



university of
groningen

faculty of spatial sciences



UNIVERSITÀ DELLA CALABRIA
DIPARTIMENTO DI
ECONOMIA, STATISTICA
E FINANZA



AISRe
Associazione Italiana di Scienze Regionali

XXXVI Conferenza scientifica annuale

L'Europa e le sue regioni. Disuguaglianze, capitale umano, politiche per la
competitività - Arcavacata di Rende (CS)

14-16 Settembre 2015

COHESION POLICY EFFECTIVENESS ON EU REGIONAL WELL-BEING

Ferrara A.R., McCann P., Nisticò R.

Paper's aims

- To define a composite measure of well-being for the EU NUTS 2 by means of the Principal Component Analysis
- To assess the impacts of the European Regional Policy (programming period 2000-2006) on well-being
 - by defining a quasi-experimental framework
 - by applying two non-parametric techniques: the Regression Discontinuity Design (RDD) and the Regression Kink Design (RKD)
- Robustness: Equal Weight Well-Being Index; parametric estimation
- Comparisons: per-capita GDP

Measuring well-being matters

- GDP “measures what it measures” (Costanza et al. 2009, p. 4)
- GDP is a poor indicator of social welfare.
- Scholars and development organizations stress the necessity of flanking GDP with other quality of life indicators.
- Increasing attention by international organizations, countries and scholars to the definition of these multidimensional indicators

Increasing attention on the measurement of well-being



- Commission on the Measurement of Economic Performance and Social Progress (Stiglitz et al. 2009)- “What we measure affects what we do”
- OECD: UNDP – Human Development Index
 - Better Life Initiative –How is Life? Report (2013)
 - How’s Life in your Region?(2014)
- European Union:
 - GDP and Beyond Communication
 - European Union Sustainable Development Strategy
 - ESSC – development of a set of Quality of Life indicators for the EU countries
 - Well-Being 2030
 - Europe 2020 Strategy: smart, sustainable and inclusive growth
- Eurofound- Quality of Life Survey

Well-being and Cohesion Policy

The European Regional Policy – or Cohesion Policy - is aimed at:

“reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions”

(Art. 174 of the Treaty on the functioning of the EU)

The European Union supports the economic and social development of regions through Cohesion Policy with the ultimate goal of “improving citizens’ well-being especially in the least developed areas” (Barca, 2009).

European Regional Policy

- Cohesion Policy makes up one third of the Union budget in the programming period 2000-2006
- Objective 1
 - It aims to promote the development and the structural adaptation of the lagging development regions
 - it consisted of almost 70% of total allocations of Structural Funds for the period 2000-2006
 - It is devolved only to the regions that have a per-capita GDP lower than the 75% of the community average.

The economic literature on the evaluation of European Regional Policy



- The effectiveness of the European Regional policy was mainly evaluated in terms of convergence among regions in the growth rate of per-capita GDP
- Different evaluative approaches are used (Ederveen et al. 2002) and unambiguous results were not reached (McCann, 2015)

Data and methods: overview

Two different methodological aspects:

1. How to measure well-being? The definition of a composite well-being indicator.
 - We refer to the regional well-being dataset (OECD)
 - We combine the variables by applying Principal Component Analysis
 - We compute the same indicator using Equal Weights for robustness checks
2. How to evaluate Cohesion Policy effectiveness on regional well-being?
 - the Regression Discontinuity Design (RDD)
 - the Regression Kink Design (RKD)

Data and methods: Principal Component Analysis

- PCA is a multivariate statistical method
- It allows to extract synthetic measures from a set of variables by transforming them into a smaller set of uncorrelated variables, the principal components
- the first principal component is extracted from the variance – covariance matrix
- the internal consistency of the indicators is assessed by analyzing the structure of correlations and by using the Measures of Sampling Adequacy and Bartlett's test
- in order to obtain our outcome variable, the first component needs to be normalized:

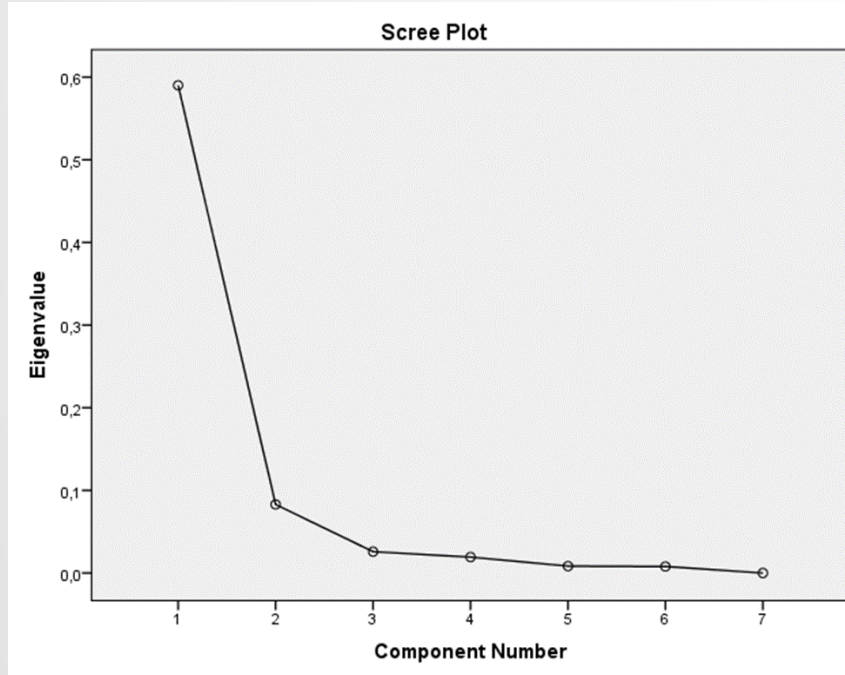
$$Y_{1,WB}^t = \frac{(Y_{1,WB}^t - Y_{1,WB \min})}{(Y_{1,WB \max} - Y_{1,WB \min})},$$

Data and methods: the variables

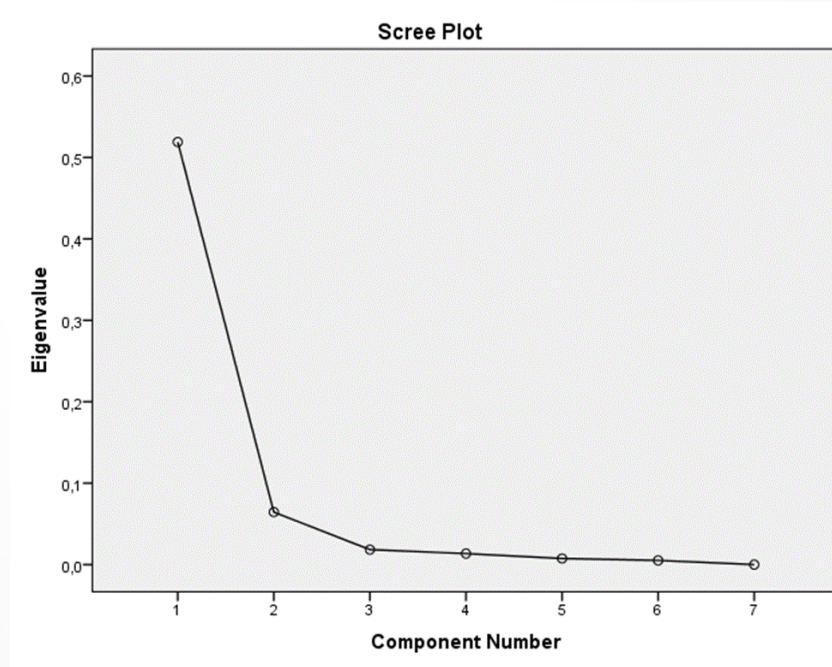
DIMENSION	VARIABLE
INCOME	Disposable household Income
JOBS	Employment rate
EDUCATION	Share of labour force with at least secondary education
HEALTH	Life expectancy at birth
HEALTH	Mortality rate
SAFETY	Homicide rate
CIVIC ENGAGEMENT	Voter turnout in general elections

First-step results: A composite Well-Being Index

2000

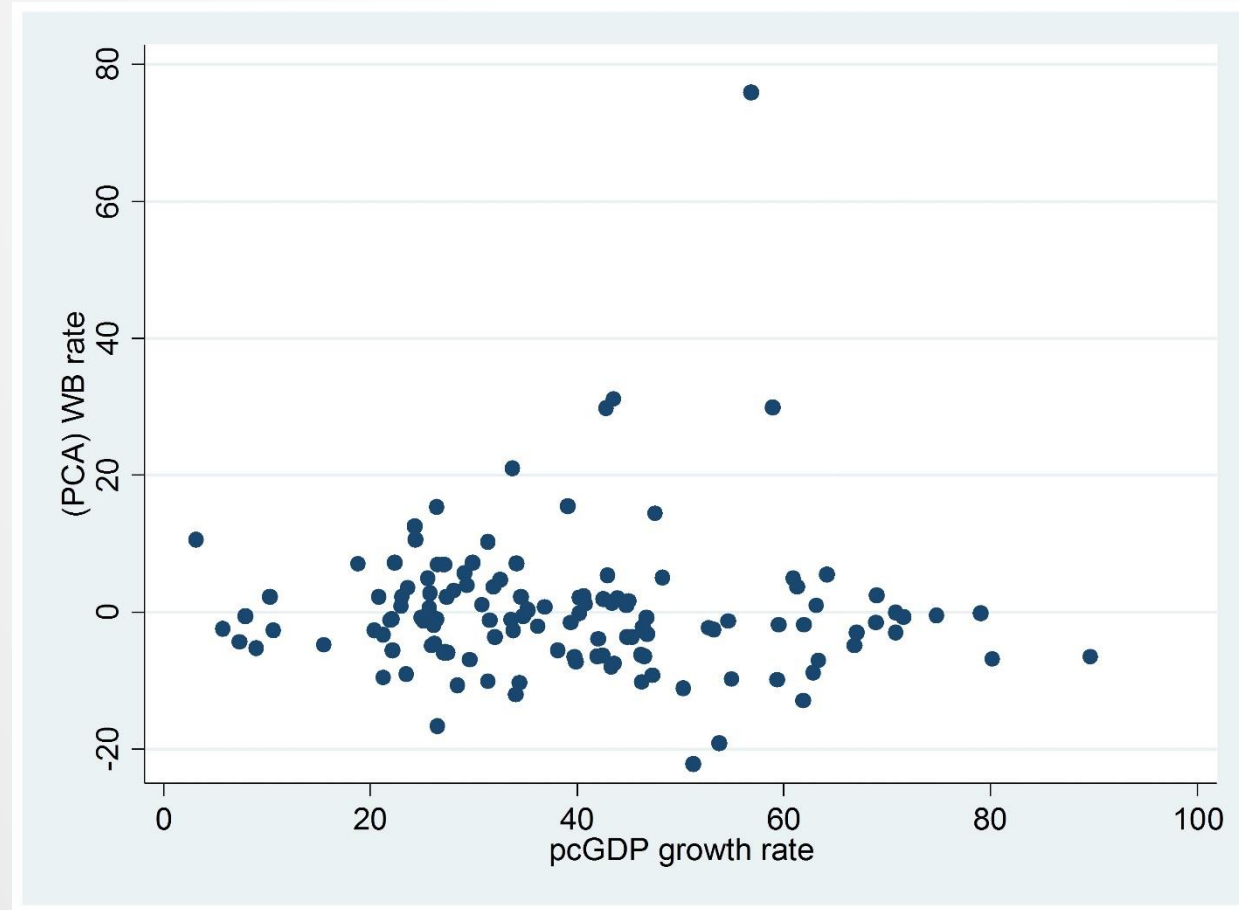


2013



The first principal component accounts for 80.34% of the total variance present in the seven original variables in 2000 and for 82.65% in 2013

First-step results: A composite Well-Being Index



Data and methods: the evaluation of EU Cohesion Policy



- **The Regression Discontinuity Design (RDD)**

- considers a discontinuity in the treatment related to some observations, to obtain an estimation of the Local Average Treatment Effect (LATE)
- The fundamental hypothesis of this method is that the unit just above (or under) the threshold that don't receive the treatment represent a good group of comparison for those just under (or above) the threshold that receive the treatment
- The eligibility for the Objective 1 is defined by the “75 percent rule

Thus, in our analysis:

- the forcing variable is the regional per capita GDP (1994-1996);
- the cut-off point is the 75 percent threshold;
- the treatment is the eligibility to the Objective 1 Fund
- the outcome variable is the well-being indicator previously defined.

Data and methods: the evaluation of EU Cohesion Policy



The Regression Kink Design (RKD)

- despite RDD, identification can come from a slope change (a kink) instead of a discrete change (a jump) in the treatment probability
- RK estimates the causal relationship from a kink in the outcome associated with a kink in the treatment.
- The regression analysis is run first by retrieving B1 in this equation:

$$Y = A0 + A1(v-k) + B1D*(v-k) + A2(v-k)^2 + A2D*(v-k)^2 + \dots$$

- B1 retrieves the change in slope in outcomes at the kink point in the treatment variable.

The methodology and the dataset



- **the estimation methods** used in the paper consist both in a parametric and in a non parametric approach:
 - **non-parametric estimation:** local linear regression methods both for RKD and RDD
 - different kernels and bandwidths
 - **parametric regressions:** Ordinary Least Square (OLS) estimation with robust standard errors is applied. The equation of a generic polynomial model of m order is :

$$Y = \alpha + \tau D + \sum_{i=1}^m \beta_i X^i + \sum_{i=1}^m \delta_i D X^i + \varepsilon$$

- the definition of the polynomial order of the regressions is the equivalent of bandwidth's choice.

Data and methods: the evaluation of EU Cohesion Policy

- In both cases, the partial non-compliance of the 75%-rule gives rise to a **fuzzy design** that requires instrumental variables estimation
 - In the programming period 2000-2006, 17 non-eligible regions were added to the list of beneficiary even though their per-capita GDP was above the 75% cut off.
- the probability of receiving the treatment needs not change from zero to one at the threshold
- the estimated coefficient is defined as the Average Treatment Effect on the Treated (ATT) and can be interpreted as instrumental variable estimator

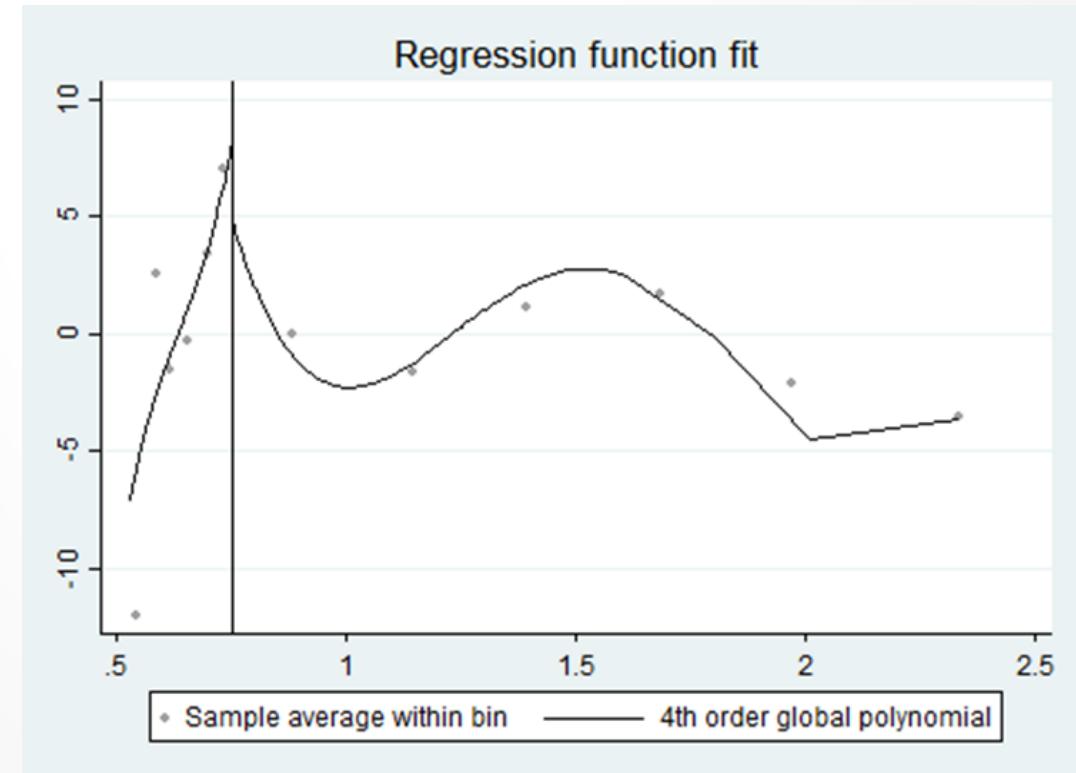
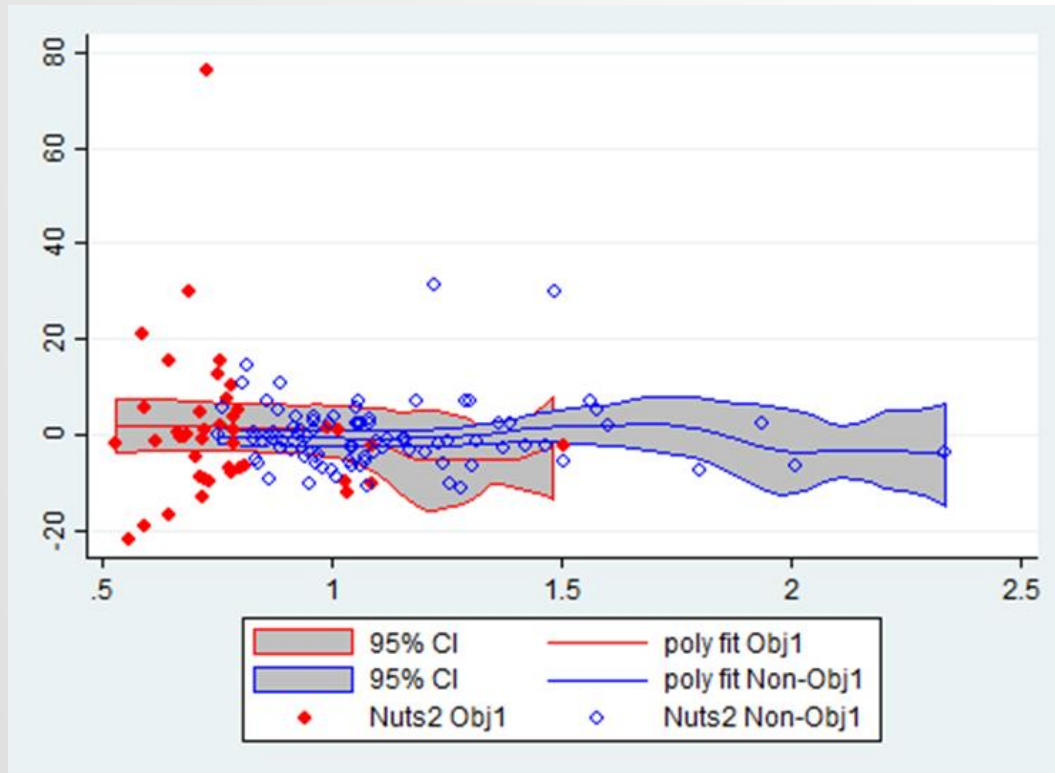
Results of the analysis on Well-Being index



- The *naïve estimation* of the difference in the average growth rate of well-being indicator does not identify a discontinuity for the Objective 1 regions

	(1)	(2)
	GDP	Well-Being
Objective1	7.980**	1.112
	(3.227)	(2.528)
Constant	36.44***	-0.231
	(1.762)	(0.750)
Observations	129	129
R-squared	0.048	0.002

Results of the analysis on Well-Being index



Results of the analysis on Well-Being index



	RKD			RDD		
VARIABLES	Triangular	Epanechnikov	Uniform	Triangular	Epanechnikov	Uniform
Conventional	-9.281	-12.97	-15.99	-274.1	1,634	155.2
	(20.60)	(21.39)	(18.82)	(3,507)	(106,847)	(873.6)
Robust	-4.557	-8.321	-10.41	8,008	304,537	2,710*
	(29.13)	(29.69)	(25.36)	(6,821)	(207,289)	(1,546)
Observations	35	31	29	74	71	61

Standard errors in parentheses

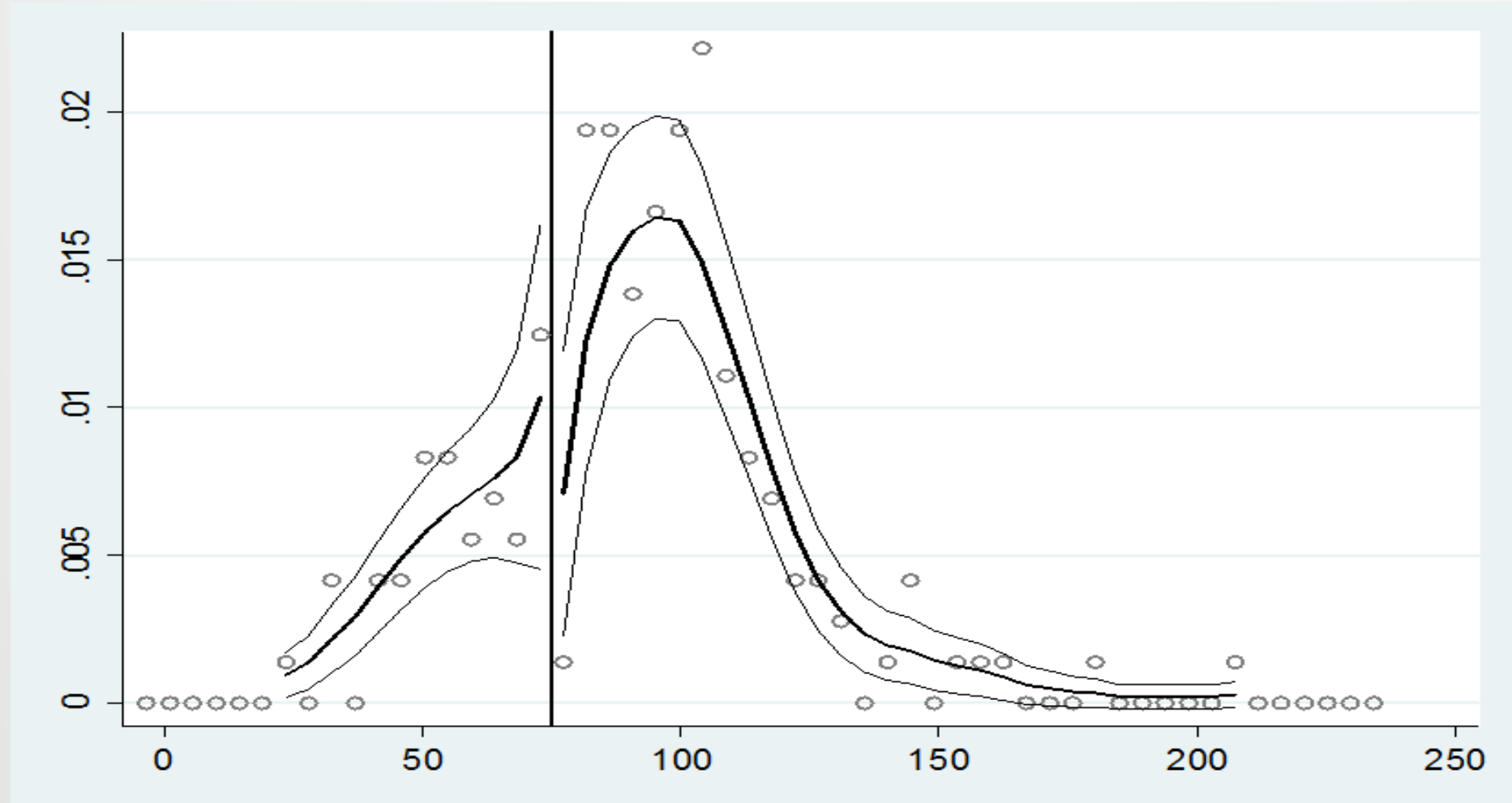
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Results of the analysis on Well-Being index

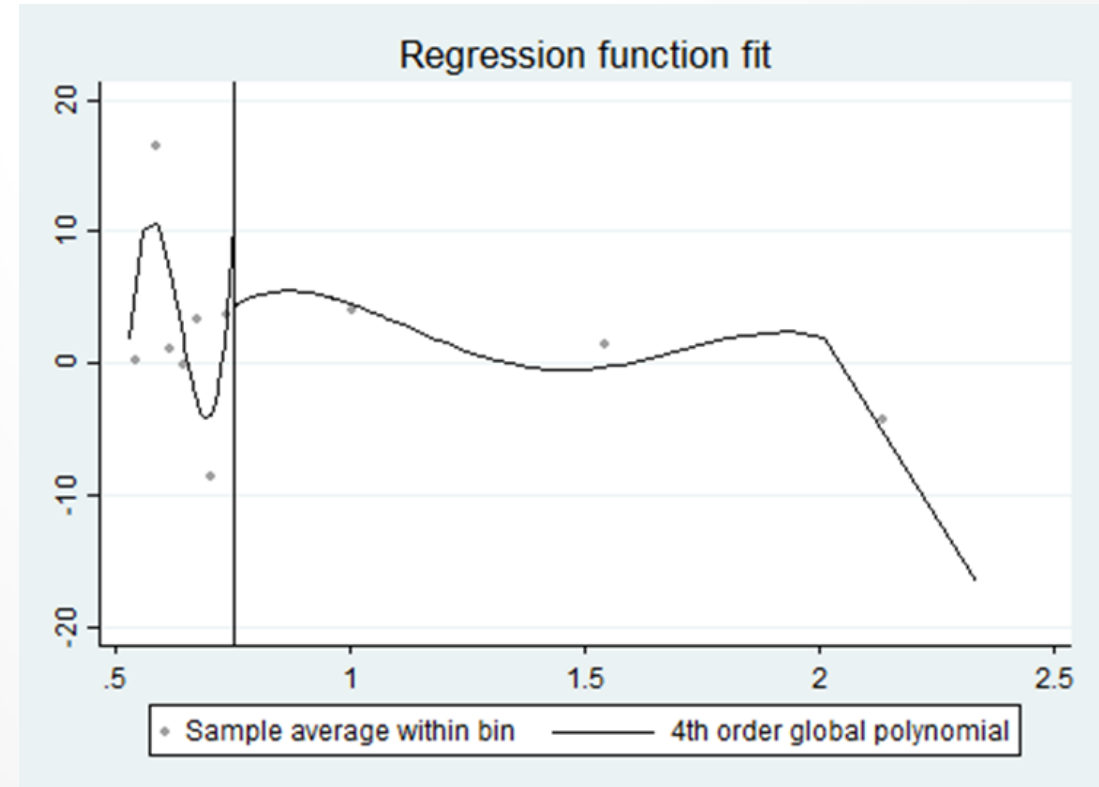
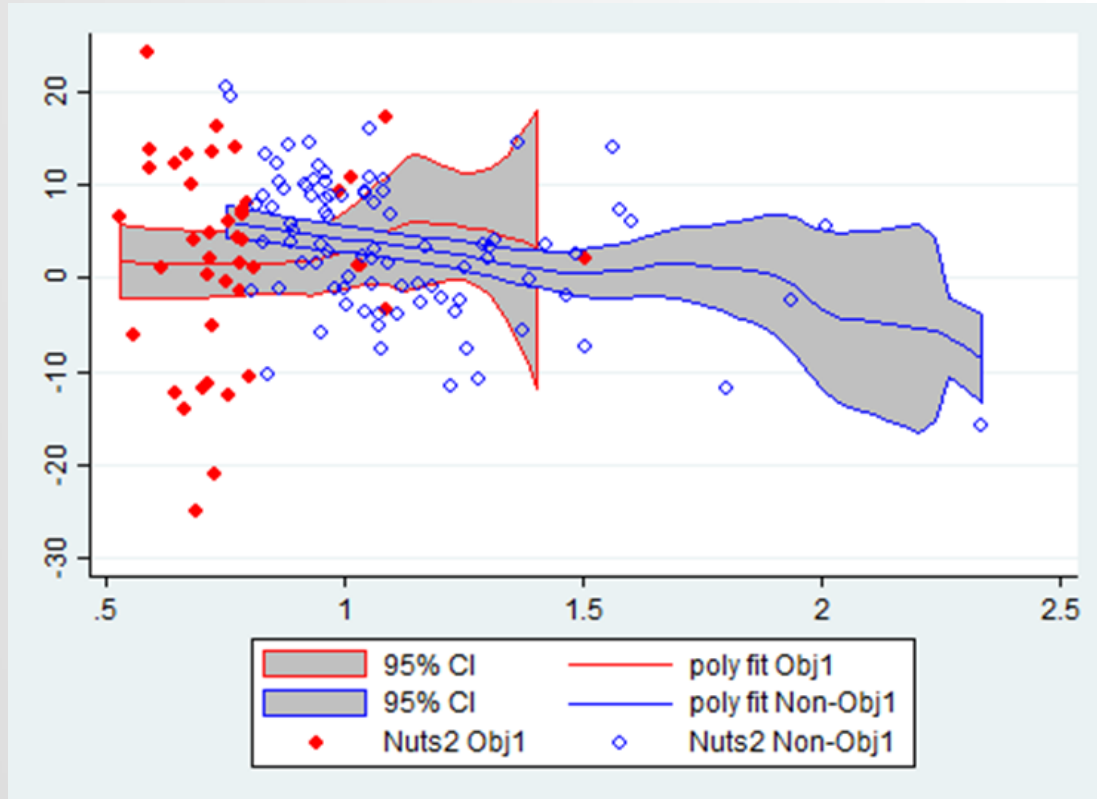


	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	wbg_rate13 00	wbg_rate13 00	wbg_rate13 00	wbg_rate13 00	wbg_rate13 00	wbg_rate13 00	wbg_rate13 00	wbg_rate13 00
objective1		1.112 (2.528)	7.988 (8.487)	0.461 (2.363)	11.00 (9.644)	1.347 (29.72)	-22.34 (35.19)	-238.3** (119.3)
X	-1.864 (3.195)		0.0955 (2.593)	-4.036 (14.71)	9.318 (15.82)	7.015 (15.90)	-73.44 (78.57)	-122.1 (79.47)
DX			-8.858 (8.592)		-11.71 (9.541)	9.246 (60.26)	52.42 (68.52)	758.1** (375.1)
X2				1.050 (5.036)	-3.377 (5.174)	-2.533 (5.168)	56.14 (56.20)	91.64 (57.24)
DX2						-10.73 (29.12)	-29.55 (32.29)	-767.2** (375.9)
X3							-13.39 (12.58)	-21.49* (12.92)
DX3								244.0** (119.4)
Constant	2.001 (3.743)	-0.231 (0.750)	-0.338 (2.743)	2.878 (9.681)	-6.152 (10.61)	-4.700 (10.68)	30.05 (34.88)	51.08 (35.05)
Observations	129	129	129	129	129	129	129	129
R-squared	0.003	0.002	0.009	0.004	0.011	0.012	0.015	0.053

McCrary Test



Results of the analysis on Well-Being index (Equal Weight)



Results of the analysis on Well-Being index (Equal Weight)

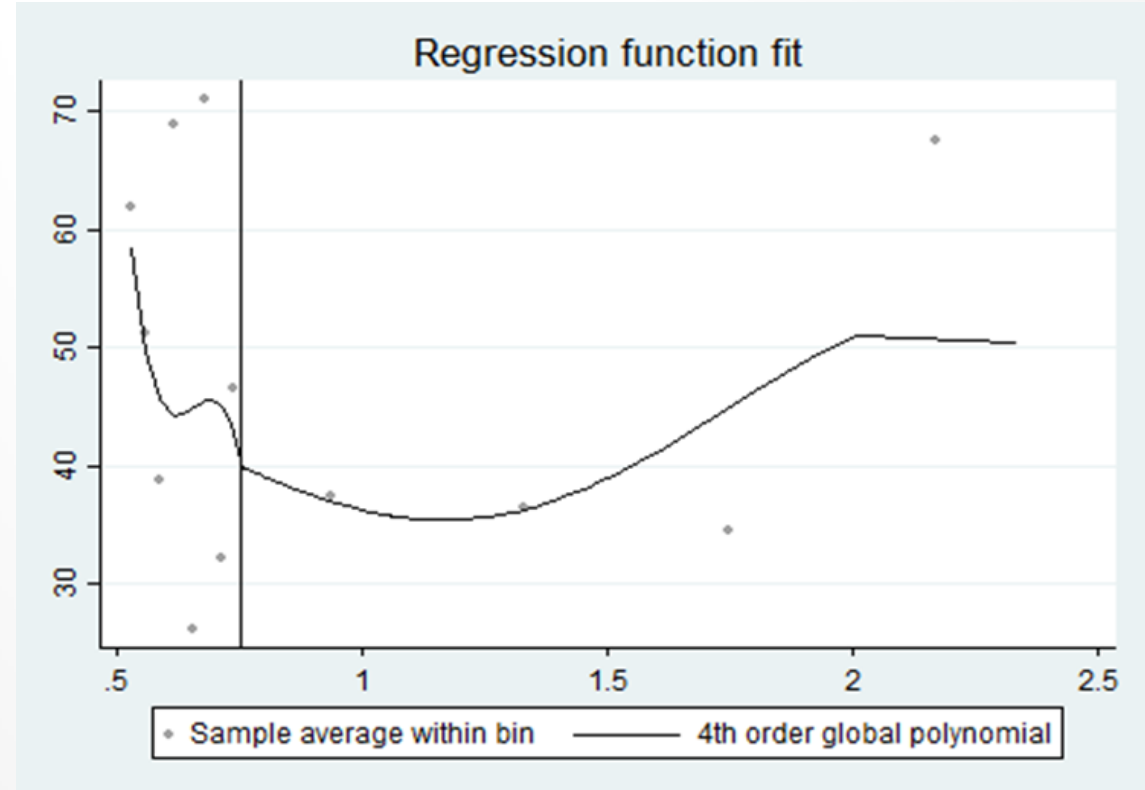
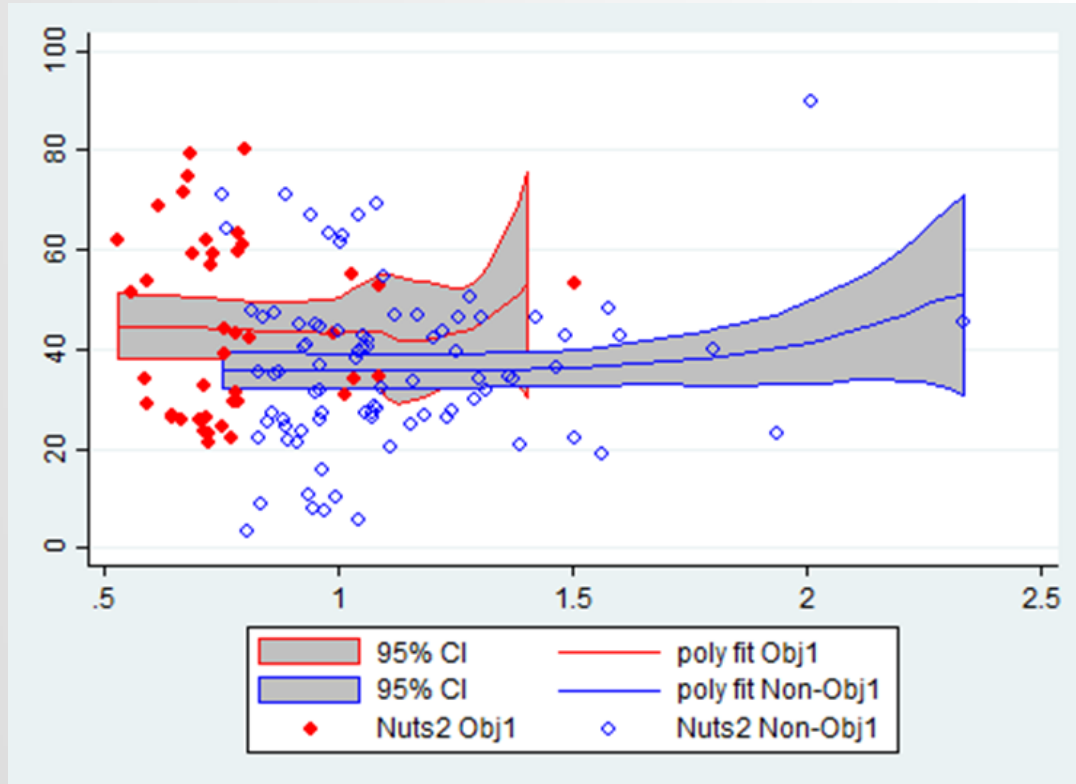


	RKD			RDD		
VARIABLES	Triangular	Epanechnikov	Uniform	Triangular	Epanechnikov	Uniform
Conventional	-12.89	-13.11	-5.203	-10.37	-10.05	-24.14*
	(25.18)	(28.97)	(22.63)	(14.83)	(14.01)	(12.79)
Robust	-16.32	-16.68	-8.182	-0.552	-0.0601	-7.724
	(28.90)	(32.87)	(26.42)	(22.05)	(21.43)	(18.92)
Observations	35	31	31	35	33	33

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Results of the analysis on per-capita GDP



Results of the analysis on per-capita GDP

	RKD			RDD		
VARIABLES	Triangular	Epanechnikov	Uniform	Triangular	Epanechnikov	Uniform
Conventional	-14.44	-17.50	-14.78	13.97	17.25	26.66
	(22.28)	(20.75)	(26.92)	(57.08)	(56.07)	(66.41)
Robust	-20.05	-19.75	-12.87	10.91	14.67	18.07
	(30.72)	(27.96)	(36.26)	(82.12)	(78.02)	(93.47)
Observations	35	33	32	54	50	45

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Concluding Remarks



- On the whole our results could be placed among those empirical work that find a neutral impact of the policy for the Objective 1.
- These results are likely influenced by four intrinsic characteristics of our analysis:
 1. Limited availability of data and, often, their poor quality
 2. Short span period of the analysis
 3. Institutional factors matter
 4. Limited attention on specific fields of intervention of Cohesion policy beyond GDP growth.

Thanks for your attention!!!

Antonella Rita Ferrara
Post-doc researcher
Ph.D. Applied Economics
University of Calabria
antonellarita.ferrara@unical.it