IRPET - Regional Institute for Economic Planning of Tuscany

ISUT

An Approach to measure Well-Being in Italian Regions

S. Bertini, L. Ghezzi, M.L. Maitino,
S. Rosignoli, N. Sciclone

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Introduction

Starting from the assumption that …

- There isn't a univocal way to evaluate the level of well-being
- Well-being is a multi-dimensional concept

we want to look towards the region's quality of life in the future with better awareness

… so we have analysed a set of indicators and we finally proposed a methodology to synthesize this information in one index (ISUT)

Outline of the presentation

- Some problems linked to the measurement of Well-Being
  - ✓ What is meant by Well-Being (assessment area)?
  - ✓ Which variables make this up (value elements)?
  - ✓ How to measure each variable?
- Methodology used to sum up different indicators
- Results obtained comparing the level of Well-Being for Italian Regions
- Work in progress: we try to extend the evaluation to all the European Regions

Part I: beyond GDP ...

In the first point we could divide empirical studies into two different approaches:

- GDP p.c is the basic indicator of living standard. Highest attention in policy design is given to economic indicator.
  - one-to-one correspondence between monetary resources and WB;
  - GDP is intended as a target and not as a means;
  - Accessability of economic data

- Well Being is a multidimensional phenomenon ... and so to measure it we need to use a mixed set of information.
  - Income doesn't represent a standard of living by itself
  - Not all needs can be satisfied in the market using monetary resources

Part I: What is Well-being for IRPET?

Our definition of Well-Being is based on some dimensions:

- HEALTH: quality and efficiency of services, general health of population
- SOLIDITY OF DEVELOPMENT: structural variables that influence the sustainability of this level of quality of life
- SOCIAL INCLUSION: incidence of emargination of some categories
- PARTICIPATION AND FREE TIME: political and social life
- SECURITY
- ENVIRONMENT: quality of our natural resources

Part I: Variables

HEALTH

Life expectancy at 60 for men/women
Disability adjusted life years for men/women
Avoidable mortality index

SOCIAL INCLUSION

Foreign workers/foreigners 14-65
Share of foreigners in nursery schools out of foreign population of corresponding age
Share of foreigners in primary schools out of foreign population of corresponding age
Absolute poverty

SECUTITY

Murders per 100,000 inhab.
Bank robberies per 100,000 inhab.
Vehicle theft per 100,000 inhab.

SOLIDITY

Upper secondary school leavers rate 25-30
Graduate rate 30-35
Female employment rate
Over-50 unemployment rate
Share of workers in competitive sectors
Infrastructure index

PARTICIPATION – FREE TIME

% of voters at regional elections
% of voters at national elections
Participation of over 15s in volunteer work
Consumption p.c. of culture-entertainment

ENVIRONMENT

Sh.electricity consumptions by renewables
Emissions of Potential Acid Equivalent p.c.
Water quality Index
Share of territory covered by forests
Sh. separate collection of house

Part II: normalization

Being $X=\{x_{ij}\}$ the data set containing the original informations. We denote M_j and S_j the mean and the standard deviation of variable j.

The standardized matrix $Y= \{y_{ij}\}$ is obtained

$$\frac{(x_{i,j} - M_j)}{S_j}$$ if the j-th indicator is concordant with the Well-Being

$$\frac{-(x_{i,j} - M_j)}{S_j}$$ if the j-th indicator is disconcordant with the Well-Being

Part II: Principal Component Analysis

After normalization we make aggregation of different variables included in a single dimension…

… traditionally, aggregation is made using arithmetic mean

BUT

… we decided to make an aggregation in a different way

Principal Component Analysis (PCA)

$$\max_{a_1 a_2 \; a_p} V(C)$$

$$C_1 = a_1 Z_1 + a_2 Z_2 + a_3 Z_3 + ... + a_p Z_p$$

$$\|a\| = 1$$

- New variable for each dimension
- Linear combination
- As much information as possible

Part II: PCA results

	Environment	Health	Partici-pation	Social Incl.	Security	Solidity of dev.
PIEDMONT	10	14	7	5	14	11
VAL D'AOSTA	1	11	5	1	7	13
LOMBARDY	19	7	4	12	13	2
TRENTINO A.A.	2	3	1	2	12	12
VENETO	16	6	3	10	4	8
FRIULI	3	13	11	11	3	1
LIGURIA	6	8	12	3	6	7
EMILIA	17	2	2	7	11	3
TUSCANY	7	4	6	9	10	9
UMBRIA	5	5	9	8	9	10
MARCHE	11	1	8	6	1	4
LAZIO	15	18	10	4	19	5
ABRUZZO	9	9	13	15	5	6
MOLISE	4	10	17	19	2	14
CAMPANIA	14	20	18	18	20	18
PUGLIA	20	17	16	14	17	17
BASILICATA	8	16	15	17	8	15
CALABRIA	13	15	19	13	18	16
SICILY	18	19	20	20	16	20
SARDINIA	12	12	14	16	15	19

Part II: Aggregation

Once a measurement had been given to each dimension, we built an aggregated index using different methodology:

- Arithmetic mean of regional score: is very simple

$$\sum_{i=1}^{6} w_i \cdot C_{j,i} \qquad \text{s.t.} \qquad \sum_{i=1}^{6} w_i = 1$$

- Discordance matrix
- Concordance matrix

We want to introduce non perfect substitutability among dimensions using two different approaches of multi-criteria analysis

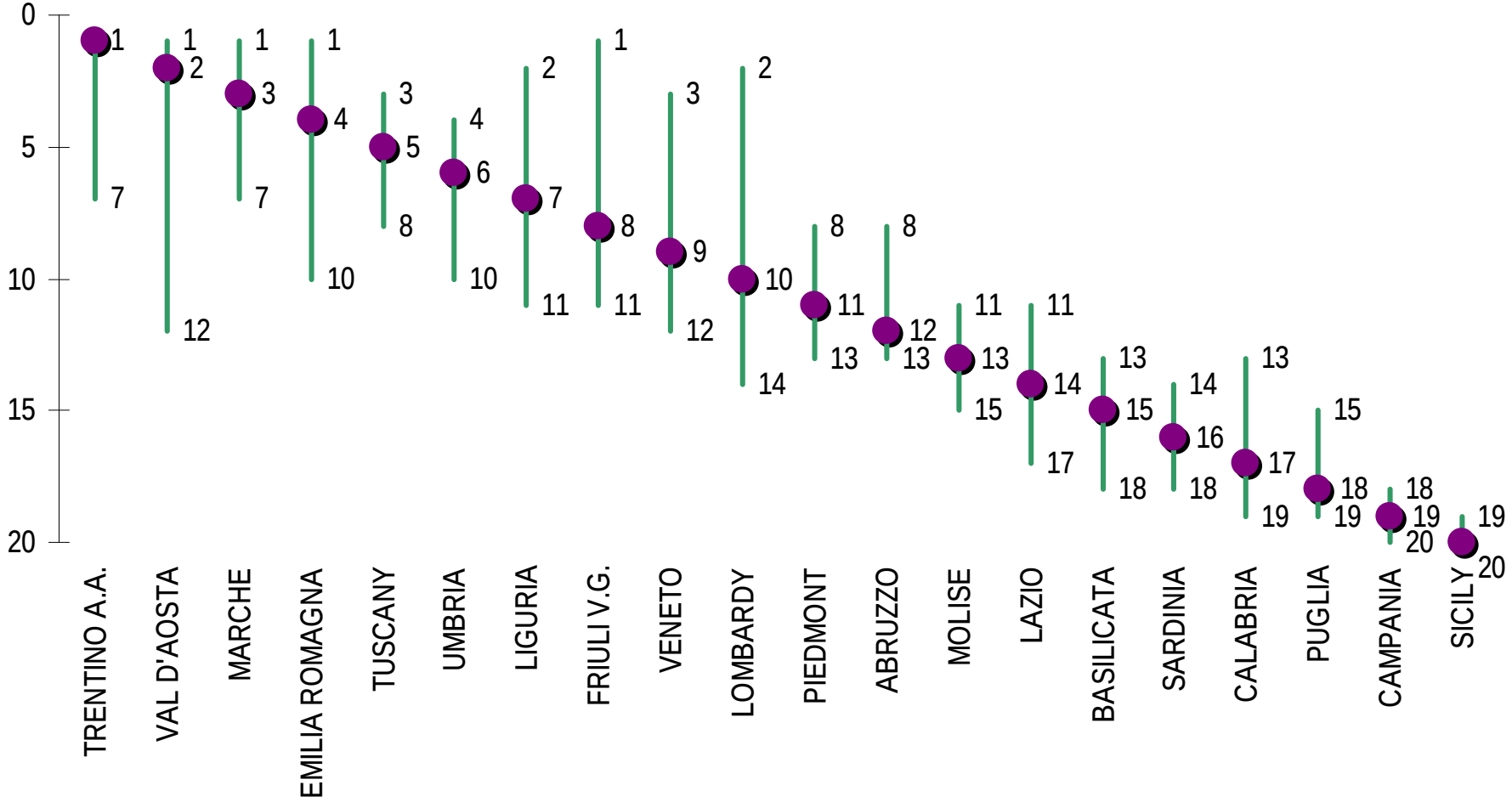
Part III: Results for Italian Regions (1)

	Discordance	Simple average	Concordance
PIEDMONT	10	11	12
VAL D'AOSTA	2	2	3
LOMBARDY	12	10	10
TRENTINO ALTO ADIGE	1	1	2
VENETO	9	9	9
FRIULI VENEZIA GIULIA	7	8	6
LIGURIA	6	7	5
EMILIA ROMAGNA	8	4	4
TUSCANY	4	5	7
UMBRIA	5	6	8
MARCHE	3	3	1
LAZIO	13	14	14
ABRUZZO	11	12	11
MOLISE	14	13	13
CAMPANIA	19	19	19
PUGLIA	18	18	18
BASILICATA	15	15	15
CALABRIA	17	17	17
SICILY	20	20	20
SARDINIA	16	16	16

When we take into account the value obtained and not just the position achieved, a region with a good equilibrium among the various dimensions of well-being is favoured.

Part III: Results for Italian Regions (2)

… in addition, the weighting system chosen to sum up the various dimensions will also affect the result



A simulation using a stochastic procedure in order to obtain alternative weighting systems

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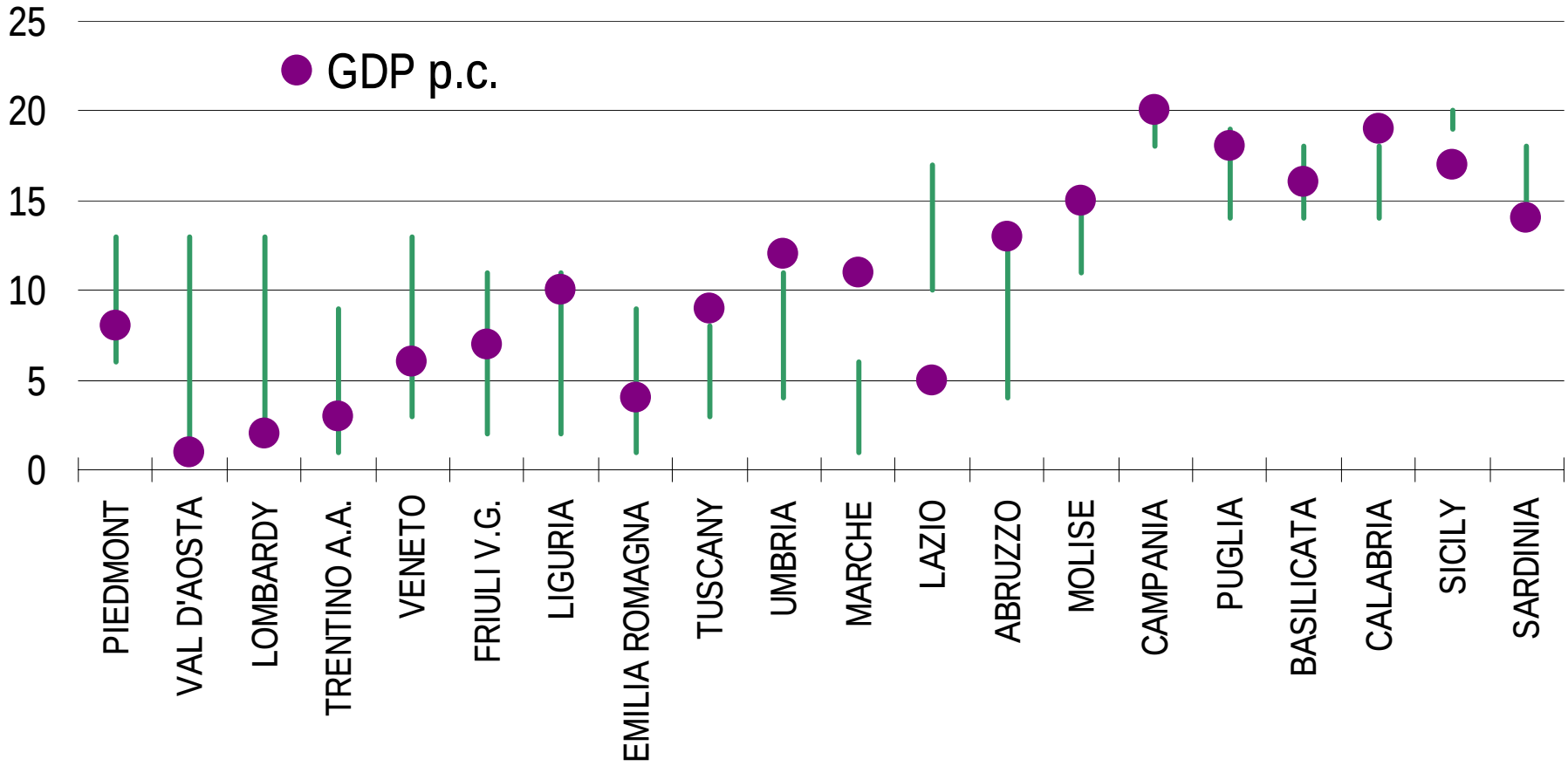
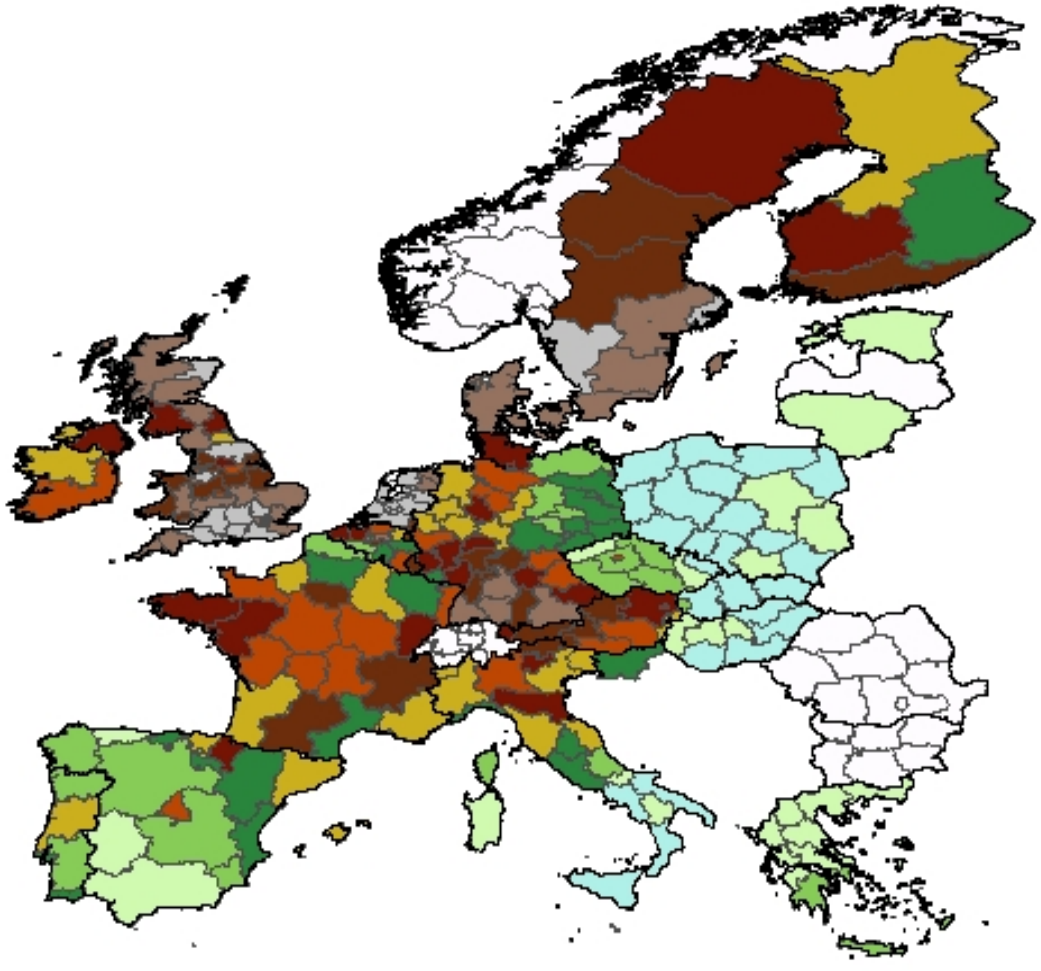
Part III: Well-Being vs GDP



Many of the areas with higher levels of GDP experience problem in other dimension and so their ranking in term of Well-Being is decreased

Comparison at European level ...



i) per-capita disposable income;

ii) total and female employment rates;

iii) long-term unemployment rate;

iv) use of part-time work;

v) fertility rate;

vi) rate of tertiary education in the population aged 25-45;

vii) infant mortality rate;

viii) standardised mortality rate.

Italian region lags behind the most developed areas in Europe

Conclusions

- It is not possible to say the italian region with the highest rate of well-Being with absolute certainty, it is easy to identify which are the best regions and which the worst;
- Many of the regions with higher levels of GDP pc have problem in other dimensions and so their ranking in terms of Well-Being is decreased;
- Extending our analysis at the european regions
  - ✓ The low fertility rate contributes to the population ageing process with negative implications on the economic system a lower tendency towards innovation, and greater problems of the financial sustainability of public policies.
  - ✓ The lower participation of women in work reduces employment rates and so reduces overall production capacity.
  - ✓ The low level of schooling influence the productivity growth.

… the regional potential of Italy is low

Conclusions

Thanks for your attention

… sorry for my english

… please, speak slowly

Part I: some examples of Well-being measure

- Measure of Economic Welfare (Nordhaus, Tobin – early ‘70s)
- HDI (UNDP – 1990)
- Index of Economic Well-Being (Osberg, Sharpe – 1998)
- Index of Human Well-Being (Prescott Allen – 2001)
- Quality of Life Index (Rahaman et al – 2005)
- Sole 24 Ore Index
- MPI (Mazziotta, Pareto – 2009)

Part II: PCA results (1)

HEALTH(2006) = 0.53 (le60f.) +0.38 (le60m) +0.45 (mr_avoidable) +0.39 (dalyf) +0.46 (dalym)
HEALTH(1995) = 0.59 (le60f.) +0.17 (le60m) +0.35 (mr_avoidable) +0.44 (dalyf) +0.54 (dalym)

SOLIDITY (2006) = 0.47 (le60f.) +0.48 (le60m) +0.46 (mr_avoidable) +0.34 (dalyf) +0.35 (dalym) +0.33 (infr)
SOLIDITY (1995) = 0.48 (fem_emp.) +0.51 (unemp_over50) +0.39 (grad) +0.43 (school leavers) +0.30 (export_sect) +0.30 (infr)

SOCIAL INCLUSION(2006) = 0.32 (for_nursery) +0.62 (for_primary) +0.42 (for_emp) +0.59 (poverty)
SOCIAL INCLUSION 1995 = 0.33 (for_nursery) +0.58 (for_primary) +0.44 (for_emp) +0.57 (poverty)

PART. - FREE TIME(2006) = 0.53 (pol_voters) +0.49 (reg_voters) +0.46 (volunteers) +0.52 (culture)
PART. - FREE TIME(1995) = 0.59 (pol_voters) +0.22 (reg_voters) +0.48 (volunteers) +0.61 (culture)

SECURITY(2006) = 0.63 (car_theft) +0.51 (murders) +0.58 (robberies)
SECURITY(1995) = 0.68 (car_theft) +0.49 (murders) +0.54 (robberies)

ENVIRONMENTAL (2006) =
ENVIRONMENTAL (1995) =