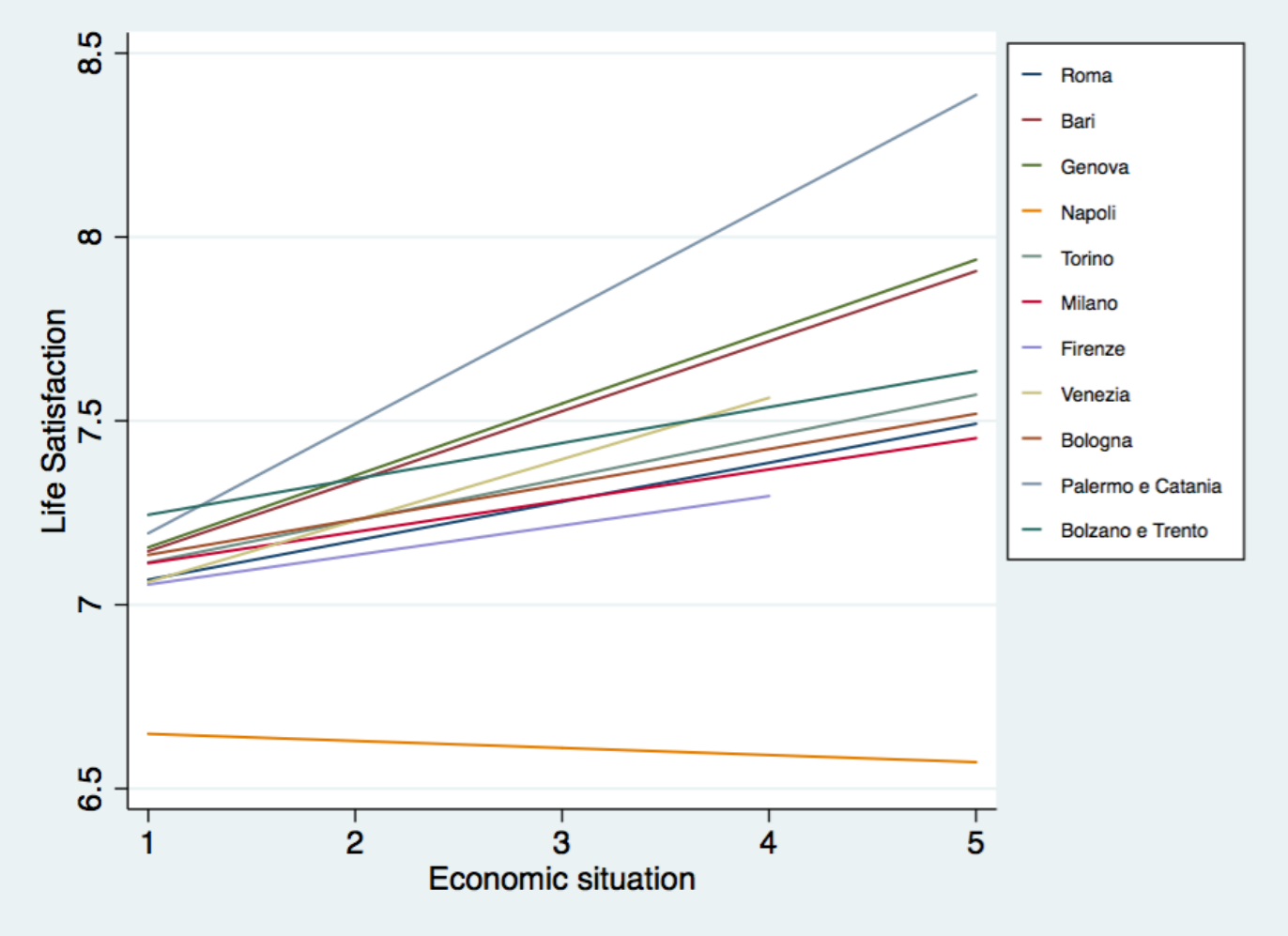
MODEL:
a multilevel approach

- Y_{ijt}: self-reported level of life satisfaction (range 1-10)
- X_{pijt}: **demographics**: sex, age, children, marital status, instruction, occupation; **environmental**: dirty streets, parking, public transportation, traffic, air pollution, noise, criminality, bad odors, street lights; **economic**: principal source of income, holidays, credit card, good economic situation, economic perspectives w.r.t. to last year; **health**: self-reported health status, smoker status, b.m.i., medicines assumption, health-related limitations, health related holidays limitations; **life-style**: sport, trust, friendliness level, TV, PC, volunteering, museum visits, movies; **governance**: gets informed on politics, speaks of politics, reads newspapers, distance of public services (post office, town hall..), distance of health services (first aid, pharmacies).
- Z_{qjt}: life expectation, % of graduates, occupation, % hi-tech firms, house robberies, gdp, average rainfall.

MODEL:
a graphical representation (health)



MODEL:
a graphical representation (economy)



RESULTS:

- We proceed in steps, firstly estimating a "empty" model in order to clearly see the impact of geographical variability on life satisfaction w.r.t. to individual variability. This impact is small but statistically significant: intraclass correlation of 2,67%.

- Controlling for demographic characteristics, while improving the fit of the model, does not, as might be expected, impact on city-level variability: intraclass correlation of 2.32%

- Adding controls related to economy, environment, public services, governance greatly improves the fit of the model and has a strong impact on the residual variability at the geographical level, making intraclass correlation drop at 0.8%, while still being statistically significant.

- Adding macro-level explanatory variables takes away the significance of city-level variability, although only life expectation has a positive and significant impact on life satisfaction in our model. The fit of the model, tested by LR test, improves w.r.t. the other models.

RESULTS:
individual level characteristics (full model)

- Following the literature on both subjective well being and city smartness and thanks to the richness of our dataset, we explore a wide range of variables with potential effects on life satisfaction:

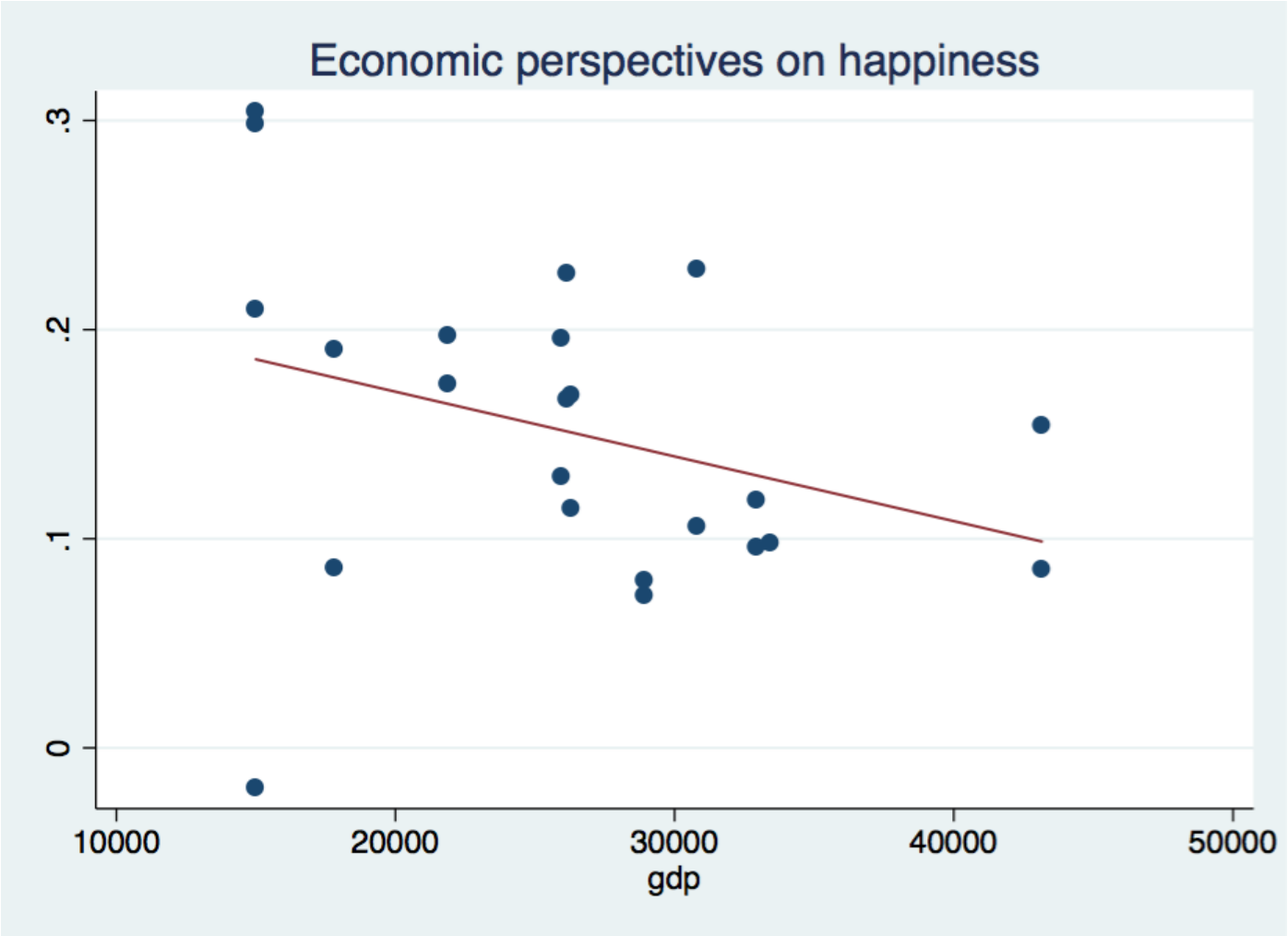
	POSITIVE EFFECT	NEGATIVE EFFECT
Demographic:	Female children <25 in house married	middle aged higher education
Economic	having a credit card having a good economic situation better economic situation w.r.t. last year	
Environmental:		dirty streets crime traffic lack of light in the streets odors
Health related:	obesity	perceived unhealthiness being a smoker health limitations to work not being able to go on vacation because of health issues .
Life-style related:	Sport watching TV lots of friends volunteering trusting people	
Governance related:	getting informed on politics reading news-papers	

Preliminary RESULTS: Exploring slope variability

- As above specified, a multilevel model allows us to estimate random slopes, varying with the city, for variables of interest. We looked at the effect of health, economic perspectives, volunteering activity, sports and traffic levels on life satisfaction. More variables can and will be explored.

- Once assessed that there is slope variability among cities, we can visualize this variability by plotting the random coefficients on city-level characteristics, such as, e.g., GDP, Bicycle paths availability, life expectation…

Preliminary RESULTS: Exploring slope variability



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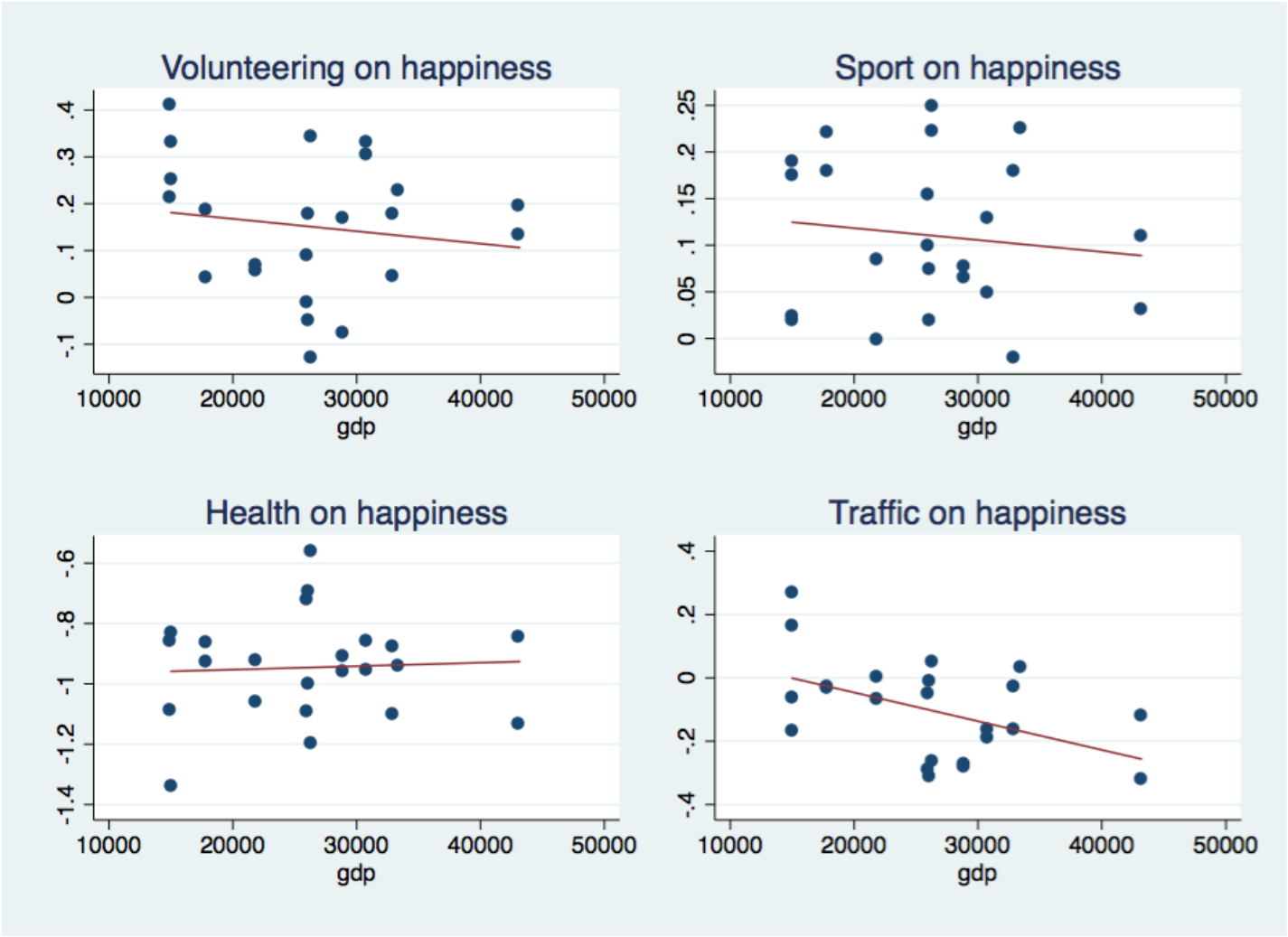

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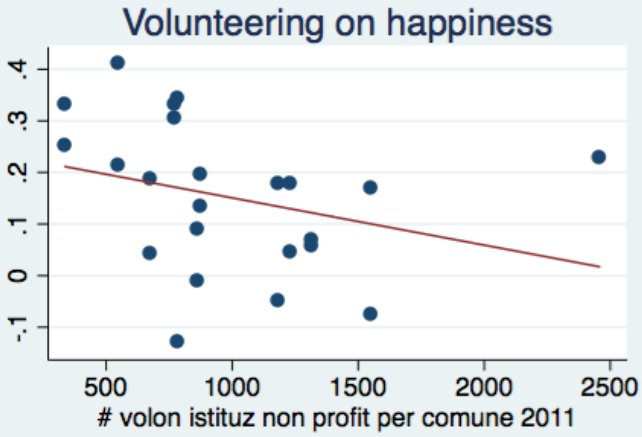

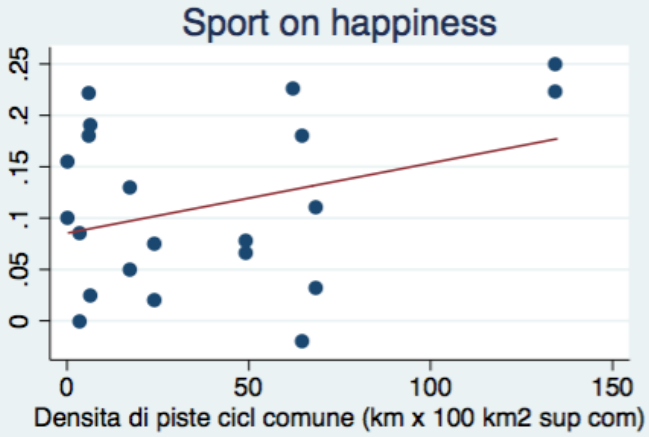

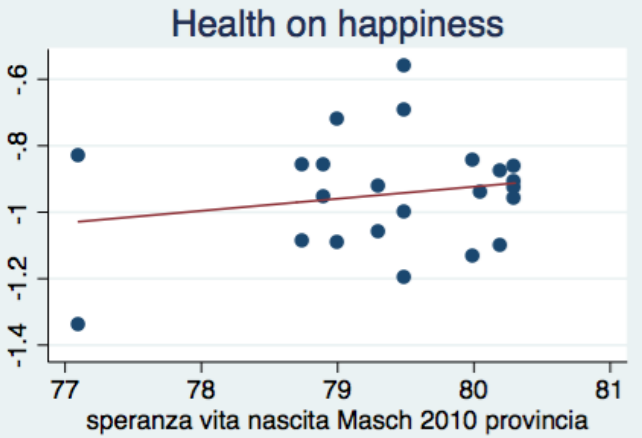

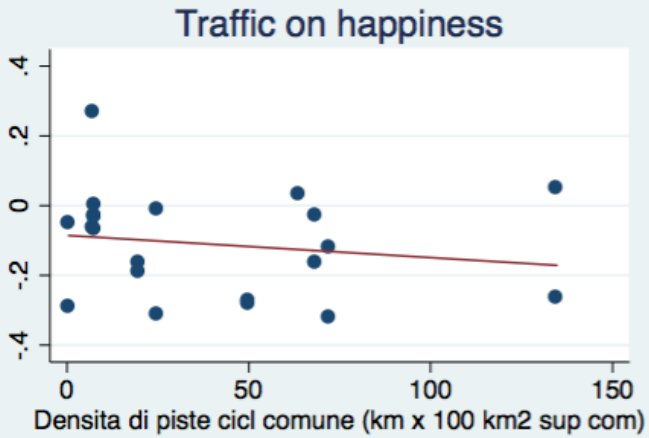

CONCLUSIONS

- Thanks to the richness of our dataset we can explore aspects that do not often get investigated in SWB analysis. Environmental issues, governance issues (public services), economic situation, health issues.
- These aspects are clearly partially related with the level of smartness of a city according to the definitions that predominate in the public debate: a smart city allows its citizens to live smart lives.
- Even accounting for a rich set of individual level variables, the location retains a role in shaping life satisfaction.
- At the same time our analysis uncovers a potential "frog in the pond" effect, where individual SWB is influenced by the environment: being rich counts less for individual happiness where the average people are richer.
- Future avenues of research inspired by these findings could aim to investigate the effect of inequalities at the city level on SWB.

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