Model-based simulation of the evolution of the cost-of-living in Italy: Did the North-South divide remain the same?

Federico Perali

Martina Menon, Ranjan Ray, Nicola Tommasi

Policy Evaluation Network

International Workshop

Rimini, September 6, 2021

WORK IN PROGRESS

Organization

- Cost of Living and PPP
  - The tale of the Two-Italies
- Quality Adjusted PPP
  - The policy conundrum explained
- Macro-micro simulations
- Understanding the evolution of cost of livings: did the North-South Divide Remain the same?
  - Did changes in total factor productivity (Granger) cause the north-south differential

Motivation
From Alesina and Giavazzi (Il Liberismo è di Sinistra, 2007)

- Public employment has served as a perverse system to support Southern Italy because
  - Public employees receive the same salary regardless of the region of residence, although in the south the cost of living is much lower
  - Public employees are more numerous in the South than in the North
- Even if ISTAT does not publish official statistics on the differences in the cost of living across Italian regions, some studies estimate that the average difference in the cost of living between North and South is about 20-30 percent
- Therefore, the purchasing power of public wages is much higher in the South
- We intend to verify these assertions
  - If true, why Italians do not move from the North to the South?
  - now we can … Because of the recovery of household specific price information

The Tale of the Two Italies

- The average difference in the "true" cost of living between North and South is about 30-40 percent depending on the regions selected for comparison.

- Such a divide in cost of living and market efficiency, probably one of the highest differentials in the world, is the traditional incipit of the tale of the two Italies.

- The study goes deep into the narrative by investigating the policy conundrum asking why Italians, and dependent workers in particular, do not migrate towards the South given the much lower cost of living there.

- The answer lies partly in the superior quality of services in the North and partly in the severe restriction on job opportunities, especially for female earners in the South.

The Underlying Theory:
The Balassa-Samuelson Effect

- The North-South purchasing power imparity can be explained through the lenses of the Balassa-Samuelson effect that imputes the imparity to differences in *productivity* between the tradable goods and higher service quality produced in the north and the non-tradable goods of the less developed South.

- The robustness of our evidence
  - lends support to the Balassa-Samuelson effect and
  - adds an important chapter to the narration of the tale of the two Italies.

BALASSA-SAMUELSON HYPOTHESIS: the role of real exchange rates

- The exchange rate is regarded as the value of one country's currency in relation to another currency. Exchange rate are of course the same but not in real terms

- A market-based exchange rate changes when the values of either of the two component currencies change.
    - A currency becomes more valuable whenever demand for it is greater than the available supply. It will become less valuable whenever demand is less than available supply (this does not mean people no longer want money, it just means they prefer holding their wealth in some other form, possibly another currency).

- Increased demand for a currency can be due to either an increased transaction demand for money or an increased speculative demand for money. The transaction demand is highly correlated to a country's level of business activity, gross domestic product (GDP), and employment levels. The more people that are unemployed, the less the public will spend on goods and services.

- The **real exchange rate** (**RER**) is the purchasing power of a currency relative to another at current exchange rates and prices. It is the ratio of the number of units of a given country's currency necessary to buy a market basket of goods in the other country, to the number of units of the given country's currency that would be necessary to buy that market basket directly in the given country.

- … and price differentials are huge between the North and the South

Comparisons of Standard of Livings

- *price* differences
  - space, time
- differences in *quality* of services
  - quality adjusted price
- differences in ***household production*** and family organization
  - current and extended income
- This study estimates regional price parities (RPP) in Italy based on household budget data and estimated "pseudo" unit values to compare living standards between Italian regions accounting for differences in the quality of services.

Methods

- Country Product Dummy Model (CPD)

- Weighted Household Region Product Dummy Model (HRPD)

- True Cost of Living Index (TCLI)
  - Recovery of pseudo-unit values
  - Estimation of a demand system for 11 commodities
  - Spatial price index w/out incorporating differences in the quality of services
  - Adjusting for regional differences in the quality of services.

- For WHRPD and TCLI models we adopt a contiguity matrix as a spacial weight allowing for spatially autocorrelated price movements.

Country Product Dummy (CPD)

- Summers (1973) implements the *hedonic* approach used to explain observed variations in the price of an item in terms of the quality attributes of the item

$$\ln P_{jr} = \alpha_j + \sum_r \beta_r S_r + \sum_j \gamma_j D_j + \sum_z \delta_z C_z + \epsilon_{jr}$$

- P_{jr} is the observed price for each commodity j=1, …, M and each Italian region r=1,…,R with R=20,

- S_r dummy variable associated with each Italian region *r*,

- D_{jh} are commodity specific dummy variables,

- C_z refers to the set of z=1,..,Z quality characteristics relevant for a given price level comparison.

Household Region Product Dummy Model (HRPD)

- Condoo, Majumder and Ray 2004

$$\left(\ln P_{jrh} - \Pi_r\right) = \alpha_j + \sum_i \delta_{ji} n_{irh} + \left(\lambda_j - \eta_{jr}\right)\left(\ln Y_{rh} - \Pi_r\right) + \epsilon_{jrh}$$

- P_{jrh} = unit or pseudo-unit value for j-th item of the h-th hh of region r,

- Y_{rh} = nominal per capita income/PCE of h-th household of region r,

- n_{irh} = number of hh members of i-th age-sex category present in the h-th household of region r, i = 1, 2, 3, 4 is adult male, adult female, male child and female child,

- $\alpha, \delta, \lambda, \eta, \Pi$ are the parameters to be estimated of the model

Household Region Product Dummy Model - II

- The parameters $(\Pi_r - \Pi_0)$, $r = 1, 2,..., R$ denote a set of logarithmic price index numbers for individual regions measuring the regional price level relative to that of the reference *numeraire* region $(r = 0)$.

- Π_r's are *the natural logarithm of the value of a reference basket of commodities purchased at the prices of region r.*

- $(\ln P_{jrh} - \Pi_r)$ measures the logarithm of the price/unit value paid in real terms

- $(\ln Y_{rh} - \Pi_r)$ measures the logarithm of real PCE

- The spatial indexes by commodity are derived as
$$I_{jr} = exp(\Pi_r - \Pi_0)$$

Estimation of TCLI from Observed Demand: QAIDS preferences

$$\ln C(u,p) = \ln A(p) + \frac{B(p)}{\left(\frac{1}{\ln u}\right) - \lambda(p)} + P^T(p,d)$$

- p is the price vector
- $A(p)$ is a homogeneous function of degree one in prices
- $B(p)$ and $\lambda(p)$ are homogeneous functions of degree zero in prices
- u is the level of utility
- P^T is a price dependent overhead function incorporating demographic characteristics d.

True Cost of Living Index (TCLI)

- TCLI is the cost of achieving a certain level of utility (or standard of living) in one year (or place) relative to the cost of achieving the same level the next year

$$I(u, p^1, p^0) = \frac{C(u, p^1)}{C(u, p^0)}$$

- The Laspeyres $\left(I_L = \frac{p_0 q_1}{p_1 q_1}\right)$ and Paasche $\left(I_L = \frac{p_0 q_0}{p_1 q_0}\right)$ price indexes are respectively the Upper and Lower bound of TCLI

Estimation of TCLI from Observed Demand with Quality of Services

- The expenditure function from which we derive the budget shares is specified as

$$C\left(u, p^r, d, A_r, \boldsymbol{y_r^{med}}\right) = \mathrm{a}(p^{r*}, d)\, exp\left(\frac{b(p^{r*}, d)}{(1/ln\,u) - \lambda(p^{r*}, d)}\right) \mathrm{P}^T(p^{r*}, d)$$

where $p^{*r} = \dfrac{p^r}{m(\iota)}$ and the modifying function m is specified as

$$m\left(A_r, \boldsymbol{y_r^{med}}; \theta\right) = m_A(A_r)\, m_y\left(\boldsymbol{y_r^{med}}\right) = (\exp A_r)^{\theta_1}\left(\exp \boldsymbol{y_r^{med}}\right)^{\theta_2},$$

- A_r captures the quality offered for a given unit of consumption (amenity index).
  - It aggregates 10 services dimensions (such as time devoted to mobility, satisfaction with public transport, broadband coverage) using the Mazziotta and Pareto (2016) composite index for spacial comparisons.
- Y^{med} is a measure of the affluence index given by the median per capita expenditure of region r.

Modelling Quality of Services *a la* Barten

- Consider the fact that in the Northern regions the index is above 100 saying that the consumption of one unit of service comes packaged with better quality.

- It means that the consumption of one unit of service is larger than one in effective terms in the North as compared to the South.

- This implies that the effective (subjective) price is lower than the price objectively paid in the North.

- This construct has been first described by Barten (1964) who formalized the following relationship linking effective quantities and prices while leaving the budget *y* unchanged

$$p^{*r} = \frac{p^r}{m(\iota)} \quad \text{and} \quad q^{*r} = q^r m(\iota) | p^{*r} q^{*r} = p^r q^r = y$$

Quality Adjusted True Cost of Living Index

- The QA-TCLI is given by the difference between the expenditure function of region r (or for the same region through time) and the expenditure function of Italy adjusted for the amenity and affluence indexes

$$\ln P(p^1, p^0, u^*) = \ln C(u, p^{*1}, d^1) - \ln C(u, p^{*0}, d^0)$$

Data

- Complete data set spans the period 1999-2019
  - Cross-sections of Household Budget Surveys
  - Pseudo-unit values as prices
  - NIC-FOI consumer price indexes by 1481 elementary COICOP products (Classif. Of Indiv. COns. By Purpose)
    - NIC (official for the entire national community)
    - FOI (weights based on the consumption basket of dependent workers)
  - Aggregation: 11 goods
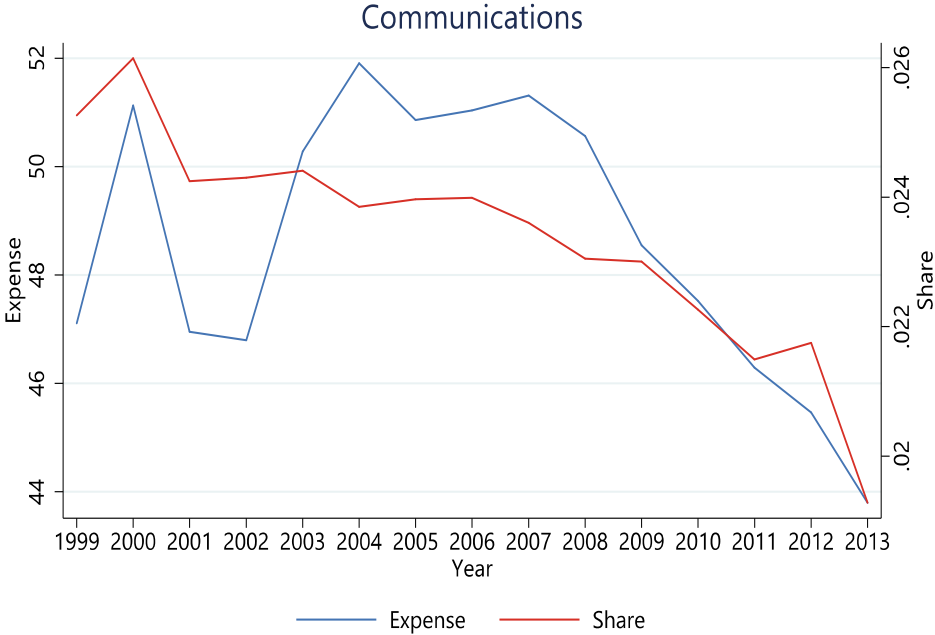- Present application
  - Year 2013 and Year 1999-2019
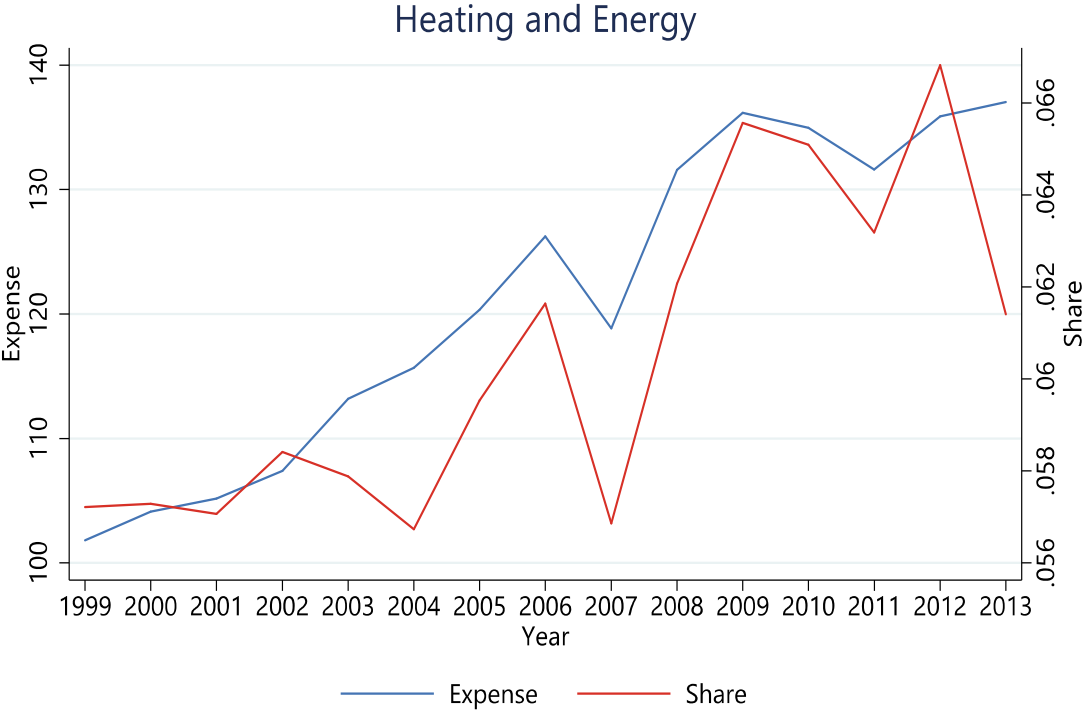
NIC – Food and Beverages
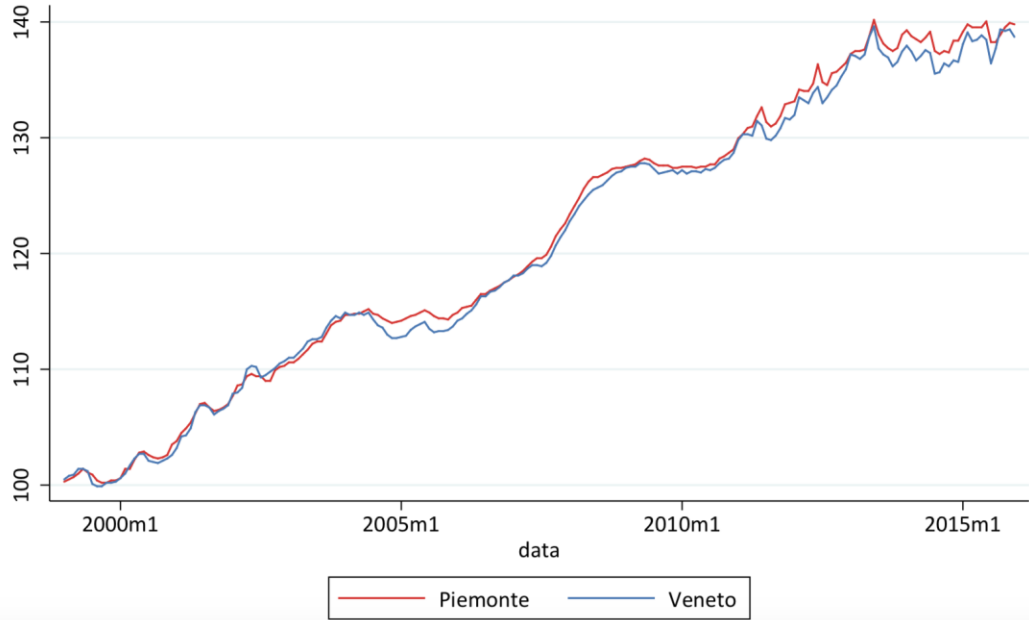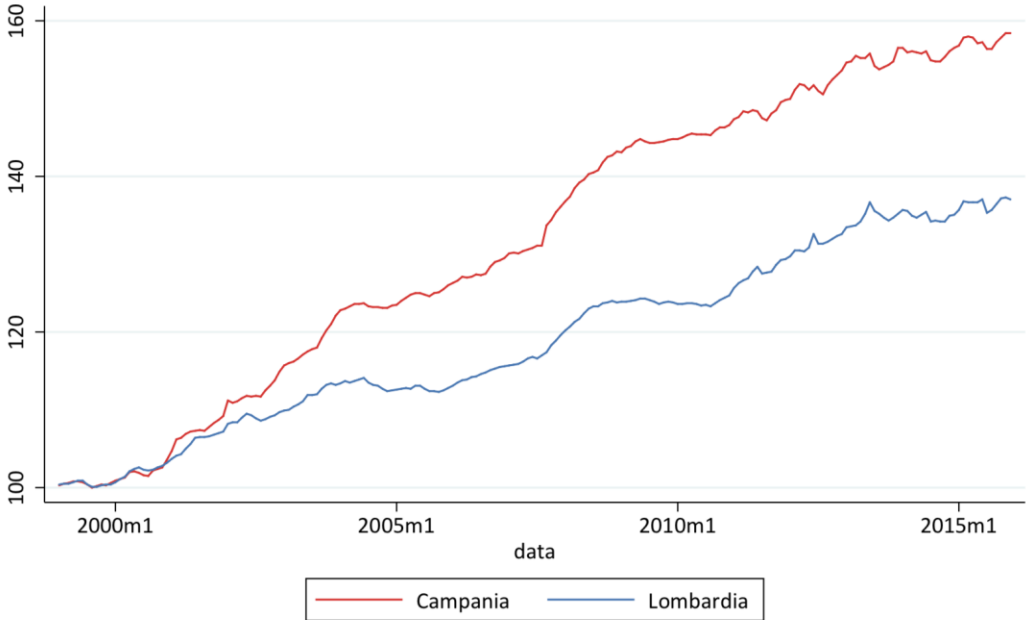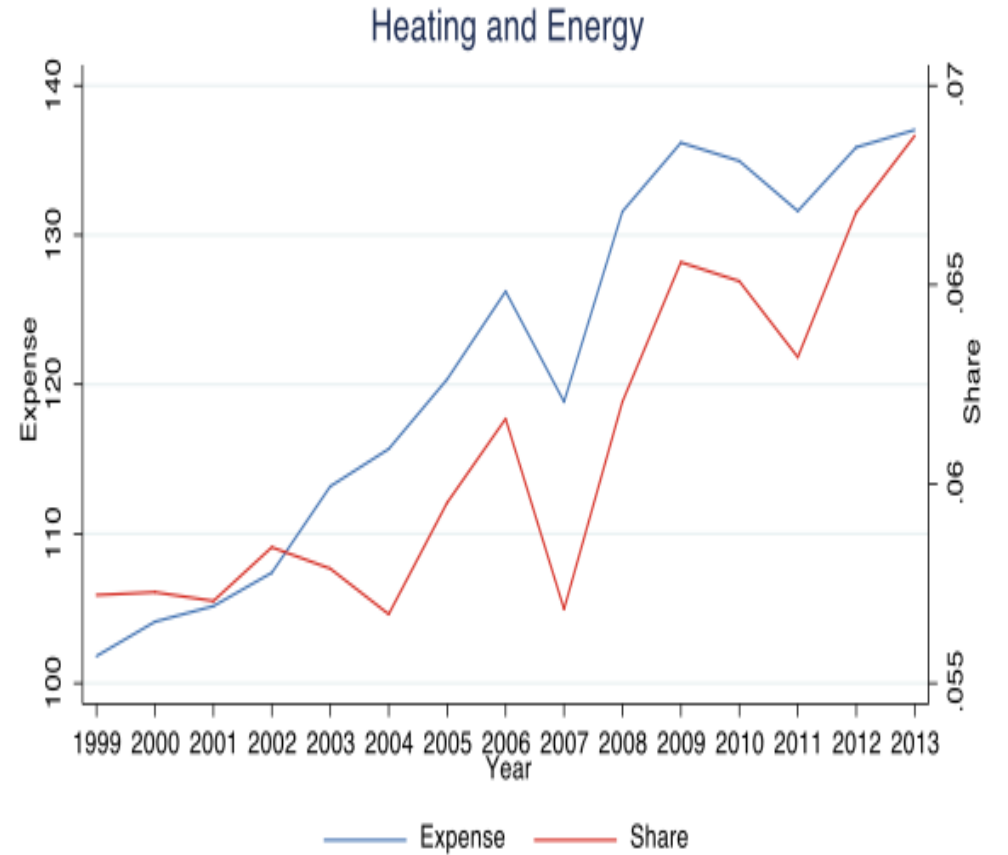
Expenditures and Share Trends
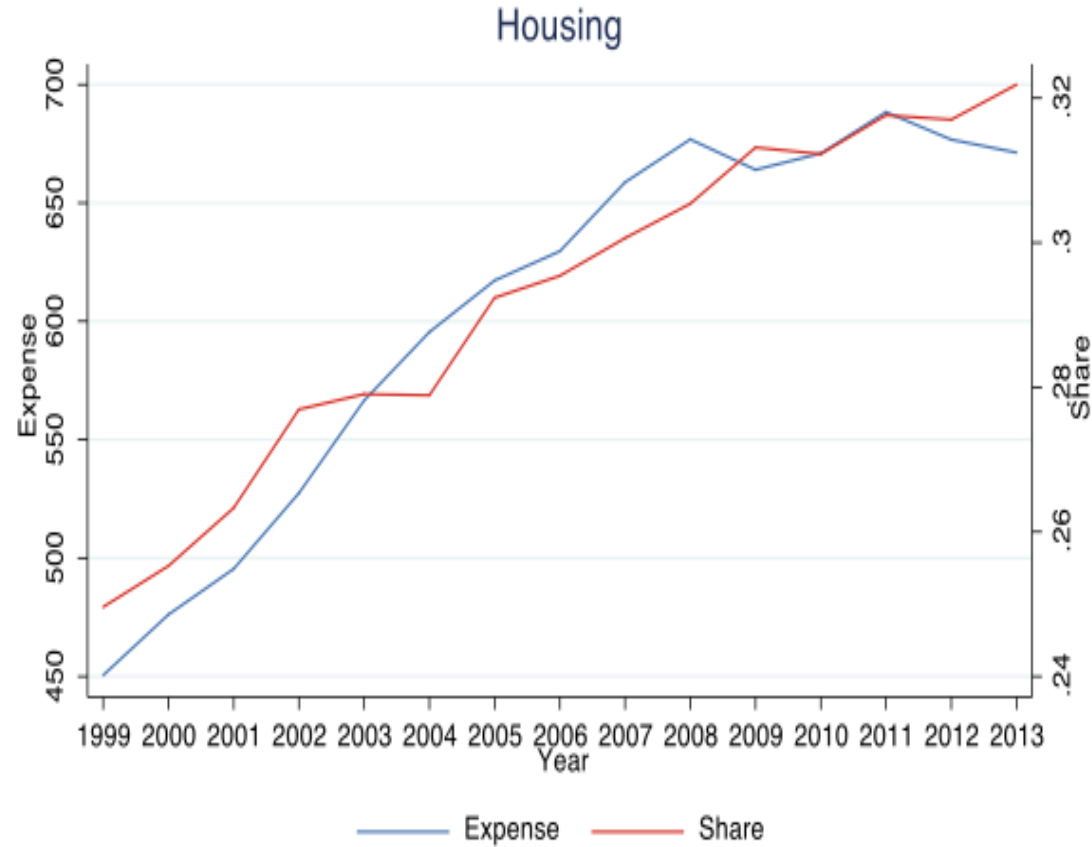## HBS 1999-2013
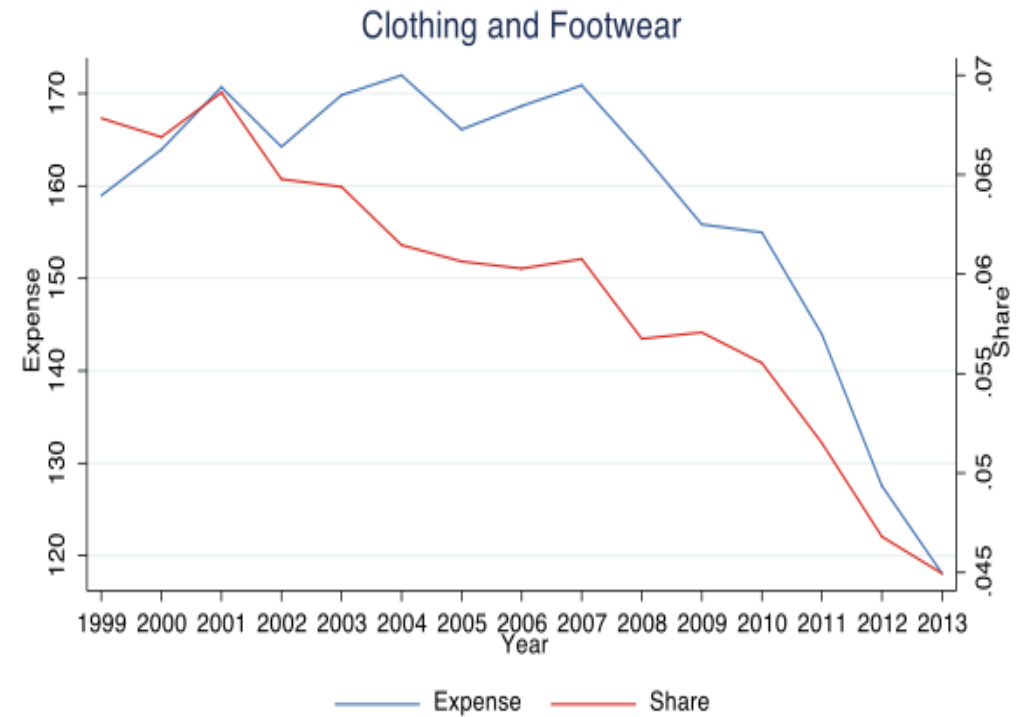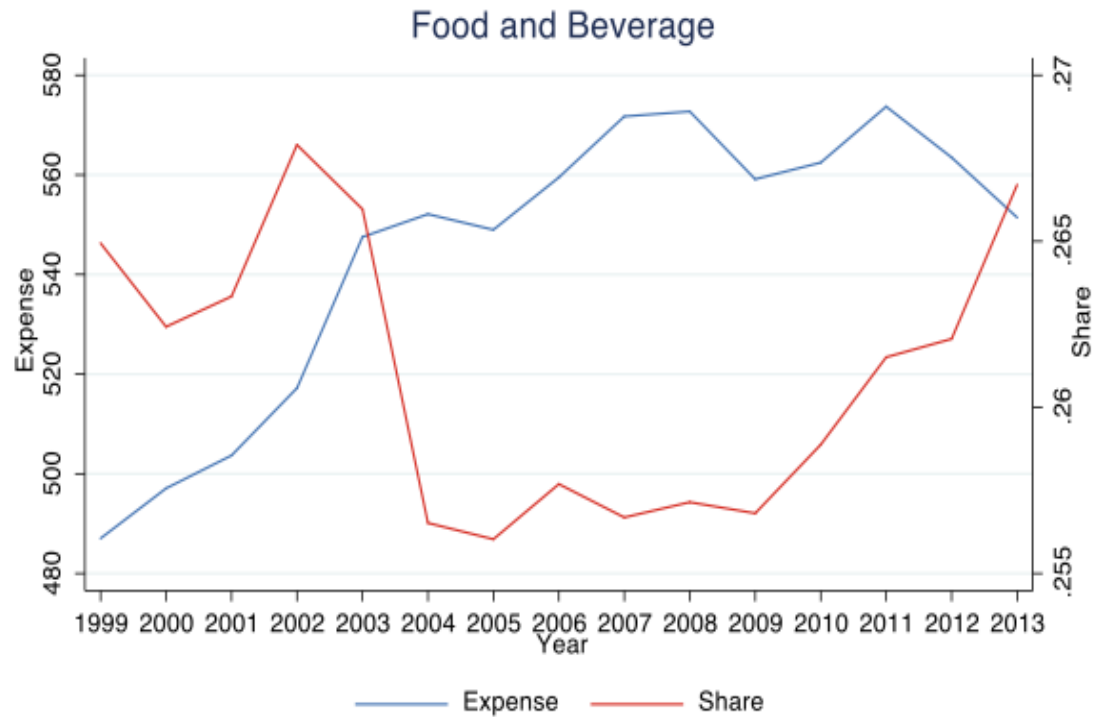
Expenditures and Share Trends
HBS 1999-2013

Expenditures and Share Trends
HBS 1999-2013

Household Specific Prices: Pseudo Unit Values

- We implement Lewbel's theory (1989) to reproduce unit values when no quantity information is available as shown in (Menon, Perali, Tommasi – Stata Journal 2017)

- Lewbel's method simply consists of adding cross-sectional price variability to aggregate price data to recover household specific prices

- We collected the consumer price indexes available from official statistics and associate them with each household in the survey.

- Then, to improve the precision of the estimated price elasticities we reproduce as best as we can the price variation of actual unit values as the ratio between expenditure and quantities if quantity information were available in the survey.
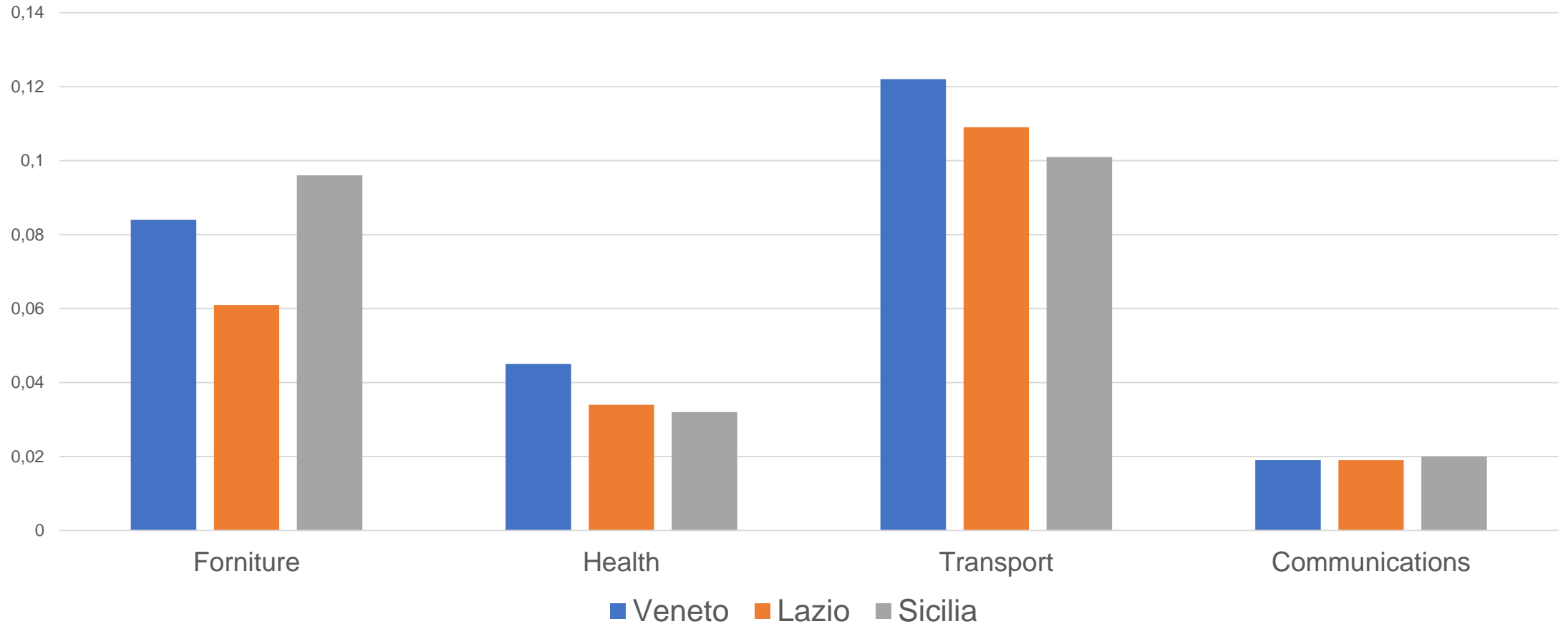
Cost Shares: Necessities
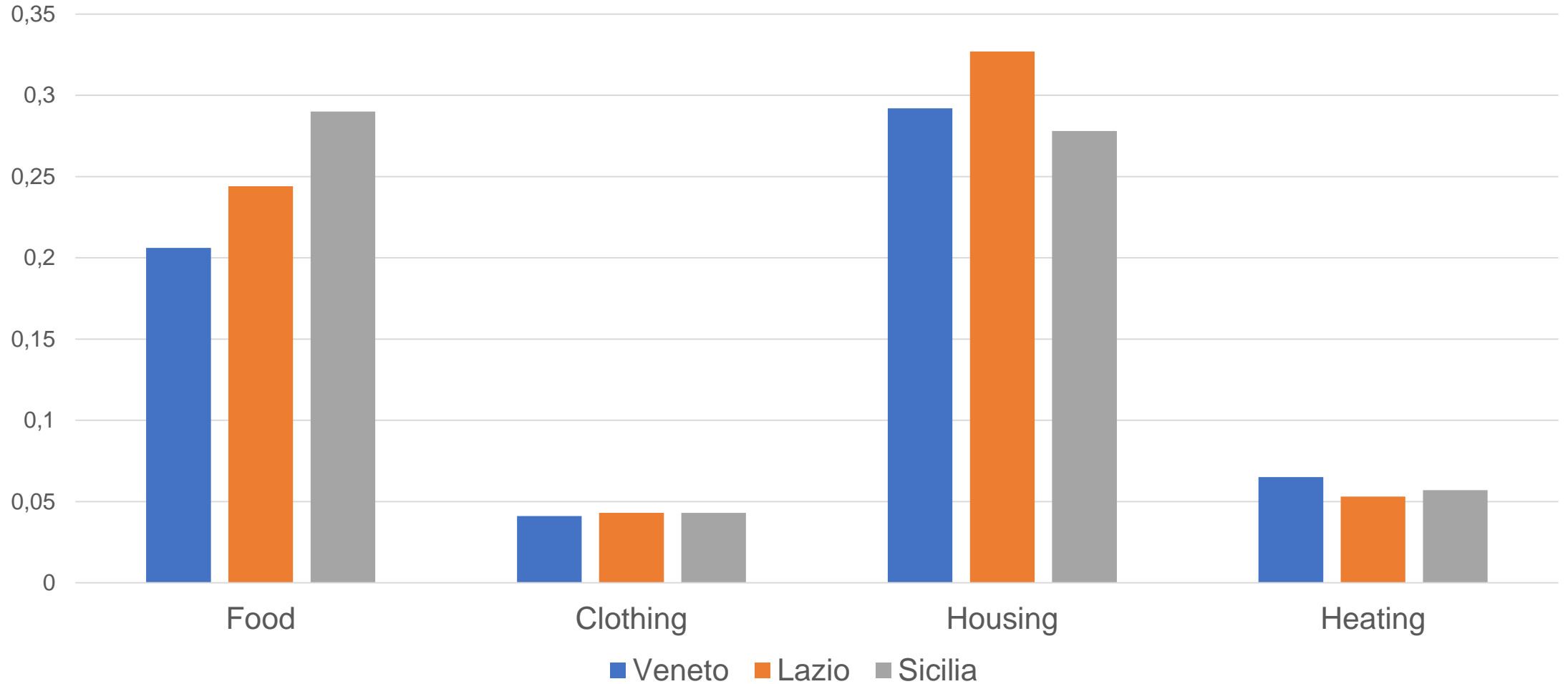
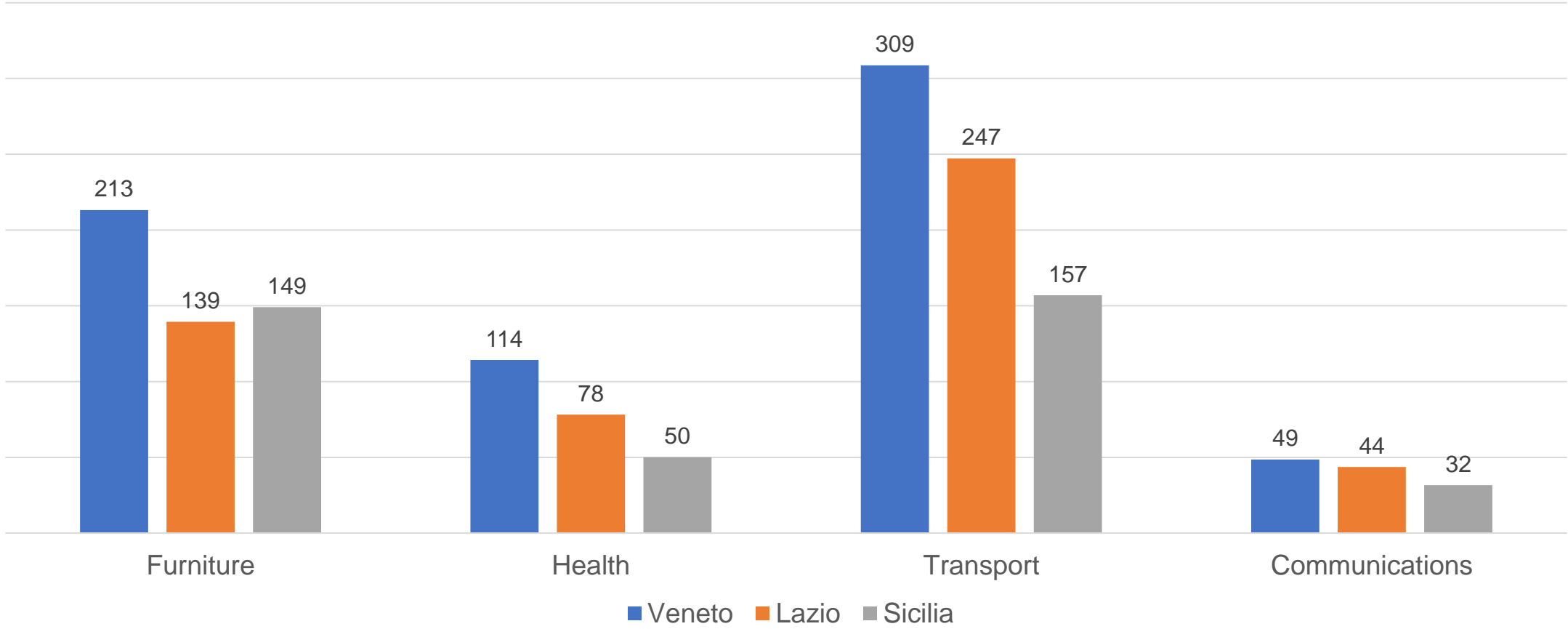# Cost Levels (Euro): Necessities

Boeri, Ichino, Moretti, and Posch (2018) are almost right about housing as proxy for cost of living
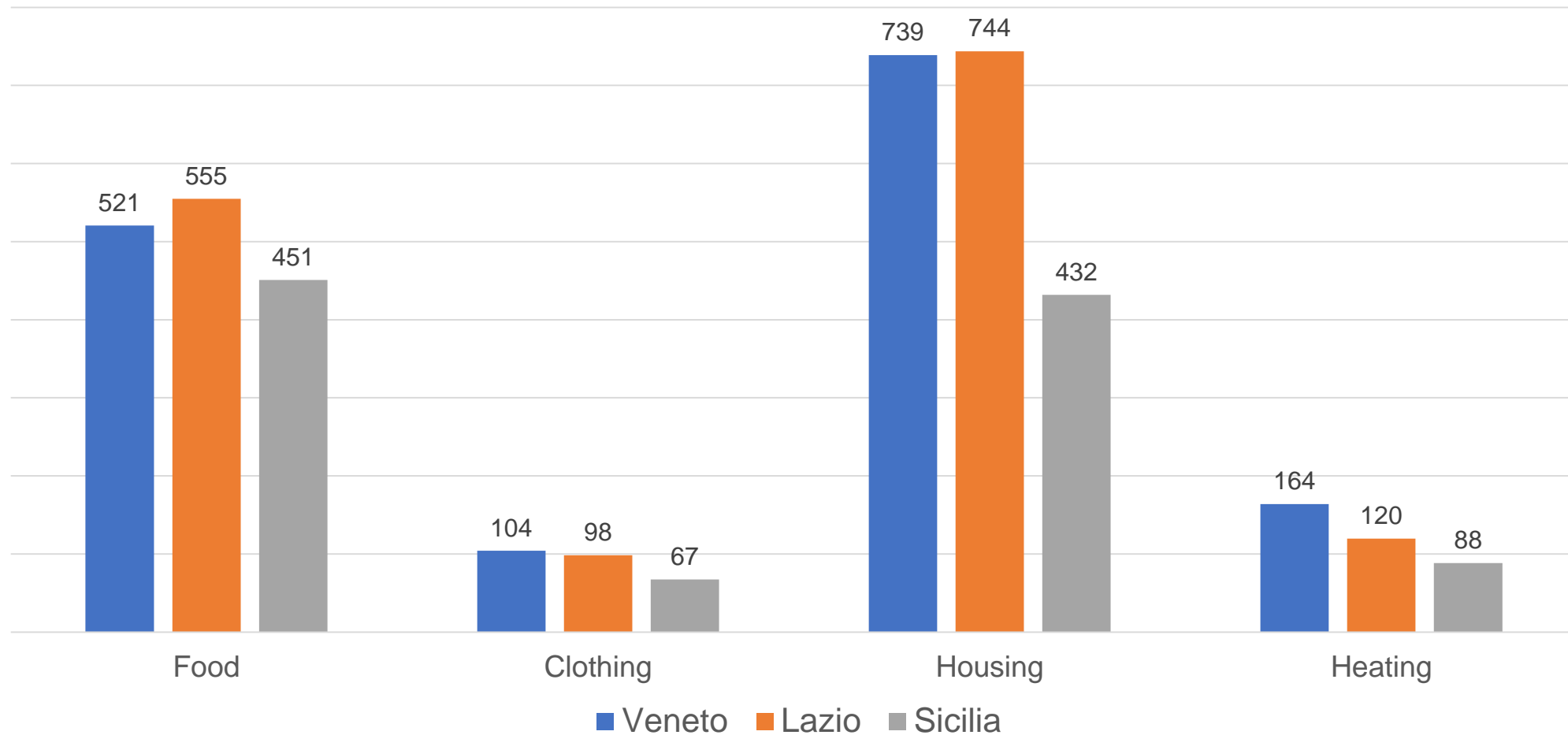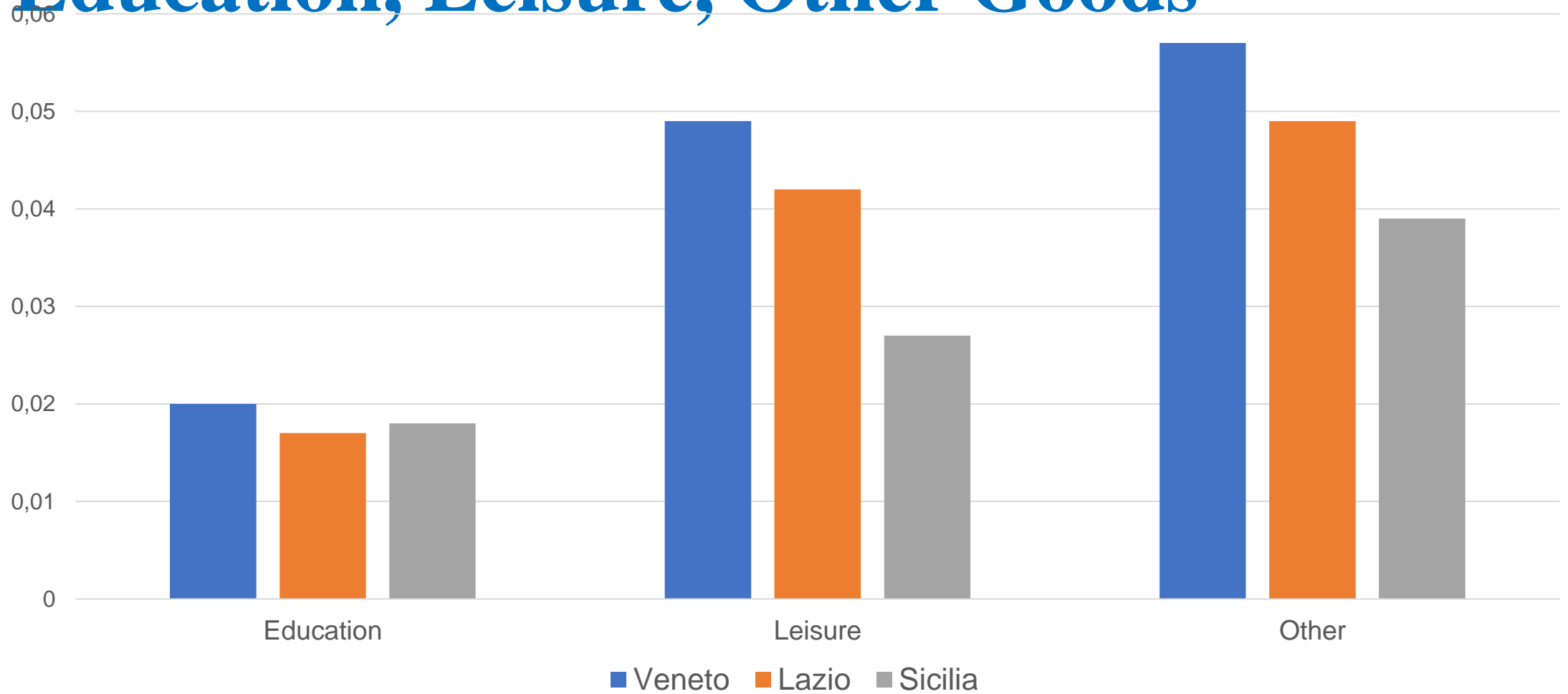
Cost Shares:
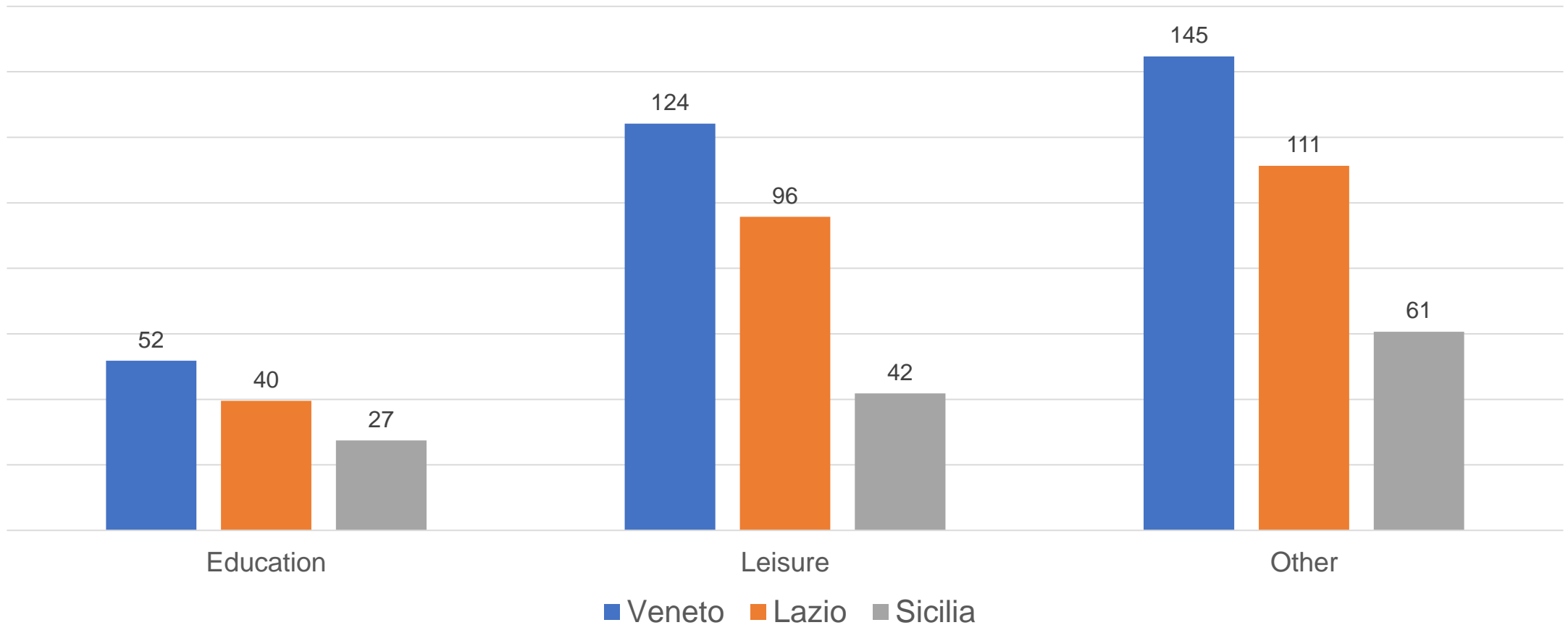Furniture, Health, Transport, Communications

Cost Levels (Euro): Furniture, Health, Transport, Communications

Cost Shares: Education, Leisure, Other Goods

Cost Levels (Euro): Education, Leisure, and Other Goods

Demand System Specification: Linear and Quadratic

- Data: Household Budget Survey ISTAT 2013 AND 1999-2019.
- 11 Budget Shares:
  - 1. Food&Beverages, 2. Clothing&Footwear, 3. Housing, 4. Heating&Energy, 5. Furniture, 6. Health, 7. Transport, 8. Communications, 9. Education, 10. Leisure, 11. Other Goods and Services.
- Demographic Controls:
  - No. children, No. of males, No. of females, North and South (Centre excluded)
- Estimation of AIDS and QUAIDS using NLSUR and a general Tobit procedure to account for zeros
- Spatial autocorrelation: Contiguity weighting matrix and spatial error model
- Fixed and random effects across time

Income and Price Elasticities: Linear and Quadratic Demand System

	Linear		Quadratic	
	Income	Own-Price	Income	Own-Price
Food-beverage	0.771	-0.781	0.854	-0. 803
Clothing	1.704	-1.167	0.801	-0.708
Housing	0.858	-0.832	0.991	-0.864
Heating-energy	0.692	-0.855	0.710	-0.869
Furnitures	0.583	-0.945	0.765	-0.942
Health	1.724	-1.262	1.042	-0.955
Transport	1.633	-0.995	1.585	-0.987
Communications	0.655	-0.736	0.738	-0.736
Education	0.950	-0.975	1.106	-0.982
Leisure	2.072	-0.749	0.903	-0.840
Other goods	1.496	-1.041	1.457	-0.902

PPP, Cost of Living and Incomes

| PPP	HH EXP (monthly)	Individual Incomes	Household Incomes	HRPD PPP	TCLI PPP	Ind Income	HH Income
Italy	HHB	Eusilc	Eusilc	1	1	1	1
Piemonte	2,608.31	16,632.78	36,283.93	1.33	1.09	1.07	1.00
Lombardia	2,869.65	19,056.88	44,316.42	1.31	1.20	1.22	1.22
Trentino Alto Adige	3,030.90	18,826.89	43,961.73	1.36	1.27	1.21	1.21
Veneto	2,774.74	16,526.28	39,345.70	0.73	1.16	1.06	1.08
Friuli Venezia Giulia	2,532.03	17,322.65	39,293.07	0.96	1.06	1.11	1.08
Liguria	2,468.03	17,372.55	36,987.69	0.69	1.03	1.12	1.01
Emilia Romagna	2,787.93	19,234.86	44,054.30	1.35	1.17	1.24	1.21
Toscana	2,582.00	16,681.35	38,602.17	0.75	1.08	1.07	1.06
Umbria	2,438.40	15,281.24	36,623.28	1.11	1.02	0.98	1.00
Marche	2,434.04	15,184.76	38,875.37	0.97	1.02	0.98	1.07
Lazio	2,451.03	15,693.50	36,119.81	1.00	1.02	1.01	0.99
Abruzzo	2,227.95	12,856.57	32,027.45	1.18	0.93	0.83	0.88
Molise	2,119.48	11,119.70	25,013.21	0.92	0.89	0.71	0.69
Campania	1,986.00	11,264.81	28,129.36	0.49	0.83	0.72	0.77
Puglia	1,974.40	12,623.91	30,788.57	0.64	0.83	0.81	0.84
Basilicata	1,958.45	11,567.54	29,001.88	1.14	0.82	0.74	0.80
Calabria	1,717.90	11,389.47	27,290.84	0.51	0.72	0.73	0.75

Cost of Living by Region (Euro)
Sicily/Veneto=0.6
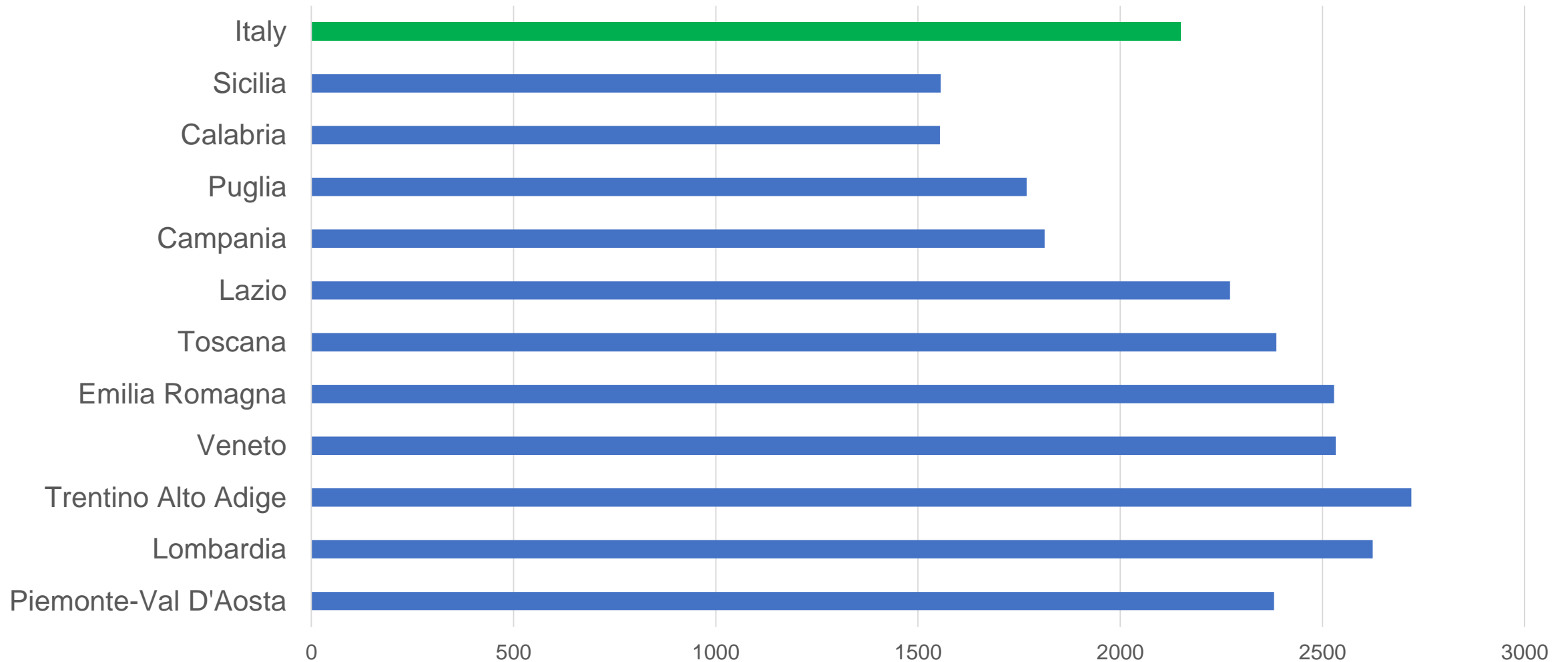
In Relative Terms
Italy 100
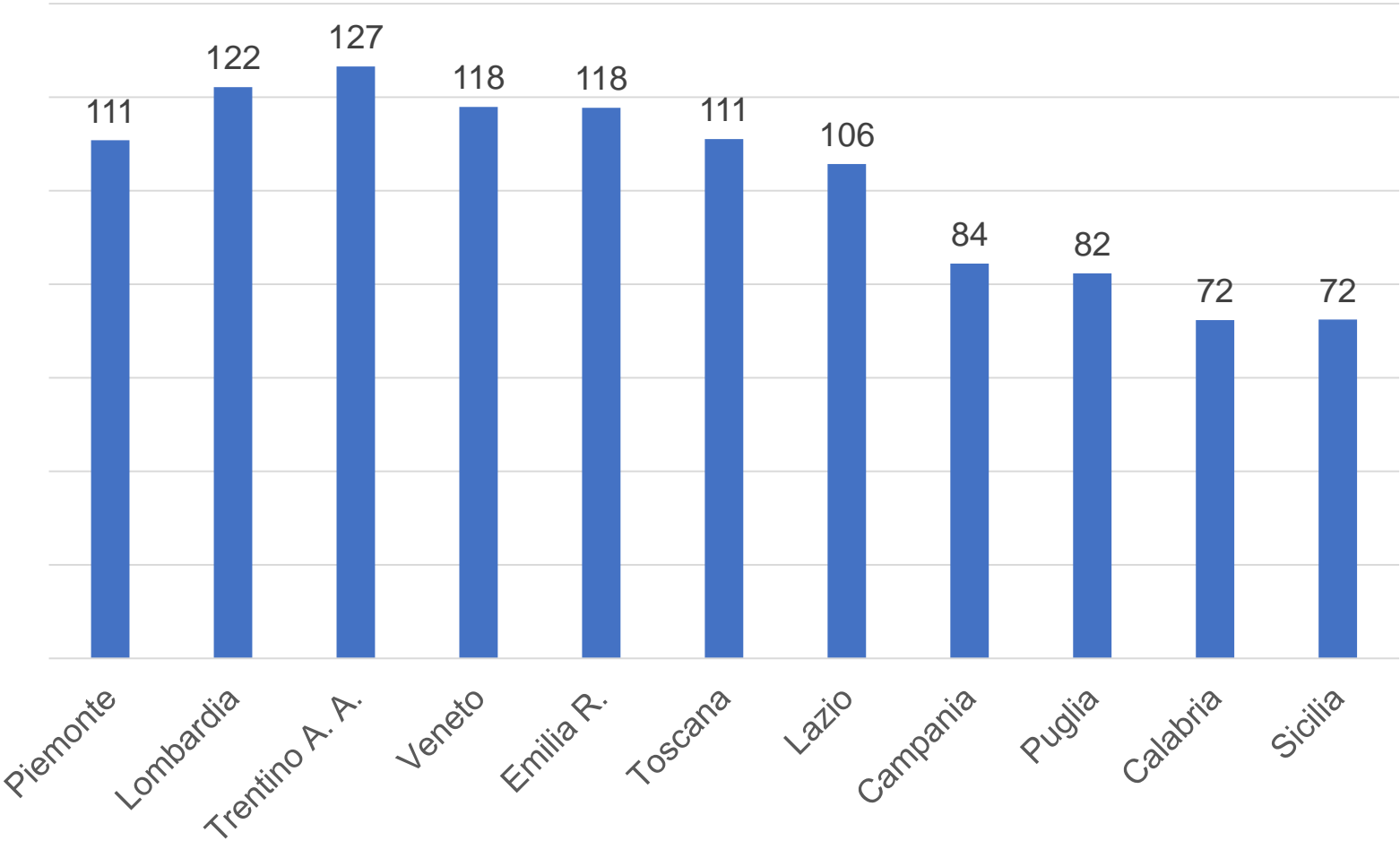
A slide showing ongoing work was deleted. The presented results are soon to be published in following article (under review):

Menon M, Perali F, Ray R and Tommasi N. The Tale of the Two Italies: Regional Price Parities Accounting for Differences in the Quality of Services.

The full set of slides can be made available under request, please contact:

federico.perali@univr.it
or
jpi-pen@leibniz-bips.de

Productivity: the other side of the medal

- The real question should not be that wages should be tied to such different costs of living (different from quality of life)
  - *Gabbie salariali* were abolished in 1969 in Italy

- Improvement in living standards depends almost entirely on rising output per worker, however we live in an age of information driven technical change, but our national accounts tell us that productivity is almost stagnant

- Krugman "Productivity is not everything, but in the long run is almost everything"

- This is the real North-South divide
  - Both for Italy and Germany and Italy's North and South
  - Why prices from Tibet to Beijing vary only by 7%?

Reverse Migration: why not?

- Efficiency of the labor market
- Very unfair for the dependent worker of the North… unless he is married
- In average price differentials equivalize both individual and real incomes
- So, not a real incentive to move
  - Difference in service quality?

	Ind Income real	HH Income real
Italy	1.00	1.00
Piemonte	15255.76	33280.00
Lombardia	15887.36	36945.75
Trentino Alto Adige	14860.56	34700.14
Veneto	14248.89	33923.70
Friuli Venezia Giulia	16367.21	37125.84
Liguria	16840.01	35853.86
Emilia Romagna	16505.76	37803.74
Toscana	15456.24	35767.15
Umbria	14992.75	35931.89
Marche	14924.79	38209.81
Lazio	15317.90	35255.33
Abruzzo	13805.39	34391.08
Molise	12551.38	28233.71
Campania	13569.77	33885.09
Puglia	15296.35	37306.42
Basilicata	14130.45	35427.54
Calabria	15861.17	38005.69
Sicilia	15230.77	37437.30

Quality of Services

- It is not the only factor that contributes to the rebalancing of the gap, but it is also important to integrate the quality of public services into the estimate.
    - The idea is that 1 euro invested in the consumption of a service is actually worth more than 1 euro if, for the same unit of service consumed, a higher quality is also obtained.
- The correction for quality, which uses the aggregate indicator relating to the quality of services of the fair and sustainable well-being index (Bes-Istat), reveals a clear advantage for the North.
- The comparison between real individual incomes and quality-adjusted real individual incomes shows that the quality of public services by itself is not sufficient to balance the standard of living in favor of the North.
- The purchasing power corrected for quality in the North is about 28 percent higher only if it is calculated at the household level, ie considering the different structure of the labor market.

A slide showing ongoing work was deleted. The presented results are soon to be published in following article (under review):

Menon M, Perali F, Ray R and Tommasi N. The Tale of the Two Italies: Regional Price Parities Accounting for Differences in the Quality of Services.

The full set of slides can be made available under request, please contact:

federico.perali@univr.it
or
jpi-pen@leibniz-bips.de

Poverty in Real Terms: a Differential Impact of Covid

- In *nominal* terms, i.e. when the cost of living is not corrected for the spatial variation of prices between regions, the incidence of poverty in the North (4.8 %) is much lower than in the South (23.9 %) compared to the Italian average of 12.4 %.

- In *real* terms, that is, considering the differences in purchasing power, the spatial differences almost disappear and are around 10 %.

- If we also consider the effect of the perception of the *quality of services*, the incidence of poverty in the North is about 7.9 % on average, while in the South it is about 13.6 %.

- To answer if the gap has widened due to the pandemic, we must wait to overcome it but today we can measure the cost of living more precisely thanks to the reconstruction of prices.

Relative Poverty (%) associated with the nominal, real and quality adjusted cost of living per region

(relative poverty line: 0,6 median (nominal 1341,8, real 1360,6, quality 1291,6 euro)

Regione	Costo della Vita Nominale	Costo della Vita Reale	Costo della Vita Corretto per la Qualità dei Servizi
Nord	0.0482	0.0993	0.0789
Centro	0.0790	0.1012	0.1065
Sud	0.2390	0.1037	0.1362
Italia	0.1235	0.1012	0.1048

MICRO-MACRO
Modelling

STIME DISAGGREGATE (MODELLO CGE)

Impatto disaggregato sul PIL, redditi delle famiglie, e occupazione e stima dell'effetto di mitigazione apportato dalle politiche di sostegno a imprese e famiglie
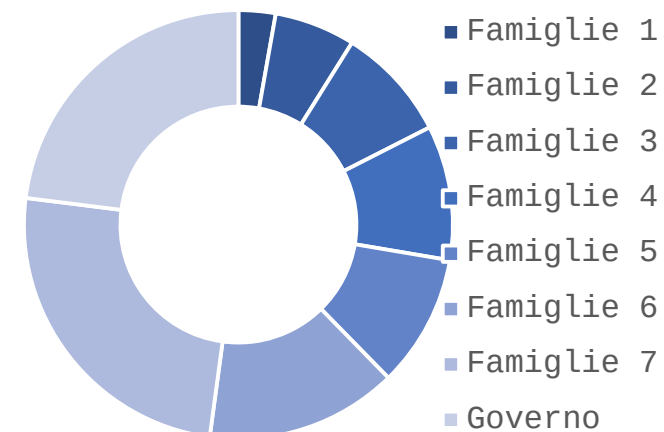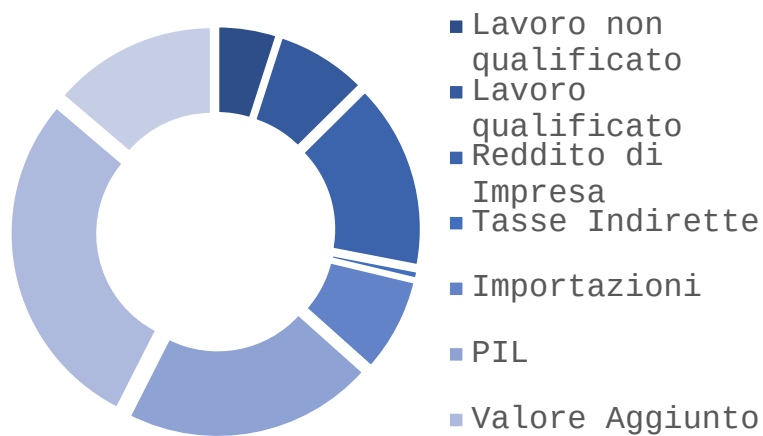
Stime in assenza di e con intervento

Le stime dell'Impatto (-10% Esportazioni) dal Modello Disaggregato (CGE) in assenza di intervento.

Il reddito alle famiglie si riduce in media del 4% in assenza di intervento.

Impatto totale sul PIL: -063 M€

- Lavoro non qualificato
- Lavoro qualificato
- Reddito di Impresa
- Tasse Indirette
- Importazioni
- PIL
- Valore Aggiunto

Impatto su redditi famiglie: -192 M€

- Famiglie 1
- Famiglie 2
- Famiglie 3
- Famiglie 4
- Famiglie 5
- Famiglie 6
- Famiglie 7
- Governo

Redditi e occupazione

La compensazione alle imprese è efficace soprattutto per il lavoro qualificato e l'occupazione nei settori industriali, delle costruzioni e in buona parte per i servizi.

Impatto sui Redditi (M€)

	No Interv.	Helicopter Money	Compens. Imprese
Unqualified work	-17,251	-6,672	-1,402
Qualified	-	-7,254	940

Impatto sull'Occupazione (M€)

|	No Interv.	Helicopter Money	Compens. Imprese
Agriculture	-17,251	-6,672	-1,402
-	-		

PRINCIPALI EFFETTI SOCIALI

Dal Macro al Micro Impatto sul costo della vita delle famiglie italiane per classe di reddito, regione e tipologia familiare prima e dopo l'intervento del Governo.

Stime in assenza di intervento

L'effetto combinato delle politiche di trasferimenti alle famiglie e alle imprese funzionerebbe come una rete sociale efficace (stime dalle micro-macro simulazioni). L'intervento a sostegno di imprese e famiglie è particolarmente efficace per le famiglie meno abbienti che riceverebbero una copertura delle perdite di reddito attese del +12%. L'incidenza della povertà economica post-intervento rimane particolarmente elevata tra le regioni del sud sebbene sia contenuta a livelli pre-pandemia.
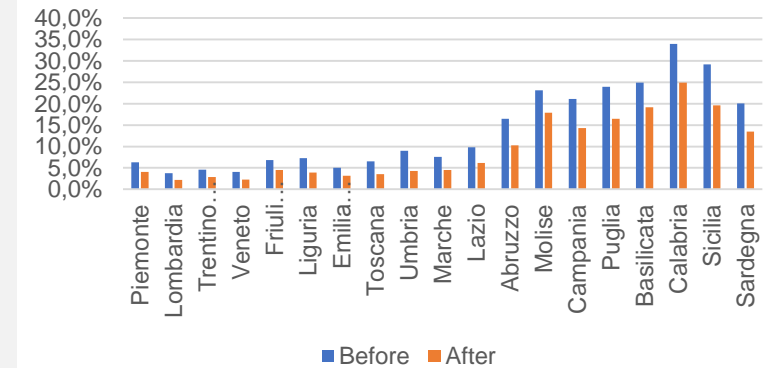
Impatto % per Classe di Reddito

Percentage Impact by Income Deciles
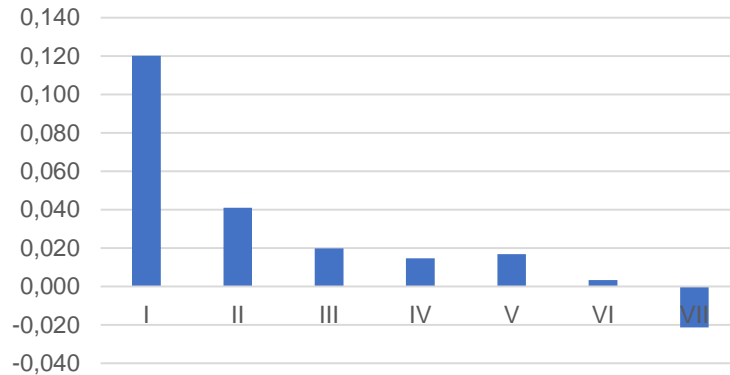
Impatto su redditi famiglie per Regione

Regional Poverty Before and After Intervention

■ Before ■ After

Redditi e occupazione

L'effetto delle misure di intervento sconterebbe l'aumento della povertà nelle fasce più deboli quali le persone sole, le madri sole e le coppie anziane che sono solo parzialmente protette dall'intervento. Gli schemi di

Impatto sulla povertà per tipologia familiare

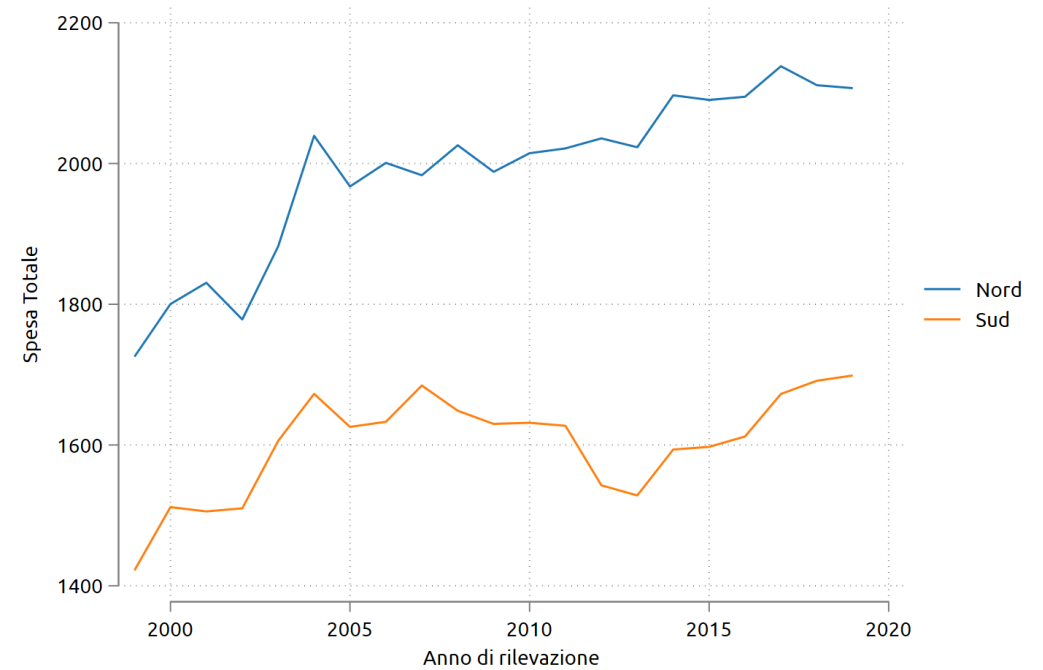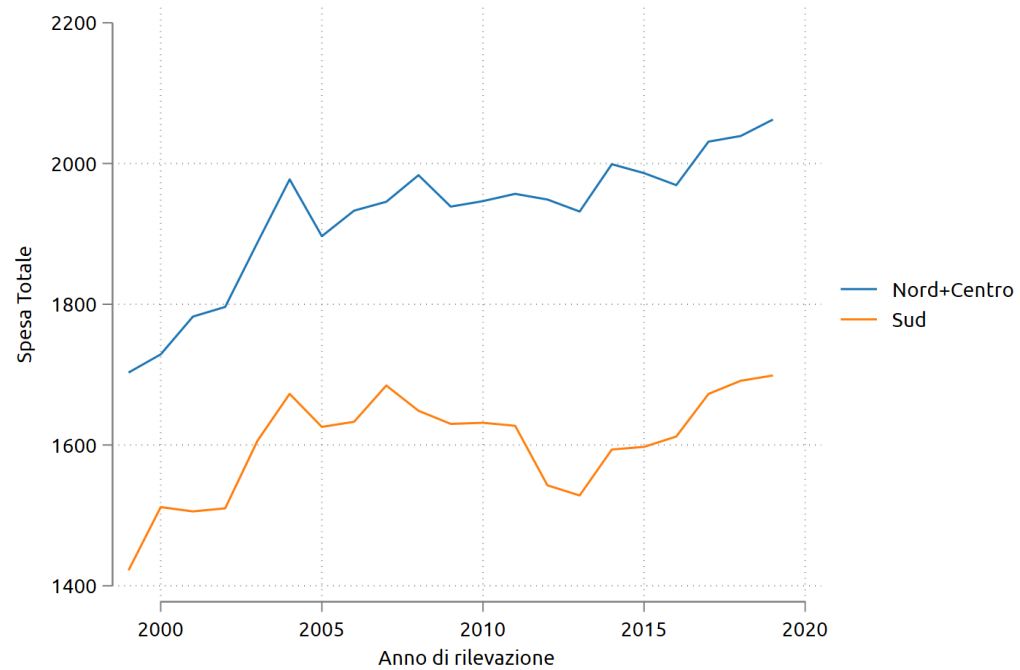Poverty by Family Type Before and After Intervention
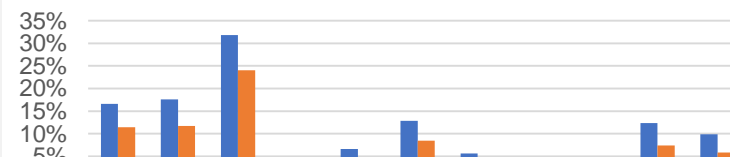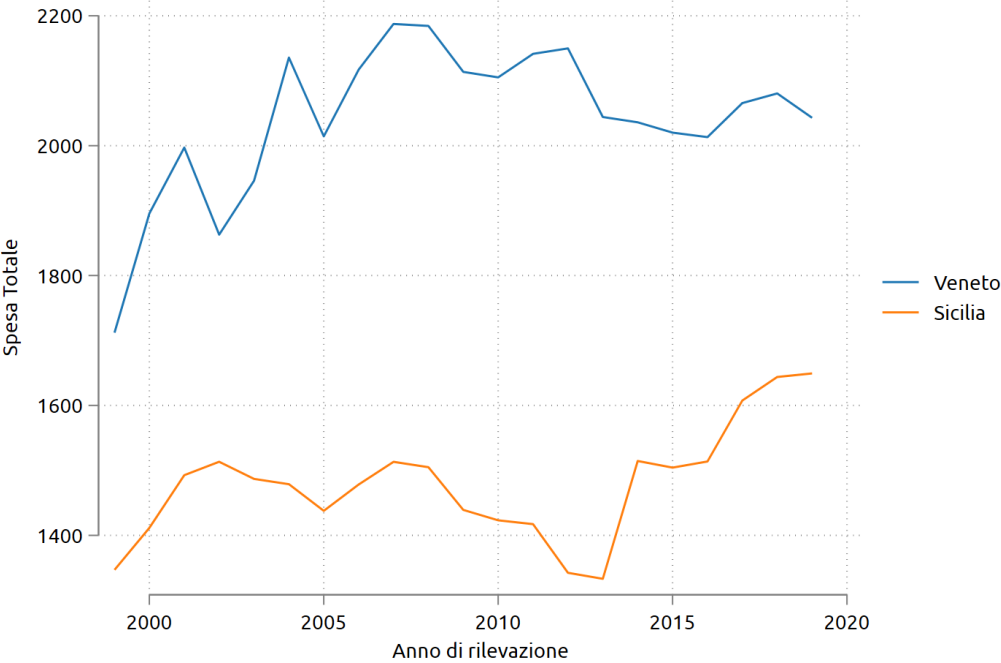
Impatto sul Benessere Sociale

Change in Average Social Welfare

Understanding the evolution of cost of livings:
did the North-South Divide Remain the same? …and in real terms?

Regional comparison – 1999-2019

Did changes in total factor productivity (Granger) cause the north-south differential?

- North-South difference in cost of living (also by young and old cohorts)
  - Total factor productivity (Balassa-Samuelson)
  - Size of state public administration
  - Political party at the government
  - Distributional feature (Gini index)
  - Unemployment
  - Inflation (Equity/efficiency trade-off)

Conclusions

- Our results explain why people in the North choose to stay in the more expensive North rather than moving to the more inexpensive South.
  - superior quality of services in the North
  - restricted on job opportunities, especially for the female earner in the household, in the South
    - while single earner households enjoy higher income and lower living costs in the South than in the North, this advantage weakens and disappears for multi earner households.
- Overall message: spatial comparisons of living standards should simultaneously take note of spatial differences in prices, wages, employment opportunities, for both income earners, and in the quality of essential services.
- A short-term cure of the North-South divide in PPP: adjusting the wage system reinforcing local wage negotiation agreements, but productivity differential is the major concern.
- So, is the Balassa-Samuelson disease curable? Or, perhaps more appropriately, do Italian politicians want to cure it?

Future Steps

- Policy Question
  - How to deal with the fairness question associated with the high North-South real wage differential

- Extensions
  - What Granger cause the North-South Differential and test the Balassa-Samuelson hypothesis in a General Equilibrium framework
  - Current and full income using Integrated Italian Living Standard Survey
  - Comparison with … Germany
  - Social Welfare Functions

Conclusions