# The Tale of the Two Italies: Regional Price Parities Accounting for Differences in the Quality of Services[1]

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**Abstract:** This study estimates regional price parities (RPP) in Italy based on household budget data and estimated "pseudo" unit values to compare living standards across Italian regions. The simultaneous consideration of spatial variation in prices and in quality of services between regions is a distinctive feature of this study. 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 Italy in cost of living and in 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 further 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, which take us closer to the end of the tale, lies partly in the superior quality of services in the North and partly in the severe restriction on job opportunities, especially for the female earner in the household, in the South. The paper makes a methodological contribution by proposing a quality adjustment procedure to spatial price calculations whose appeal extends beyond Italy to the international context of cross-country PPP calculations.

**Keywords:** Price Parities, Cost of Living, Quality of Public Services, Unit Values

JEL codes: D12, I31, J3.

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## 1. Introduction

Prices are required in a host of comparisons that range from tracking a country's Gross Domestic Product (GDP) over time to ranking countries at a point in time based on their GDP at Purchasing Power Parity (PPP). In both cases, price indices are required for adjusting the monetary aggregates for price changes-temporal price movements in case of the former and spatial price differences between countries in case of the latter. The latter, i.e., cross-country differences in prices, form the basis of the exercise in calculating Purchasing Power Parity (PPP) between different countries' currencies that is periodically undertaken by the International Comparison Project (ICP)[2].

At the level of the individual as well, prices are required to examine how living standards in a country have changed over time, by calculating per capita income or expenditure at constant prices in each time period, or in comparing living standards between different regions in a country, by calculating per capita income or expenditure in each province corrected for price differences between the provinces. As with the country level comparisons, while the former requires information on temporal changes in prices, the latter requires information on spatial differences in prices between provinces, or what has been referred to as 'regional price parities' (RPP). In the literature on real income comparisons at the individual level, the former has generally dominated the latter, namely, studies comparing real income or expenditure over time rather than between regions. One reason for that is the greater availability of information on movement in prices over time than across regions in the same time period. While the information on temporal changes in prices is, in case of most countries, available by items in fine detail, this is not so in case of regional differences in prices at the same point in time. In most countries, there is no information on prices across regions and, when there is, the information is limited to, spatially differentiated, temporal changes in prices at the aggregate country level, from which we can work out spatial price indices at the level of all items, but not at the level of individual items. At the cross-country level, the ICP does not publish within country price information, and this makes the estimated PPP of a country's currency difficult to interpret in the context of a heterogeneous country where the purchasing power of the currency unit is likely to vary sharply between provinces. As Slesnick (1998), points out, the

[2] World Bank (2015).

absence of information on cross sectional price variation between regions in a country poses a significant obstacle to meaningful welfare comparisons between households in the same time period in view of the spatial variation in prices within a country. Brandt and Holz (2006) provide empirical evidence from China in support of this point by showing that the inequality estimates are quite sensitive to the use of spatial price deflators that take into account price differences between the Chinese provinces. There is increasing appreciation of this issue that has led to the ICP signalling greater attention to the estimation of RPPs in future rounds.

While the focus of this study is on spatial prices within a country, namely, Italy, it deviates from the recent literature by introducing differences between regions in the quality of life (proxied by Amenities and Affluence indexes) in the RPP calculations. The results confirm that it is as important to make quality of life adjustment as the introduction of spatial prices themselves in making welfare comparisons between regions. This has wider implications in the international context of PPP calculations by the ICP. For example, while the basis of the PPP concept is the Balassa-Samuelson hypothesis on productivity differences in non-tradeable items between the affluent and the less developed countries, it does not allow for differences in the quality of an item, and more generally in the basic amenities, in the PPP calculations. The Italian evidence at the sub-national level, which is a tale of two economically separate Italies, points to the need to do so at the international level of the PPP exercise.

The interest in spatial prices is reflected in an increasing literature on RPPs. Evidence on spatial prices in large countries in the form of estimated RPPs, though largely but not exclusively restricted to prices of food items, is contained in, for example, Coondoo and Saha (1990), Coondoo, Majumder and Ray (2004), Coondoo, Majumder and Chattopadhyay (2011), Majumder, Ray and Sinha (2012) for India, Deaton and Dupriez (2011) for India and Brazil, Aten and Menezes (2002) for Brazil, Mishra and Ray (2014) for Australia, Gomez-Tello, Diaz-Minguela and Martinez-Galarraga (2018) for Spain, Montero, Laureti and Minguez (2019) for Italy. Majumder, Ray and Sinha (2015) have explored the implication of allowing spatial price differences within countries for the calculation of PPP between countries in the bilateral country context of India and Vietnam. With the exception of Gomez-Tello, Diaz-Minguela and Martinez-Galarraga (2018) that utilised regional price information in early twentieth-century Spain, these studies are part of a recent tradition that seeks to overcome the absence of detailed item wise information on prices by using unit values by dividing expenditures by quantities at household level obtained from the unit records in the household expenditure surveys. This tradition, however, has the significant limitation of being restricted to food items since the required expenditure and quantity information is only available for such items. Moreover, unit

values are unsatisfactory proxies for prices, as they are not exogenously given and can reflect consumer choice. This may lead to inconsistencies in the estimated price effects due to the omission of quality effects and that of household characteristics on the unit values. Also, for a number of commodities like the services, for example, unit values may be difficult to tabulate. Yet, for reasons explained above, spatial price indices within countries are required for both cross country and intra country comparisons.

This paper addresses the issue of estimation of RPPs on limited price information by proposing alternative procedures that can be easily implemented on widely available information on prices and household expenditures. The alternative procedures only require published item wise Consumer Price Indices (CPIs) and disaggregated household level information on expenditure by items and household characteristics that are available in the unit records of household surveys. The informational requirements for the proposed procedures are, therefore, quite minimal and are easily satisfied in case of a large number of countries, both developed and developing countries. The basis for the alternative procedures is the concept of 'pseudo unit value' (PUV) that was proposed by Lewbel (1989) as a proxy for the actual unit value of an item. Atella, Menon and Perali (2004) implemented Lewbel's proposal on Italian data and found that the PUVs are close approximation of the actual unit values. Moreover, their "results showed that the matrix of compensated price elasticities is negative semidefinite only if 'pseudo' unit vales are used" (p. 195). Menon, Perali and Tommasi (2017) have recently made the task of estimation of PUVs simpler by presenting in Stata the pseudo unit command which estimates pseudo unit values in cross section of household expenditure surveys without quantity information (p.222). Based on PUVs, the present study proposes and implements alternative procedures for calculating RPPs on Italian data, both item wise and over all items. While one procedure uses the concept of 'True Cost of Living Index' (TCLI) due to Konüs (1939), the other uses the framework of the Household Regional Product Dummy (HRPD) model proposed originally in Coondoo, Majumder and Ray (2004) and extended recently in Majumder and Ray (2017). A comparison between the alternative sets of RPPs is an important motivation of this study. While the empirical implementation of the proposed procedures in this study is restricted to Italy, the positive experience reported later suggests considerable potential for application in any country that has household level expenditure information on items and household characteristics. The more disaggregated the breakdown of expenditures on items the better will be the implementation of the proposed procedures.

The measurement of the cost of living in Italy is both an empirically interesting exercise and a policy delicate issue. The empirical challenge is common to many other countries where

individual prices cannot be derived from household budgets that do not record quantities. Further, nominal prices at the regional and local level for a high level of commodity definition are not available on a regular basis from official statistical sources. Estimates of regional price parities in Italy have been therefore mainly based on basket product approaches and associated price indices (Biggeri, De Carli and Laureti 2008, De Carli 2010, Biggeri and Laureti 2014, Biggeri, Ferrari and Yanyun 2017, Cannari and Iuzzolino 2009) rather than on the use of unit values as in the present case. From a historical perspective, Amendola, Vecchi and Al Kiswani (2009) and Amendola and Vecchi (2017) estimate an average price differential of about 20 percent that testifies to the failure of the integration process between the two Italies and redesign the Italian map of welfare with a significantly smaller North-South gap in real costs of living coherently with the early evidence produced by Campiglio (1996). This reshuffling of the distribution of real household incomes has been documented also by Massari, Pittau and Zelli (2010) that find that providing subsidized housing as especially relevant, though not sufficient, in alleviating the cost of living of the poor people living in the South. It is worth noting that the estimates of regional price differentials between the North and the South of Italy, also reported in our study, are significantly higher than those found in larger and more heterogeneous countries such as China (Brandt and Holz 2006) and India (Majumder, Ray and Sinha 2012) with the exception of rural India, or as compared to the East-West German price differentials (Roos 2006).

The Italian North-South divide in cost of living, probably one of the highest differentials in the world, is a public concern that attracts an intense policy debate, mainly centred on the economic efficiency and political opportunity of establishing wage zones. The debate around the tale of the two Italies stayed alive through the years because it was never based on exhaustive and conclusive evidence. Alesina, Danninger and Rostagno (2001) and Alesina and Giavazzi (2007) contend that public employment, which is much more diffused in the South than in the North, 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. This source of spatial inflation poses a serious question of fairness. Comparing the standard of living of two public workers with same level of skills, same labor contract centrally negotiated by the State [3] and same fiscal treatment, the employee living in

[3] In Italy, about 20% of all labor contracts are the result of a firm or territorial level negotiation. It is not always the case though that decentralized negotiation grants higher wages than those established by national contracts through collective bargaining agreements. Though labor productivity is higher in the North than in the South, national contracts maintain the system rigidity and nominal wages are not associated with productivity differentials.

the South enjoys a much higher living standard. The same authors claim that even though 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. Boeri, Ichino, Moretti and Posch (2018) estimate a 30 percent price differential using housing costs as their benchmark cost of living (Moretti 2013). Recently, D'Alessio (2017) aiming at explaining the North-South divergence in price parity and standard of living placed special emphasis on the socio-economic context as described by features of the labor market and the quantity and quality of the public services effectively accessible to Italian residents. The study shows that perceived standards of living are significantly affected by occupational opportunities, quality of health services, access to childcare and public safety.

A spontaneous policy question is to ask, if there exists such a South to North real wage gradient, why Italians, and dependent workers in particular, do not migrate towards the South and why migrants go North and do not stay in the South of Italy? Or more, why jobless people from the South do not migrate to the North of Italy? What is the relative importance of the differential quality of services in answering these questions? These are the policy conundrums at the core of our motivation for writing another chapter of the tale of the two Italies narrated by the many contributions in the literature related to this relevant issue. We hope that the robustness of our evidence helps placing our chapter close to the end of the tale.

The rest of the paper is organised as follows. The Lewbel (1989) based procedure used in deriving individual prices and the cost of living index theory as the basis of the empirical application are described in Section 2. This section also shows how intra-country regional differences in 'amenities' and 'affluence' can be incorporated in the spatial price calculations. The data set used is described in Section 3. The results are presented and analysed in Section 4. The paper concludes with Section 5.

## 2 Alternative Procedures for Estimating Regional Purchasing Power Parities

Both the procedures for estimating RPPs start by calculating the pseudo unit values following Lewbel (1989). The methodology for the calculation of demographically varying PUVs is described below.

### 2.1 The Calculation of Demographically Varying PUVs in the absence of quantity information

When only expenditure information is available, the cross-sectional variability of actual unit values for the *i*-th consumption group can be estimated as follows (Lewbel 1989, Menon, Perali, and Tommasi 2017)

$$\hat{P}_D^i = \frac{1}{k_i} \prod_{j=1}^{n_i} w_{ij}^{-w_{ij}}, \qquad (1)$$

where $k_i$ is the average of the sub-group expenditure for the $i$-th group, and $w_{ij}$ is the budget share of good $j$ of the $i$-th consumption group. As an example, one may suppose that a household budget is divided into $i = 1,2$ groups such as food and non-food, and that the food sub-group is composed by $j = 1,2,3$ items such as cereals, meat, and other food. The index $\hat{P}_D^i$ summarizes the cross-section variabilities of prices that can be added to spatially varying price indexes to resemble unit values expressed in index form. In general, this technique allows the recovery of the household-specific price variability that can be found in unit values. The pseudo unit value is an index that can be compared to actual unit values after normalization choosing the value of a specific household as a numeraire.

The estimated index $\hat{P}_D^i$ is then used to add cross-sectional variability to group-specific price indexes $P_{rm}^i$

$$\hat{P}_{DI}^i = \hat{P}_D^i \sum_{j=1}^{n_i} \left(P_{rm}^{ij} \omega_{ij}\right) = \hat{P}_D^i P_{rm}^i, \qquad (2)$$

where $P_{rm}^{ij}$ is the consumer price index for the $j$-th of the $i$-th consumption group collected monthly $m$ by national statistical institutes with $m = 1, \dots, M$, per each territorial level $r$ with $r = 1, \dots, R$. These price indexes are the same for all households living in the same region and interviewed in the same month, while the index $\hat{P}_D^i$ is household specific. $\omega_{ij}$ are weights provided by national statistical institutes for each item $j$ of group $i$.

For pseudo unit values in index form to look like actual unit values, they have to be transformed into levels. The transformation in nominal terms is fundamental to properly capture complementary and substitution effects as shown in Atella, Menon, and Perali (2004). Cross-effects would otherwise be the expression of the differential speed of change of the good-specific price indexes through time only. Thus, the transformation of the index $\hat{P}_D^i$ is obtained as

$$\hat{P}_{DIL}^i = \hat{P}_{DI}^i \bar{y}_i, \qquad (3)$$

where $\bar{y}_i$ is the average expenditure of group $i$ in the base year. Early experiments with pseudo unit values, on Italian household budget data (Perali 1999, Atella, Menon, and Perali 2004,

Menon and Perali 2010) and Hoderlein and Mihaleva (2008), Berges, Pace Guerrero, and Echeverrìa (2012) for other data sets, have provided comforting indications about the possibility of estimating regular preferences. Atella, Menon, and Perali (2004) describe the effects on the matrix of cross-price elasticities associated with several price definitions and find that the matrix of compensated elasticities is negative definite only if pseudo unit values are used. Nominal pseudo unit values, which more closely reproduce actual unit values, give a set of own- and cross-price effects that is more economically plausible. The derived demand systems are regular and suitable for sound welfare and tax analysis. The authors conclude that the adoption of pseudo unit values does no harm because Lewbel's method simply consists in adding cross-sectional price variability to aggregate price data. Therefore, Lewbel's method for constructing demographically varying prices is potentially of great practical utility. Let us now describe the alternative procedures for estimating the RPPs from the demographically varying PUVs.

### 2.2 The Weighted Household Regional Product Dummy (WHRPD) Model

The basic premise of the approach is the concept of quality equation due to Prais and Houthakker (1971) in which the price/unit value for a commodity paid by a household is taken to measure the quality of the commodity group consumed and hence the price/unit value is postulated to be an increasing function of the level of living of the household.

A direct extension of the Country Product Dummy (CPD) model[4] due to Summers (1973) to incorporate this would be

$$p_{jrht} = \alpha_j + \beta_r + \delta_t + \theta y_{rht} + \varepsilon_{jrht.} \quad (4)$$

Here $p_{jrht}$ denotes the natural logarithm of the nominal price/unit value for the *j*-th commodity *(j=1,2,...,N)* paid by the *h*-th sample household of region *r* (*r=0,1,2,,...,R*) at time *t (t=1,2,...T)*. $y_{rht}$ denotes the natural logarithm of the nominal per capita income/ per capita expenditure (PCE) of the *h*-th sample household in region *r*, at time *t*, $\alpha_j, \beta_r$ and $\delta_t$ capture the commodity effect, region effect and time effect, respectively. Majumder and Ray (2017) extend this model to adapt it to the household context by introducing household demographics. Further, all the parameters are made time varying and the regional effect is incorporated

[4] See Rao (2005) for a formal demonstration of the equivalence of the weighted CPD model and the 'Rao-system' in multilateral price comparisons. See Clements and Izan (1981) for an earlier demonstration of a similar result demonstrating that 'Divisia index numbers can be interpreted and estimated as regression coefficients under a plausible error specification'.

through a formulation of both the price/unit value of individual commodities and PCE in real terms.

The model is given by

$$p_{jrht} = \alpha^*_{jt} + \phi_{jrt} + \sum_{i=1}^{4} \delta^*_{jit} n_{irht} + (\lambda^*_{jt} + \eta^*_{jrt}) y_{rht} + \varepsilon_{jrht}. \quad (5)$$

$\alpha^*_{jt}$ captures the pure commodity-time effect, which is the intercept in the numeraire region for item *j* at time *t*, $\phi_{jrt}$ captures the interaction between time and region and hence $\alpha^*_{jt} + \phi_{jrt}$ is the region-specific intercept at time *t*. Thus, $exp(\phi_{jrt})$ is the price relative of commodity *j* for region *r* (≠0) with the numeraire region taken as the base. $\delta^*_{jit}$'s are the slopes with respect to demographic variables (same for all regions), $\lambda^*_{jt}$ is the overall income slope (slope in the numeraire region) at time *t*, $\eta^*_{jrt}$ captures the differential slope component of each region and hence $\lambda^*_{jt} + \eta^*_{jrt}$ is the region specific income slope at time *t*. Note that this model (i.e., equation (5)) reduces to the basic CPD model for time *t* when $\phi_{jrt}$=$\phi_{jt}$ for all *j, t*; $\eta^*_{jrt}$=0 for all *j, r* and *t*, and $\lambda^*_{jt}$= 0 for all *j, t*. Here $n_{irht}$ denotes the number of household members of the *i*-th age-sex category present in the *h*-th sample household in region *r*, at time *t*, *i=1,2,3,4* denote adult male, adult female, male child and female child categories, respectively, and $\varepsilon_{jrht}$denotes the random equation disturbance term. Also, note that the term involving the demographic variables does not affect the basic structure of the CPD model.

An alternative way of interpreting the model is as follows. The same equation can be written in the form of Coondoo et al. (2004) formulation, as

$$p_{jrht} - \pi_{rt} = \alpha_{jt} + \sum_{i=1}^{4} \delta_{ijt}\, n_{irht} + \left(\lambda_{jt} + \eta_{jrt}\right)(y_{rht} - \pi_{rt}) + \varepsilon_{jrht}\ . \quad (6)$$

$\alpha_{jt}$, $\delta_{ijt}$, $\lambda_{jt}, \eta_{jrt}$ and $\pi_{rt}$ are the parameters of the model. In principle $\pi_{rt}{}'$s may be interpreted as *the natural logarithm of the value of a reference basket of commodities purchased at the prices of region r in time t.* The left-hand side of eq. (6) thus measures the logarithm of the price/unit value paid in real terms and $(y_{rht} - \pi_{rt})$ on the right-hand side of (2.22) measures the logarithm of real PCE. The parameters $(\pi_{rt} - \pi_{0t})$, *r = 1,2,...,R; t=1,2,...,T,* thus 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) at time *t* and the spatial price index is given by the formula $exp(\pi_{rt} - \pi_{0t})$. In the estimations reported

below obtained from the joint implementation of a SUR procedure, we use the PUVs as prices in equations (4 - 6) and the spatial price in region *r* is estimated directly from equation (6).
As in Rao (2005), we also recognize the relevance of attaching higher weight to more representative price observations in making appropriate price level comparisons. To this end, we compute an importance weight $w_{ij}$ given by the expenditure share of the commodity in a given region. We then construct a transformed model where both the dependent variable and the regional dummy variables are multiplied by the square root of $w_{ij}$ and estimate the weighted WHRPD version of the model in equation (6).

## 2.3 Spatial Price Index as a True Cost of Living Index

Following Konüs (1939), the TCLI is the ratio of the cost of buying the same utility (u) in two price situations. The methodology is based on the fact that a spatial price index can be viewed as a True Cost of Living Index that is defined below. The general cost function underlying the Rank 3 Quadratic Logarithmic (QL) systems, (e.g., the Quadratic Almost Ideal Demand System (QAIDS) of Banks, Blundell and Lewbel (1997) modified *a la* Gorman to introduce exogenous demographic characteristics via budget translating (Perali 2003)) is of the form:

$$C(u,p,d) = a(p).exp\left(\frac{b(p)}{(1/ln\ \ )-\lambda(p)}\right) P^T(p,d), \qquad (7)$$

where *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, $\mathrm{P^T}(p,d)$ is an overhead function homogeneous of degree zero in prices, and *u* denotes the level of utility. Gorman's 'committed total expenditure' is a fixed cost translating total expenditure. The vector of demographic characteristics $d_i$ can contain both individual and household specific attributes. The budget share functions corresponding to the cost function (7) are of the form

$$w_i = a_i(p,d) + b_i(p)\, ln\left(\frac{x^*}{a(p)}\right) + \frac{\lambda_i(p)}{b(p)}\left(ln\frac{x^*}{a(p)}\right)^2, \qquad (8)$$

where $x$ denotes nominal per capita expenditure, $x^* = \frac{x}{P^T(p,d)}$ and $i$ denotes item of expenditure. Demographic variation across households describe observed heterogeneity that it is included in the demand system as a translating effect as in Menon and Perali (2010).
The corresponding True Cost of Living Index (TCLI) in logarithmic form comparing price situation $p^1$ with price situation $p^0$ is given by $\ln C(u,p^1,d^1) - \ln C(u,p^0,d^0)$

$$ln\, P(p^1,p^0,u^*) = [ln\, a(p^1) - ln\, a(p^0)] + \left[\frac{b(p^1)}{\frac{1}{ln\, u^*}-\lambda(p^1)} - \frac{b(p^0)}{\frac{1}{ln\, u^*}-\lambda(p^0)}\right] + [P^T(p^1,d^1) - P^T(p^0,d^0)], \qquad (9)$$

where $u^*$ is the reference utility level. Note that while "price situation" refers to the prices in a given year in temporal comparisons of prices and welfare, and in the spatial context of this study, it refers to the prices prevailing in a particular region, i.e., state/ province. The first term of the R.H.S. of (9) is the logarithm of the basic index (measuring the cost of living index at some minimum benchmark utility level) and the second term is the logarithm of the marginal index. Note that for $p^1 = \theta p^0, \theta > 0$, $a(p^1) = \theta a(p^0)$, so that the basic index takes a value $\theta$ and hence, may be interpreted as that component of TCLI that captures the effect of uniform or average inflation on the cost of living. On the other hand, for $\mathrm{p}^1 = \theta \mathrm{p}^0, \theta > 0$, $\mathrm{b}(\mathrm{p}^1) = \mathrm{b}(\mathrm{p}^0)$ and $\lambda(\mathrm{p}^1) = \lambda(\mathrm{p}^0)$, the marginal index takes a value of unity. Hence, the marginal index may be interpreted as the other component of TCLI that captures the effect of changes in the relative price structure.

In the Italian context of the present study, from (9), the spatial price of region *r* with reference to all of Italy, denoted by *I*, is given by

$$ln\, P(p^r, p^I, u^*) = [ln\, a(p^r) - ln\, a(p^I)] + \left[\frac{b(p^r)}{\frac{1}{ln\ u^*} - \lambda(p^r)} - \frac{b(p^I)}{\frac{1}{ln\ u^*} - \lambda(p^I)}\right] + [P^T(p^r, d^r) - P^T(p^I, d^I)]. \qquad (10)$$

To describe the contribution to the general TCLI aggregate index of each expenditure category we estimated commodity specific indexes as the average regional expenditure for each good divided by the national average expenditure for the same good.

Using the functional forms for $a(p), b(p)$ and $\lambda(p)$ proposed in Banks, Blundell and Lewbel (1997) and the demographically varying PUVs obtained following the procedure outlined in section 2.1, QAIDS is estimated using NLSUR in budget share form given by equation (8) separately for each region *r* (=1,2,…, *R*), and on the combined data for all Italy from pooling the data for each region. The RPP of region *r* with respect to all Italy, *I*, is then calculated from (10), with the reference utility, $u^*$, calculated by inverting the estimated expenditure function for all Italy at median per capita household expenditure and the prices for the whole of Italy (used as reference prices) normalised at one.

The estimation includes as controls the exogenous demographic characteristics related to the number of adult females and males, the number of boys and girls and the dummies for the Italian regions where the Centre is the excluded one. We correct for endogeneity of total expenditure using a two-stage control function approach (Blundell and Robin 1999) and log income as an instrument. We then include the predicted error among the covariates of the translating demographic function of the demand system as a control.

## 2.4 Adjusting for Regional Differences in the Quality of Services

In this section we explain how we incorporate differences in the quality of services in the North and South of Italy within the estimated demand system. We assume that objectively measured differences in quality affect the subjective perception of prices (Barten 1964, Perali 2003, Chapter 2, Jorgenson and Slesnick 2008). As an example, let us consider the index describing the quality of services in Italy. The composite index capturing the quality of services is one of the 12 domains describing the equitable and sustainable well-being in Italy (ISTAT 2018). We term this index as the Amenity index ($A_r$) for region r and for All Italy (region 0). When $A_r = A_0$, then there is no spatial variation in amenities. It aggregates 10 service dimensions[5] using the Mazziotta and Pareto (2016) non-compensatory composite index for spatial comparisons (MPI) that corrects the arithmetic mean with a region-specific penalty proportional to the unbalance of the indicators.

In the Northern regions the index is above 100 (Graph 6) 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 unchanged

$$p^{*r} = \frac{p^r}{m(\iota)} \; and \; q^{*r} = q^r \; m(\iota) \mid p^{*r} q^{*r} = p^r \; q^r = y, \quad (11)$$

where the function $m(\iota)$ is any modifying function with arguments a vector of indexes ι. In the present study, we also assume that there is a positive and high correlation between the quantities of amenities, or quality offered for a given unit of consumption as captured by the amenity index ($A_r$) for region *r* and for All Italy (region 0), and the level of incomes. Therefore, we also compute an affluence index given by the median per capita expenditure of the regions ($\boldsymbol{y_r^{med}}$) and for All Italy ($\boldsymbol{y_0^{med}}$). The regional variation of the Amenity and Affluence indexes is illustrated in Graph 6. The correlation between the two indexes is 0.89 while their respective coefficient of variation is 0.11 and 0.19. We then specify the so-called Barten scaling function $m(\iota)$ for $\iota = \{A_r, \boldsymbol{y_r^{med}}\}$ in exponential form as

$$m\left(A_r, \boldsymbol{y_r^{med}}; \theta\right) = m_A(A_r) m_y\left(\boldsymbol{y_r^{med}}\right) = (\exp A_r)^{\theta_1} \left(\exp \boldsymbol{y_r^{med}}\right)^{\theta_2}, \quad (12)$$

[5] The dimensions are: 1) Beds in residential health care facilities (‰ beds per 1,000 inhabitants), 2) Children who benefited of early childhood services (%), 3) Integrated home assistance service (%), 4) Composite index of service accessibility (three year average), 5) Broadband coverage (%), 6) Irregularities in water supply(three-year average number of interruptions), 7) Irregularities in electric power distribution (average number of interruptions), 8) Place-Km of public transport networks (places-km/Inhab.), 9) Time devoted to mobility (minutes), 10) Satisfaction with means of transport (%).

where θ is the vector of parameters $\theta_1$ and $\theta_2$ associated respectively with the amenity and affluence index. For interpretation purposes note that $m_A(A_r) = (\exp A_r)^{\theta_1} \gtrless 1 \; if \; A_r \gtrless 1 \; and \; \theta_1 \gtrless 0$. Similarly for $m_y(\boldsymbol{y_r^{med}})$. Note that the Barten technology is the same for all-prices. We prefer this specification to price specific scaling not simply for being parsimonious in the parameters to estimate, but also because we do not have price-specific indexes describing, for examples, regional differences in the quality of the provision of health, transportation or other services.

In the version incorporating the Amenity index ($A_r$) and affluence ($\boldsymbol{y_r^{med}}$) for region *r* through Barten scaling of individual prices, we propose the following:

$$C(u, p^r, \mathrm{d}, A_r, \boldsymbol{y_r^{med}}) = \mathrm{a}(p^{r*}, d)\, exp\left(\frac{\mathrm{b}(p^{r*},d)}{(1/ln\, u)-\lambda(p^{r*},d)}\right) \mathrm{P}^T(p^{r*}, d). \quad (13)$$

Because the scaling functions $m_{\mathrm{A}}$ and $m_{\mathrm{y}}$ are not price specific, then we can rewrite

$$\mathrm{a}(p^{r*}, d) = \frac{a(p^r,d)}{(\boldsymbol{A_r})^{\boldsymbol{\theta_1}}(\boldsymbol{y_r^{med}})^{\boldsymbol{\theta_2}}} = \frac{a(p^r,d)}{m_A(A_r)m_y(\boldsymbol{y_r^{med}})}. \quad (14)$$

The overhead term is specified as $P^T(p,d) = \sum_{j=1}^{N} t_{ij}(d_i) \ln p_{ij}^*$, where the translating function is specified as $t_{ij}(d_i) = \sum_{j=1}^{N} \tau_{ij} \ln d_i$.

Now, under the modified set up $\ln(\mathrm{TCLI}) = \ln C(u, p^{1*}, d^1) - \ln C(u, p^{0*}, d^0)$ is given by

$$ln\, P(p^r, p^0, u^*, d, A_r, \boldsymbol{y_r^{med}}) = [ln\, \mathrm{a}(p^{r*}) - ln\, \mathrm{a}(p^{0*})] + \left[\frac{\mathrm{b}(p^{r*})}{\frac{1}{ln\, u^*}-\lambda(p^{r*})} - \frac{\mathrm{b}(p^{0*})}{\frac{1}{ln\, u^*}-\lambda(p^{0*})}\right] + [P^T(p^{r*}, d^r) - P^T(p^{l*}, d^l)]$$

$$= (\pi_r^* - \pi_0^*) + \left[\frac{\mathrm{b}(p^{r*})}{\frac{1}{ln\, u^*}-\lambda(p^{r*})} - \frac{\mathrm{b}(p^{0*})}{\frac{1}{ln\, u^*}-\lambda(p^{0*})}\right] + [P^T(p^{r*}, d^r) - P^T(p^{l*}, d^l)]. \quad (15)$$

The budget share equations being

$$w_i = a_i(p^{r*}) + b_i(p^{r*})\, ln\left(\frac{y_{rh}^*}{a(p^{r*})}\right) + \frac{\lambda_i(p^{r*})}{\mathrm{b}(p^{r*})}\left(ln\frac{y_{rh}^*}{a(p^{r*})}\right)^2 \quad (16)$$

where $y_{rh}^* = y_{rh}P^T$.

Similar to the Slutsky decomposition of substitution and income effects, the Barten-Gorman household technology rotates the budget constraint by modifying the effective prices with the scaling substitution effects and translates the budget line through its fixed cost element.

The parameters for the price specific modifications have been estimated including the homogeneity restriction that insures both identification of all parameters and the regularity of the modified cost function (Perali and Cox 1996, Perali 2003, Menon, Pagani, Perali 2016).

## 2.5 Allowing for Spatially Autocorrelated Price Movements via Contiguity Matrices

Many studies report statistical evidence that price movements are often spatially correlated (Majumder, Ray, and Sinha 2012, 2015). Spatial correlation is traditionally modelled by constructing a matrix of distances to be used as a weight matrix of a spatial error model. The present study is in the same mainstream. The choice between a contiguity or an inverse distance matrix[6] has been made mainly on an economic ground because the Moran test for spatial dependence based on a $\chi^2$ distribution was not helpful in discriminating between the two distance matrices that were both highly significant in rejecting the null hypothesis that the residuals of HRPD and WHRPD models are independent and identically distributed for all prices. In our context, we find more meaningful to define spatial lags based on only neighboring areas rather than modelling effects across distances that decrease with increasing distance. Prices for goods such as energy, local public transportation, communication, or housing do not vary in relation to distance as it may be the case for perishable goods and associated transportation costs. This type of goods whose prices are related to distance represent a relatively small proportions of larger aggregates such as food. On the other hand, it is likely that price levels are similar for adjacent regions that may share similar standard of living.

Similarly, the choice between a spatial lag model, obtained multiplying the spatial weight matrix times the vector of observations, and the spatial error model, where the spatial weight matrix is multiplied by an error term, has been based on the contention that the pattern of spatial dependence is mainly due to omitted random factors responsible for spatial autocorrelation error covariances being non-zero. We also deem that specifying an explicit model of spatial interaction is a demanding task especially for aggregate prices that hardly depend on neighbours' values. In line with these considerations, we adopt a contiguity matrix as a spatial

[6] A contiguity matrix *Wc* records adjacent regions as follows $Wc_{i,j} = \begin{cases} d_{i,j} & if\ i,j\ are\ neighbors \\ 0 & otherwise \end{cases}$, where the symmetric weighting matrix *Wc* has the same positive $d_{i,j} = 1$ weights for contiguous spatial units and a zero weight for all other units. The contiguity matrix for Italy considers Liguria, Tuscany, Lazio, Campania and Calabria as adjacent regions of both islands of Sicily and Sardinia. The distance matrix *Wd* is also a symmetric matrix with elements equal to the reciprocal of distance between regional centroids as derived from ISTAT provided shapefiles.

weight and model spatial dependence as a spatial error process for all HRPD, WHRPD and TCLI models.

## 3. Data

The present empirical application uses the 2013 Italian household budget survey conducted by the National Statistical Institute (Italian Statistical Institute [ISTAT]) that gathers expenditure data exclusively. As explained in Section 2.1, we implement Lewbel's (1989) theory to compute pseudo-unit values first implemented in Atella, Menon, and Perali (2004) using the information traditionally available in expenditure surveys and in the ISTAT survey, such as budget shares and demographic characteristics, which help reproduce the distribution of the unit-value variability as closely as possible.

We construct Divisia Index Numbers based on our estimated PUVs to provide a formal description of the constructed household specific prices (Clements and Izan 1981, Clements, Izan, Selvanathan 2006) and to obtain an additional term of comparison to judge the statistical and economic robustness of the estimated HRPD and TCLI indexes. The Divisia Indexes have been computed as

$$logP_{rs} = \sum_i w_{rs}^i \, log \frac{p_r^i}{p_s^i} \qquad (17)$$

where $w_r^i$ is the budget share of $i$ in region $r$. The 2013 sample comprises more than 23,000 households that are interviewed at different times during the year. The ISTAT budget survey is representative at the regional level. Table 1 lists the 20 Italian regions organized by the North, Centre and South macro-areas. For convenience of presentation of the results, the Valle d'Aosta region, which is very small both in size and population, has been aggregated to the Piemonte region. The analysis is then conducted for a total of 19 regions.

Household expenditures in the dataset have been aggregated into eleven groups: food and beverages, clothing and footwear, housing, heating and energy, furniture and other domestic appliances, health, transportation, communications, education, leisure, health and other non-food categories. Table 2 lists the eleven commodity groups and the subgroups used in the procedure to derive the pseudo unit values as explained in Section 2.1.

This level of commodity detail has been chosen for a better understanding of the regional differences in purchasing power parities and costs of living across Italy. For example, the consumption of heating is markedly higher in the North of Italy rather than the South. In the largest cities of the North of Italy, it is often the cause of what is termed "housing poverty" because many poor households cannot afford the payment of heating costs. Similarly, there are

large cost fluctuations at different latitudes along Italy's boot that we may not be able to capture at a higher level of commodity aggregation. This comes at the cost of higher computational burden due to the large expansion of the parameter space and the necessity to deal with corner solutions. We treated zero expenditures as the outcome of infrequent purchases and imputed non-consumption before estimation using the Blundell and Meghir (1987) modelling strategy.
ISTAT collects information about consumer price indexes based on the consumption habits of the whole population available monthly for each of the 106 Italian provinces with the COICOP level of disaggregation.[7] We have chosen January 1997 as the base year. Price indexes[8] have been matched to the 2013 ISTAT consumption survey, accounting also for the period of the year when the household was interviewed. This means that households interviewed in March have been matched with prices collected in the same month.
After determining the expenditure groups as described in Table 2, we constructed the corresponding consumer price indexes starting from the COICOP categories available for territorial disaggregation and months that have been matched to all households living in the same region and interviewed in the same month. Once 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 as shown in Atella, Menon, and Perali (2004), we reproduce as best as we can the price variation of actual unit values. The estimation of PUVs is described in Atella, Menon, and Perali (2004) and Menon, Perali, Tommasi (2017). Table 3 reports the variable definitions and descriptive statistics of the data used both for the HRPD and TCLI estimations.
The estimated cost of living, the regional wage levels for dependent workers (ISTAT estimates from data of the Observatory on Dependent Workers of the *Istituto Nazionale di Previdenza Sociale* (INPS)), and the regional individual and household income levels that have been taken from the individual IT-SILC 2013 data, are then adjusted for differences in the quality of services using the Amenity and Affluence indexes described in section 2.4 and in Graph 6.

## 4. Results

[7] Eurostat adopts the classification of individual consumption by purpose (COICOP), which is a nomenclature developed by the United Nations Statistics Division to classify and analyse individual consumption expenditures incurred by households, non-profit institutions serving households, and general government according to their purpose. National statistical institutes traditionally publish consumer price indexes per each COICOP category monthly, which are collected at the provincial level.
[8] ISTAT publishes NIC (official for the entire national community) and FOI (weights based on the consumption basket of dependent workers) consumer price indexes by 1481 elementary COICOP products.

The first part of the section describes in order the econometric estimates of both the HRPD and TCLI models along with the associated elasticities. The second part interprets the evidence related to the price parities estimated from both models, the commodity specific cost indices, and discusses the reverse migration conundrum and other policy issues associated with the impact of the estimated parities on real incomes.

### 4.1 Spatial variation of prices

The estimated parameters for the HRPD, with (495 parameters) and without spatial correction (484 parameters), WHRPD, with and without spatial correction, and the TCLI model with a spatial error correction are reported in Appendix, Table A.1, A.2 and A.3 respectively. The parameters of the Household Regional Product Dummy Model described in equation (5) and WHRPD obtained using a joint SUR estimation of all 11 price equations are all generally significantly different from zero at the 1 percent significance level. Inspection of Table A.1 and A.2 reveal interesting regularities. All the parameters associated with the demographic variables in each equation are positive and significantly different from zero at the 1 percent significance level. The impact of most regional dummies is also positive in all equations, while the interaction terms with the logarithm of per capita expenditures are generally negative and significantly different from zero. In light of this regular pattern what is relevant is the relative impact of the coefficients in controlling for the regional price differentials. All the parameters associated with per capita expenditure are also positive and significantly different from zero at the 1 percent significance level. The spatial error terms are all significantly different from zero (but for clothing & footwear) signalling that spatial correlation is an important factor to control for in both HRPD and WHRPD models. The comparison of the results with and without spatial correction reveal that the general pattern is maintained, but the size of the coefficients, and their relative impact, changes significantly both for the total expenditure term and the regional dummies. Based on likelihood ratio tests we prefer the model with spatial correction both for the HRPD (LRT=3136.54 with 11df) and weighted WHRPD (LRT=3135.44 with 11df) versions. Because the HRPD and WHRPD models are non-nested, we discriminate between the two models using the Akaike Information Criterion (AIC) that selects the model that minimizes the information loss. In our case, $AIC_{HRPD}$(439360.6) is larger than $AIC_{WHRPD}$(-789359.4) associated with the spatial versions. We therefore prefer the spatial WHRPD model. Table A.3 shows the parameter estimates of the joint NLLS estimation with both the correction for expenditure endogeneity and spatial correlation with the same error correction as in the HRPD and WHRPD models for the Quadratic Demand System. The parameters are generally significantly different from zero at the 1 percent significance level. The income parameters β

associated with the linear term of total per capita expenditure in the heating and energy, communication and education equations are not significant, but the corresponding non-linear terms λ, as well as all other λ parameters, are. This evidence supports the quadratic in total expenditure specification of the demand system. Both the spatial error parameters and the parameters associated with the control term correcting for endogeneity are significantly different from zero at the 1 percent level in 8 out of 11 cases as is reported at the bottom of Table A.3.

Table A.4 reports the income elasticities and associated standard errors and t-values at the data mean showing that all income elasticities are significantly different from zero. As it is reasonable to expect, the most elastic goods with an elasticity greater than one are transportation, education and other goods and services. Standard errors are bootstrapped with 200 replications. Table A.5 shows the compensated price elasticities computed at the data means along with the associated standard errors and *t*-values. The underlying Slutsky matrix is regular judging by the negative own-price elasticities. With the exception of the own-price elasticity for the communication good, all price elasticities are significantly different from zero at the 1 percent level of significance. The pattern of cross-elasticities shows that almost all goods are substitute. The substitution effects are especially strong for housing.

Table 4 shows the estimated Cost of Living levels compared with Individual and Household Income Levels in both nominal and real terms. The Cost of Living, derived using expenditure data, is lower than household income as we expect to be in all regions but Molise. Real figures are obtained by deflating individual and household incomes using the TCLI PPP. Once deflated, the North-South income gap dissipates. Differences across regions do not reveal substantial differences in standard of living with the notable exception of the Molise region. Graph 1 compares the yearly nominal levels of the cost of living, individual incomes and household disposable income between the Italian regions presented in Table 4. Information about incomes comes from the Istat 2013 Living Condition Survey (IT-SILC).[9] Individual incomes, which are an average of both the male and female labor income, are lower than household costs for all regions. An income source alone is not sufficient to sustain the cost of living of a household. When comparing the average regional levels of household disposable incomes with the cost of living, then we observe a positive savings margin for all regions with

[9] The colors of the graphs graduate from dark green associated with the highest values of the distribution to dark violet associated with the lowest values of the distribution. In general, the different gradations of violet pertain to regions belonging to the low tercile of the distribution, the gradations of grey are associated with the regions of the middle tercile, the gradations of green are for the top tercile regions.

the exception of the small central region of Molise. Inspection of the maps in Graph 1 reveals a marked North – South divide both in terms of cost of living and incomes. The green to violet gradient seems very persuasive in this respect. The picture radically changes when regional differences in purchasing power parity are taken into account. The parity effect is shown in the maps grouped in graph 2 where the cost of living map is compared with both individual and household real incomes. The regional income differentials in real terms are markedly reduced producing an effective purchasing power parity with negligible differences across regions. The income maps in real terms show a dispersion of colours throughout the country. The standard of living of Sicily, Calabria and Puglia is higher than the one in Trentino Alto-Adige, Veneto and Piedmont and Campania is almost as high as Veneto.

### 4.2 Impact of spatial variation and the quality adjustment on real wages, incomes, and poverty

Table 5 describes the PPP using the DIVISIA, WHRPD and TCLI approaches. The maps included in Graph 3 compare the DIVISIA, WHRPD and TCLI PPPs. The three PPPs reveal a clear North-South gradient, though the WHRPD PPP is significantly more variable with respect to both the DIVISIA index and TCLI PPP in terms of standard deviation. The DIVISIA index is highly and positively correlated with the TCLI PPP (0.92) and to a lesser extent with the WHPRD PPP (0.71). The highest WHRPD index is 1.15 for Lombardia while the TCLI index reaches 1.25 for the Trentino-Alto Adige region. The lowest value for the WHRPD regional index is 0.43 for Sardegna, while for the TCLI is 0.72 for Sicily. Estimates obtained with the TCLI approach are more smooth and closer to common expectations. Somehow surprising are the WHRPD indexes for Abruzzo and Basilicata, 1.03 and 1.06 respectively.

Graph 5, Panel 1, describes the correlation between the TCLI and WHRPD index that is 0.619. The graph shows that TCLI and WHRPD PPPs are coherent for the north-Western regions Piedmont and Lombardia along with Trentino-Alto Adige and Emilia Romagna. Veneto and Friuli-Venezia Giulia, the North-Eastern regions of Italy are quite discrepant. In the Italian South, Sicily, Sardegna and Puglia are the more discordant.

On the other hand, the TCLI compares very well with both the index of individual and household incomes obtained from the 2013 EU-SILC dataset shown in the adjacent columns as also shown in the maps grouped in Graph 4. We exploit this evidence to select the TCLI PPP as our preferred deflator to derive real individual and household annual and monthly incomes as shown in Table 4. On the basis of this True PPP and considering the northern regions of Lombardia, Trentino Alto Adige and Veneto as representative of the North with an average index of 1.19 and Sicilia, Calabria and Campania as representative of the South, with

an average index of 0.77, we can conclude that the cost of living in the South is 64% with respect to the cost of living in their North, corresponding to a 36% North-South differential that reduces to 28% when considering all regions in the North and in the South as defined in Table 1.

Comparing the standard deviations of nominal and real incomes shown in Table 4, we observe a 1/3 reduction of standard deviation showing an amazingly accurate inter-regional equalizing effect with the exception of the small Molise region. The evidence described in Table 4 and 5 and Graph 1 to 5 clearly explains why people from the South do not longer move to the North. Dependent workers from the North do not move to the South because there are no extra gains, especially for families considering that the labor market in the North is more efficient and offers more job opportunities to married women. In the expenditure survey for the year 2013 used in this study the female participation rate to the labor market is 51.28% in the North of Italy, 50.28 % in the Centre and 32.57% in the South of Italy. For married couple with children and single mothers, the proportion in the South reduces to 23.92%.

It is instead less clear why immigrants move to the North and do not stay in the South. One possible explanation is that immigrants cannot compete with state jobs considering that the State in the South is the largest provider of job opportunities only for Italians, thus providing a sort of legal barrier. Immigrants move to the North independently of the higher housing costs that they probably offset by implementing housing sharing. We may gain further insights by exploring the composition of the cost of living in the different regions.

Table 6 shows the descriptive statistics of the cost levels of each expenditure group. While food expenditure is about 20 percent higher in the North than in the South, housing costs mainly formed by rents are about 100 percent higher. Heating and energy are about 30 percent higher in the North independently of the fact that winters are sensibly more rigid in the North. The use of the car is relatively more important in the North considering that transportation costs are almost twice as high in the North. Life styles differ markedly as well judging by the level of leisure expenditures in the North. In general, differences in regional cost levels as compared with the mean are negative for all commodities only in the Southern regions. Table 7 reports differences with respect to the mean level of regional expenditure by class from the estimates obtained from the TCLI model. The difference turns negative for all commodity groups from the Abruzzo region and for all other regions in the South. Interestingly, this clear-cut change seem to demarcate the South from the rest of Italy. Negative differences are especially high for all commodities in the Calabria and Sicily regions.

In terms of shares, as shown in Table 8, food is relatively more important in the South in line with Engel's law. The housing and heating & energy share are almost as important in the North as in the South. Similarly, for transportation and leisure. In general, it seems reasonable to contend that expenditure patterns are similar across Italian regions.

Table 9 shows the indexes specific to each expenditure class along with their standard deviations and the correlation index with the TCLI general PPP index. The expenditure categories that are more closely related with the general index presenting a correlation index around .94 are Housing, thus reinforcing the methodology implemented by Moretti, but also Health, Transportation and Leisure. Interestingly, as shown in Graph 4, the correlation between HRPD PPP and the Housing index is 0.469.

Table 10 reports the regional cost of living indexes, yearly incomes and wages for dependent workers expressed both in nominal and real terms using both the HRPD and TCLI PPP deflator. A visual comparison of the reported indexes reveals that the TCLI is highly and positively correlated with both the wage index (0.89) and the index of individual incomes (0.94), while the HRPD deflator has a significantly lower correlation (0.57 and 0.58 respectively). Table 10 further compares nominal and real yearly wages of dependent workers with individual incomes. The salary of dependent workers, which is the result of a bargaining process between the unions and the State at the national level, vary across regions mainly because of differences in the skill mix of the labor force. Wages are larger than individual incomes in all regions. The average percentage difference is about 30%. The TCLI index reduces the north-south distance because the standard deviation of both real wages and incomes is more than halved, while the HRPD deflator increases the distance because the variance almost doubles. Because of these evidences, we select the TCLI s our preferred PPP index that will be used for the subsequent analysis.

Table 11 reports the estimates of the price scaling parameters introduced in the demand system as described in Section 2.4 to model spatial differences in the quality provision of services. All Barten parameters associated with the Amenity Index or the Affluence Index or both are statistically significantly different from zero. Table 11 also reports the specification tests using a likelihood ratio test comparing the quality modified models among each other and with the reference model. The statistically preferred specification is the one incorporating the Barten modification including both the Amenity and the Affluence index. The results that will be presented below related to the quality adjustment refer to the estimates of the latter model.

Poverty analysis should account for spatial differences in the cost of living either by adjusting the absolute and relative poverty line, as it is the case of the official poverty lines adopted in

Italy, or by estimating poverty using real figures. Official poverty lines in Italy do not adjust for quality differences. Therefore, we present poverty figures only in terms of relative poverty lines computed as 0.6 of the median of each cost of living distribution chosen for comparison. Table 12a shows the impact of the spatial price variation on the regional poverty headcount ratios in Italy using our estimates of nominal, real and the quality adjusted cost of living. As it is reasonable to expect, in nominal terms, that is when the cost of living is not corrected for spatial price variation across regions, the incidence of poverty in the North (4.8 percent in average) is much lower than in the South (23.9 percent in average). Average relative poverty in nominal terms in Italy is 12.4 percent. Inspection of Table 12.a also reveals that accounting for differences in purchasing power drastically reduces relative poverty in the South to a level (about 10%) that is comparable to the level of relative poverty in the Centre and in the North of Italy. In real terms spatial differences almost disappear. The Italian (and macro-regional) average is about 10 percent. Quality adjusted figures show that, as compared with real figures, the incidence of poverty in the North decreases (7.9 percent in average), while in the South the opposite trends apply (13.6 percent in average). It is instructive to compare how controlling for spatial differences in prices and for quality differences affect the measure of poverty in the Calabria region, the poorest region in nominal terms recording an incidence of 32.8 percent, with the Veneto region showing the lowest poverty rate of 3.3 percent in real terms. Accounting for purchasing power difference the poverty rate is around 10 percent for both regions, while controlling also for quality differences raises the poverty rates in both regions at around 12.5 percent.

The impact of spatial price variation on inequality is negligible within macro area, but it is significant at the national level when controlling for both spatial differences in both observed prices and prices corrected for differences in the quality of services (Table 12b). When accounting for differences in purchasing power, the Gini coefficient reduces from 0.268 to 0.252; considering also quality differences the Gini coefficient increases to 0.257.

### 4.3 The Relevance of Female Participation to the Labor Market and the Quality of Services: The Policy Conundrum Explained

As Table 13 shows, while wages expressed in real terms are very close in the North and South of Italy, real individual incomes are significantly lower in the North. The North-South gap almost disappear when we refer to total disposable real household income. This is because the participation rate to the labor market of the female component of the population is, as explained in Section 4.2, about 30% higher in the North. This feature of the Italian labor market virtually overrides the South advantage generated by an almost 40% lower cost of living.

This is not the only factor contributing to the counterbalancing of the direction of the North-South gradient. The households' perception of the North-South differences between the quantity and quality of the public services is also important (D'Alessio 2017). The idea is that 1 Euro becomes equivalent to more than 1 Euro if the quality coefficient is greater than one for a "better quality area" and reverse for an "inferior quality area". This rescaling captures the repackaging effect of getting more services in a better-quality area for the same unit of public service available at the same nationally fixed price. To capture this effect, we multiply the figures in the 'Real' columns by the corresponding 'Quality of Services' coefficient to obtain the quality adjusted figures for "effective" wages, individual and household incomes.

The quality correction reveals a clear North advantage. The comparison of real individual household incomes with the quality adjusted real individual incomes shows that the quantity and quality provision of public services per se is not sufficient to clearly revert the standard of living in favour of the North.

The strength and direction of the labor market and quality of public services' effects are probably better grasped when aggregating the figures shown in Table 13 at the level of the North, Centre and South macro area. Panel (a) in Graph 7, summarising the first three columns of Table 13, reproduces the equivalising effect of the more efficient job market in the North of Italy, especially in terms of job market opportunities for married women. The real salary of a household living in the South is comparable with the wage level of a dependent worker living in the North. A household with a single income earner fares better in the South than in the North. When there are two earners in the household, a situation that is much more frequent in the North, the South advantage due to a higher purchasing power parity is essentially cancelled. Panel (b) in Graph 7 describes the impact of the quantity/quality of public services on real wages and incomes. This transformation gives an estimate of the effective purchasing power of the households living in the different macro-areas of Italy. The North has a significantly higher standard of living only when both the labor market and the provision of public services are taken into account. These two factors together explain the policy conundrum associated with the observation that Italians living in the North do not migrate to the South of Italy in spite of the large purchasing power differential. Households living in the South are not sufficiently attracted by the "bright lights" of more and better public services. They do not longer move to the North because of the uncertainty associated with the perceived low likelihood of capturing labor market opportunities often saturated by the excess supply of migrant labor mainly concentrated in the Centre and North of Italy. Interestingly, migrant labor does not establish its residence in the South (Frigenti and Rosati 2018), where life would be sensibly less costly,

mainly because of difficulties in competing for State jobs, that is by large the main source of labor opportunities in the South of Italy. These final graphs exhaustively summarize the tale of the two Italies.

## 5. Conclusions

While projects such as the International Comparisons Project (ICP) of the United Nations has focussed much attention and resources on spatial price differences between countries in calculating 'true' purchasing power parity (PPP) of a country's currency, less attention has been paid to spatial price differences within countries and the consequent neglect of the measurement of intra-country 'Regional Purchasing Parity' (RPP) between the various regions. Yet, the former has implications for the latter since the assumption in traditional PPP calculations that the country's currency has the same purchasing power in all the regions within the country is unlikely to be valid in case of most countries, especially ones with heterogeneous prices and preferences. RPPs are required in a host of policy applications such as real expenditure-based welfare comparisons, assessment of cost of living differences and inequality and poverty comparisons between the different regions in the country. The lack of reliable information on RPPs provides a serious bottleneck for such comparisons. RPPs are difficult to calculate in the absence of spatial price information from different regions in a country. Such information is rarely available unlike data on temporal price movements. The evidence on RPP provided in the ICP exercise has been largely limited to rural price differences. Moreover, the recent literature on RPPs is largely based on large developing countries and emerging economies such as Brazil, India and Indonesia, and uses the 'unit values' of (mostly) food items as proxy for the regional price information. The present study is the first of its kind to conduct the exercise for a developed and relatively homogeneous country such as Italy. Unlike the recent literature, this study is not based on 'unit values.' The study shows how 'pseudo unit' values can be constructed from expenditure and demographic information at the household level contained in the unit records of HES data set thus avoiding the need for regional price information or the unsatisfactory use of unit values as proxy for prices. The study also takes into account spatial variation in the quality of public services in Italy alongside the spatial variation in prices. As stated in the Introduction, the implication of the evidence on this interaction between spatial variation in prices and in 'quality of life' extends beyond Italy to the international context of the ICP exercise.

The present study deviates from both these aspects in the recent literature on RPPs. The contribution of this paper is both methodological and empirical. On the former, the paper is among the few to use the Lewbel (1989) procedure to generate pseudo-unit values (PUV) that avoid the need for regional price information. The study shows how the PUVs can be used in conjunction with the HRPD and TCLI models to calculate alternative sets of RPPs that are compared between the two procedures. This study goes beyond the conventional calculations of spatial price differences by introducing regional differences in amenities and affluence in the RPP calculations. Moreover, in addressing the question why there is no migration from the expensive North to the much cheaper South in Italy, the paper is of policy interest as well. The latter is underlined by the sensitivity of the North-South divide in poverty rates to adjustment for spatial price differences and in the 'quality of life' between the two Italies. While spatial price adjustment tends to narrow the North-South divide in Italy, the overall picture that emerges from this study is one of sharp heterogeneity justifying the title of this paper. The North-South purchasing power imparity can be explained through the lenses of the Balassa-Samuelson effect that imputes 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.

A key result of this study is the sharp North-South divide in regional prices. The magnitude of the divide is even larger than the spatial price variation found in much bigger and diverse countries such as China and India. The simultaneous consideration of spatial variation in prices and in quality of services is a distinctive feature of this study. Since the North is associated with both higher prices and higher quality of services, the simultaneous consideration of both, as the Italian evidence demonstrates, helps to moderate the sharp correction to the nominal wages and incomes due to spatial prices. It helps to partly explain why people in the North choose to stay in the more expensive North rather than moving to the more inexpensive South. The answer lies partly in the superior quality of services in the North and partly in the severe restriction on job opportunities, especially for the female earner in the household, in the South. The paper contains evidence in support of both these propositions. A significant result in this context is that 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. The overall message from this exercise is that spatial comparisons of living standards within a country such as Italy must simultaneously take note of spatial differences in prices, wages, employment opportunities, for both the primary and the secondary income

earner, and in the quality of essential services. A lesson from the tale that may serve as a short-term cure of the North-South divide in PPP consists in adjusting the wage system reinforcing wage negotiation agreements coordinated at the regional and local level.

The paper also provides added evidence in support of RPPs by examining the sensitivity of inequality and poverty comparisons to the use/omission of RPPs. A result of some significance is that the poverty rates decline sharply once we move from the 'nominal' to the 'real' poverty line by using the spatial price deflators. In contrast, the effect on inequality estimates is minimal.

Notwithstanding the considerable potential of the proposed procedures for calculating spatial prices when price information is not available, as this study demonstrates, in future estimations of RPPs, they cannot take the place of real price information from different regions in the country. The central message of this study is two-fold: (a) statistical agencies should embark on a country wide program of collecting regional price information on a wide variety of items at a disaggregated level, and (b) until such information becomes publicly available the proposed procedures can be used to estimate spatial prices covering a larger group of items than just food items. To add to these, the study demonstrates the need to obtain information on the availability and quality of public services in the various regions in a country. This aspect has clear implications for the cross country ICP exercise which does not collect information on quality of services between countries. As our exercise for Italy shows, spatial variation in prices along with that in services, need to be jointly considered in assessing differences in levels of living, both within and between countries. In case of most countries, the collection of regional prices and quality of services can be coordinated with the ICP exercise on a global scale. The subject of spatial prices within a country, or RPP, needs much greater attention than it has received to date. The present study provides a strong case for further research into RPP.

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Table 1. List of Regions

| North<br>(8 Regions) | Center<br>(5 Regions) | South and Islands<br>(7 Regions) |
|---|---|---|
| | | |
| Valle d'Aosta | Toscana | Campania |
| Piemonte | Marche | Molise |
| Lombardia | Lazio | Basilicata |
| Veneto | Abruzzi | Puglia |
| Friuli-Venezia Giulia | Umbria | Calabria |
| Trentino-Alto Adige | | Sicilia |
| Emilia-Romagna | | Sardegna |
| Liguria | | |

Table 2. Items Aggregation

| **Main Group** | **Sub-groups** | | | |
|---|---|---|---|---|
| Food | Bread, cereals, and pasta, Meat, fish, and milk derivates, Fruit and vegetables, fats&oils, salt and sugar | Mineral water, juices, nonalcoholic drinks&beverage | alcoholic drinks&beverages, sigarettes, tobacco | Food away from home (bar, restaurants, factory or school canteens) |
| Clothing&Footwear | clothing | footwear | | |
| Housing | Rents (actual and figurative) and condominium fees | Other housing expenditures: Water, Home repairs | | |
| Heating&Energy | heating | energy | | |
| Furniture&Domestic Appliances | furniture | Domestic appliances: large and small electrical appliances and flatware | | |
| Health | Medicines and health supports | Medical examinations, expenditures for medical assistance, Other medical expenditures such as insurance | | |
| Transport | Private transportation (fuels&repairs) | Public transportation, Purchase of means of transportation | | |
| Communications | Telephone expenses | Purchase of telephones, fax and repairs | | |
| Education | Education expenditures such as fees, baby sitter | Books and lessons | | |
| Leisure | Sports and Recreation, Computer, music, and television, toys | Travels and subscriptions, theater | | |
| Other Non-Food Expenditures | Jewelry, Insurance, professional services | Personal care, animal care and feed, | | |

Table 3. Descriptive Statistics – 19418 Obs.

| Variable Name | Definition | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| **shares** | | | | | |
| WSP_1 | Food&Beverage | 0.226 | 0.089 | 0.0042 | 0.657 |
| WSP_2 | Clothing&Footwear | 0.069 | 0.049 | 0.00048 | 0.783 |
| WSP_3 | Housing | 0.271 | 0.107 | 0.0178 | 0.823 |
| WSP_4 | Heating&Energy | 0.057 | 0.041 | 0.00027 | 0.426 |
| WSP_5 | Furniture&Appliances | 0.079 | 0.065 | 0 | 0.841 |
| WSP_6 | Health | 0.057 | 0.061 | 0.00058 | 0.770 |
| WSP_7 | Transport | 0.107 | 0.096 | 0 | 0.879 |
| WSP_8 | Communication | 0.018 | 0.014 | 0 | 0.217 |
| WSP_9 | Education | 0.020 | 0.034 | 0.00072 | 0.577 |
| WSP_10 | Leisure | 0.044 | 0.040 | 0.0001 | 0.410 |
| WSP_11 | Other Goods&Services | 0.051 | 0.048 | 0.00056 | 0.516 |
| **ln prices and ln expenditure** | | | | | |
| p_1 | Food&Beverage | 6.390 | 0.340 | 5.013 | 7.459 |
| p_2 | Clothing&Footwear | 4.804 | 0.585 | 1.467 | 6.797 |
| p_3 | Housing | 6.518 | 0.321 | 5.251 | 7.499 |
| p_4 | Heating&Energy | 4.881 | 0.401 | 3.504 | 6.163 |
| p_5 | Furniture&Appliances | 3.889 | 1.218 | -0.475 | 7.497 |
| p_6 | Health | 4.443 | 0.655 | 0.746 | 6.515 |
| p_7 | Transport | 5.781 | 0.651 | 1.919 | 7.893 |
| p_8 | Communication | 3.950 | 0.349 | 2.585 | 5.182 |
| p_9 | Education | 3.127 | 1.258 | -2.508 | 6.260 |
| p_10 | Leisure | 4.504 | 0.894 | -0.796 | 7.212 |
| p_11 | Other Goods&Services | 4.803 | 0.578 | 1.405 | 6.633 |
| lnx | ln total expenditure | 7.728 | 0.468 | 6.159 | 10.337 |
| **demog variables** | | | | | |
| males_adu | No adult males | 0.942 | 0.669 | 0 | 4 |
| females_adu | No adult females | 1.037 | 0.587 | 0 | 5 |
| males_child | No boys | 0.191 | 0.485 | 0 | 4 |
| females_child | No girls | 0.177 | 0.463 | 0 | 3 |
| macro1 | North | 0.242 | 0.428 | 0 | 1 |
| macro2 | Centre | 0.214 | 0.410 | 0 | 1 |
| macro3 | South | 0.178 | 0.383 | 0 | 1 |
| macro4 | Island | 0.256 | 0.437 | 0 | 1 |
| **spatial error** | | | | | |
| vx | | 7.728 | 0.204 | 7.471 | 8.101 |
| WxiC | | 2.983 | 0.914 | 0.958 | 4.445 |

Note: the proportion of zero observations in Furniture&Appliances is 1.1%, in Transport is 13.8% and in Communication is 1.8%.

Table 4. Regional Cost of Living Levels and Incomes

| Regione | Cost of Living | Difference from Mean | Disposable Hh Income / Month | Hh Income - Cost of Living | Indiv. Incomes / Year | Disposable Hh Income / Year | Real Disposable Hh Income / Month | Real Indiv. Incomes / Year | Real Disposable Hh Income / Year |
|---|---|---|---|---|---|---|---|---|---|
| | Euro / month | Euro / month | Euro / month | Euro / month | Euro / year | Euro / year | Euro / month | Euro / year | Euro / year |
| Piemonte | 2,752.56 | 188.19 | 3,023.66 | 271.10 | 16,632.78 | 36,283.93 | 2816.93 | 15495.60 | 33803.19 |
| Lombardia | 3,040.42 | 476.05 | 3,693.04 | 652.62 | 19,056.88 | 44,316.42 | 3114.80 | 16073.08 | 37377.64 |
| Trentino Alto Adige | 3,194.43 | 630.07 | 3,663.48 | 469.04 | 18,826.89 | 43,961.73 | 2940.90 | 15113.49 | 35290.76 |
| Veneto | 2,948.24 | 383.87 | 3,278.81 | 330.57 | 16,526.28 | 39,345.70 | 2851.90 | 14374.50 | 34222.76 |
| Friuli Venezia Giulia | 2,735.48 | 171.11 | 3,274.42 | 538.95 | 17,322.65 | 39,293.07 | 3069.60 | 16239.09 | 36835.21 |
| Liguria | 2,650.86 | 86.49 | 3,082.31 | 431.45 | 17,372.55 | 36,987.69 | 2981.74 | 16805.73 | 35780.88 |
| Emilia Romagna | 2,925.44 | 361.07 | 3,671.19 | 745.75 | 19,234.86 | 44,054.30 | 3218.08 | 16860.80 | 38616.91 |
| Toscana | 2,774.71 | 210.34 | 3,216.85 | 442.14 | 16,681.35 | 38,602.17 | 2972.99 | 15416.77 | 35675.83 |
| Umbria | 2,599.45 | 35.09 | 3,051.94 | 452.49 | 15,281.24 | 36,623.28 | 3010.75 | 15074.98 | 36128.96 |
| Marche | 2,615.86 | 51.49 | 3,239.61 | 623.75 | 15,184.76 | 38,875.37 | 3175.84 | 14885.85 | 38110.11 |
| Lazio | 2,615.77 | 51.40 | 3,009.98 | 394.21 | 15,693.50 | 36,119.81 | 2950.83 | 15385.11 | 35410.02 |
| Abruzzo | 2,382.49 | -181.88 | 2,668.95 | 286.47 | 12,856.57 | 32,027.45 | 2872.70 | 13838.04 | 34472.42 |
| Molise | 2,309.53 | -254.84 | 2,084.43 | -225.09 | 11,119.70 | 25,013.21 | 2314.44 | 12346.67 | 27773.23 |
| Campania | 2,158.77 | -405.59 | 2,344.11 | 185.34 | 11,264.81 | 28,129.36 | 2784.53 | 13381.26 | 33414.35 |
| Puglia | 2,160.68 | -403.69 | 2,565.71 | 405.04 | 12,623.91 | 30,788.57 | 3045.08 | 14982.51 | 36540.99 |
| Basilicata | 2,101.51 | -462.86 | 2,416.82 | 315.31 | 11,567.54 | 29,001.88 | 2949.13 | 14115.29 | 35389.54 |
| Calabria | 1,896.32 | -668.04 | 2,274.24 | 377.91 | 11,389.47 | 27,290.84 | 3075.41 | 15401.79 | 36904.94 |
| Sicilia | 1,843.94 | -720.43 | 2,156.15 | 312.21 | 10,526.32 | 25,873.75 | 2998.55 | 14638.95 | 35982.61 |
| Sardegna | 2,109.65 | -454.72 | 2,524.71 | 415.05 | 12,170.96 | 30,296.46 | 3068.88 | 14794.31 | 36826.60 |

Table 5. Comparison between Divisia Index, WHRPD, TCLI PPP and Housing PPP indexes and Income Indexes

| Region | Divisia Index | WHRPD PPP | TCLI PPP | Housing PPP | Indiv. Incomes | Disposable Hh Income |
|---|---|---|---|---|---|---|
| Italia | 1 | 1 | 1 | 1 | 1 | 1 |
| Piemonte | 1.12 | 1.13 | 1.07 | 1.06 | 1.07 | 1.00 |
| Lombardia | 1.24 | 1.15 | 1.19 | 1.29 | 1.22 | 1.22 |
| Trentino Alto Adige | 1.12 | 1.13 | 1.25 | 1.27 | 1.21 | 1.21 |
| Veneto | 1.20 | 0.66 | 1.15 | 1.14 | 1.06 | 1.08 |
| Friuli Venezia Giulia | 1.13 | 0.83 | 1.07 | 1.09 | 1.11 | 1.08 |
| Liguria | 0.88 | 0.65 | 1.03 | 1.11 | 1.12 | 1.01 |
| Emilia Romagna | 1.21 | 1.14 | 1.14 | 1.15 | 1.24 | 1.21 |
| Toscana | 1.05 | 0.71 | 1.08 | 1.21 | 1.07 | 1.06 |
| Umbria | 1.03 | 0.99 | 1.01 | 0.93 | 0.98 | 1.00 |
| Marche | 1.02 | 0.89 | 1.02 | 0.99 | 0.98 | 1.07 |
| Lazio | 0.97 | 0.97 | 1.02 | 1.17 | 1.01 | 0.99 |
| Abruzzo | 1.02 | 1.03 | 0.93 | 0.86 | 0.83 | 0.88 |
| Molise | 0.95 | 0.80 | 0.90 | 0.77 | 0.71 | 0.69 |
| Campania | 0.74 | 0.50 | 0.84 | 0.82 | 0.72 | 0.77 |
| Puglia | 0.83 | 0.63 | 0.84 | 0.77 | 0.81 | 0.84 |
| Basilicata | 0.80 | 1.06 | 0.82 | 0.60 | 0.74 | 0.80 |
| Calabria | 0.73 | 0.55 | 0.74 | 0.58 | 0.73 | 0.75 |
| Sicilia | 0.69 | 0.56 | 0.72 | 0.68 | 0.68 | 0.71 |
| Sardegna | 0.71 | 0.43 | 0.82 | 0.82 | 0.78 | 0.83 |
| St dev | 0.18 | 0.24 | 0.15 | 0.22 | | |
| Corr | 0.71, 0.92 (Div,WHRPD; Div, TCLI) | 0.458 (WHRPD, Hous.) | 0.941 (TCLI, Hous.) | | | |

Table 6. Cost Levels per Each Expenditure Category by Region – Euro

| Region | Food & Bev. | Cloth. | House | Heat. & Energy | Furnit. & Appl. | Health | Transp. | Comm. | Educ. | Leisure | Other goods |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Piemonte | 577.44 | 166.68 | 711.27 | 163.76 | 183.30 | 168.36 | 379.80 | 45.59 | 59.11 | 132.85 | 166.57 |
| Lombardia | 585.05 | 179.54 | 867.75 | 159.68 | 232.84 | 174.38 | 405.10 | 51.15 | 76.35 | 146.34 | 166.02 |
| Trentino Alto Adige | 581.96 | 200.12 | 849.62 | 135.11 | 247.70 | 184.86 | 473.85 | 49.78 | 80.18 | 176.89 | 191.66 |
| Veneto | 551.66 | 173.53 | 764.76 | 166.53 | 232.60 | 181.42 | 421.57 | 49.49 | 62.22 | 142.10 | 178.10 |
| Friuli Venezia Giulia | 554.01 | 156.10 | 730.86 | 143.44 | 195.15 | 175.00 | 384.30 | 46.74 | 53.81 | 128.32 | 147.12 |
| Liguria | 588.14 | 167.51 | 742.90 | 135.11 | 239.84 | 156.55 | 288.14 | 39.71 | 48.31 | 120.89 | 138.84 |
| Emilia Romagna | 574.76 | 171.90 | 769.32 | 166.51 | 200.99 | 182.94 | 417.64 | 48.95 | 61.62 | 152.37 | 156.01 |
| Toscana | 573.14 | 163.58 | 810.63 | 150.32 | 166.33 | 163.65 | 384.76 | 49.63 | 51.48 | 116.69 | 141.82 |
| Umbria | 554.42 | 148.99 | 627.78 | 133.43 | 234.52 | 136.08 | 375.74 | 41.66 | 43.48 | 144.76 | 154.24 |
| Marche | 561.14 | 160.42 | 664.17 | 138.85 | 183.38 | 147.80 | 379.96 | 44.95 | 55.05 | 134.20 | 145.28 |
| Lazio | 598.85 | 169.66 | 783.83 | 125.39 | 150.87 | 132.41 | 319.15 | 45.80 | 47.52 | 103.77 | 141.23 |
| Abruzzo | 548.06 | 165.07 | 577.81 | 132.85 | 230.61 | 112.40 | 280.66 | 41.73 | 43.08 | 97.16 | 117.80 |
| Molise | 530.21 | 157.43 | 518.83 | 123.83 | 250.51 | 125.78 | 245.07 | 41.74 | 61.29 | 91.90 | 122.00 |
| Campania | 560.92 | 156.19 | 550.62 | 101.47 | 143.43 | 98.60 | 240.95 | 39.51 | 45.82 | 73.83 | 106.63 |
| Puglia | 511.85 | 168.56 | 519.68 | 110.26 | 176.60 | 117.94 | 246.84 | 38.49 | 47.14 | 76.55 | 107.51 |
| Basilicata | 486.45 | 173.17 | 399.84 | 141.62 | 194.37 | 109.03 | 254.26 | 41.78 | 59.20 | 81.65 | 123.41 |
| Calabria | 484.63 | 156.14 | 386.51 | 135.10 | 137.65 | 105.90 | 226.41 | 33.12 | 47.67 | 63.38 | 84.47 |
| Sicilia | 491.68 | 154.82 | 458.36 | 92.46 | 145.61 | 106.99 | 203.08 | 33.30 | 33.13 | 63.67 | 87.05 |
| Sardegna | 456.02 | 155.49 | 554.05 | 116.37 | 182.95 | 119.13 | 294.71 | 36.36 | 37.58 | 74.51 | 107.09 |
| Mean | 553.43 | 118.08 | 671.29 | 137.04 | 192.72 | 109.80 | 335.24 | 43.80 | 54.85 | 134.34 | 137.57 |
| Stdev | 41.05 | 11.63 | 150.00 | 20.95 | 37.61 | 30.26 | 80.10 | 5.53 | 11.97 | 33.93 | 29.78 |

Table 7. Differences with respect to the Mean in Estimated Commodity Expenditures by Region Using TCLI

| Region | Food & Beverage | Clothing | Housing | Heat & Energy | Furniture & Appl. | Health | Transp. | Commun. | Educ. | Leisure | Other goods |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Piemonte | 40.937 | 11.954 | 49.820 | 12.033 | 13.369 | 11.128 | 21.982 | 3.289 | 3.788 | 8.935 | 10.958 |
| Lombardia | 95.448 | 29.328 | 142.054 | 27.081 | 35.730 | 27.344 | 51.756 | 8.518 | 10.499 | 23.172 | 25.120 |
| Trentino Alto Adige | 123.204 | 41.394 | 180.323 | 28.909 | 48.473 | 37.238 | 73.599 | 10.339 | 14.019 | 35.566 | 37.004 |
| Veneto | 75.323 | 23.943 | 106.142 | 23.469 | 30.440 | 24.057 | 45.176 | 6.990 | 7.531 | 18.783 | 22.017 |
| Friuli Venezia Giulia | 36.480 | 10.933 | 48.291 | 9.930 | 12.688 | 11.004 | 18.352 | 3.201 | 3.185 | 8.212 | 8.833 |
| Liguria | 19.248 | 5.726 | 25.111 | 4.632 | 8.124 | 5.072 | 7.479 | 1.376 | 1.579 | 3.905 | 4.238 |
| Emilia Romagna | 74.778 | 21.605 | 100.297 | 22.318 | 27.001 | 22.922 | 40.818 | 6.369 | 7.398 | 19.162 | 18.403 |
| Toscana | 45.285 | 12.742 | 64.149 | 12.054 | 13.674 | 12.550 | 22.985 | 3.928 | 3.654 | 8.953 | 10.372 |
| Umbria | 7.869 | 2.179 | 9.212 | 1.887 | 2.900 | 1.908 | 3.948 | 0.618 | 0.564 | 2.008 | 1.993 |
| Marche | 11.276 | 3.226 | 14.032 | 2.913 | 3.839 | 2.928 | 6.094 | 0.934 | 0.970 | 2.673 | 2.607 |
| Lazio | 12.030 | 3.294 | 16.028 | 2.572 | 2.975 | 2.616 | 5.439 | 0.942 | 0.855 | 2.032 | 2.619 |
| Abruzzo | -43.168 | -13.041 | -45.714 | -10.70 | -20.198 | -9.270 | -17.73 | -3.244 | -3.047 | -7.410 | -8.359 |
| Molise | -59.362 | -18.471 | -59.415 | -14.50 | -32.455 | -13.671 | -23.95 | -4.805 | -5.931 | -10.36 | -11.92 |
| Campania | -108.450 | -30.372 | -109.364 | -20.64 | -28.327 | -19.618 | -38.95 | -7.743 | -8.893 | -14.27 | -18.97 |
| Puglia | -99.223 | -32.875 | -102.024 | -22.91 | -33.409 | -23.198 | -40.15 | -7.604 | -8.699 | -14.85 | -18.75 |
| Basilicata | -113.824 | -39.056 | -92.825 | -33.46 | -43.438 | -24.643 | -51.16 | -9.788 | -11.33 | -18.90 | -24.43 |
| Calabria | -177.869 | -57.023 | -139.653 | -51.05 | -55.122 | -37.743 | -70.38 | -12.304 | -15.14 | -23.77 | -27.99 |
| Sicilia | -190.228 | -61.049 | -180.884 | -36.99 | -61.327 | -40.734 | -67.47 | -13.347 | -11.57 | -26.23 | -30.59 |
| Sardegna | -99.665 | -35.842 | -123.141 | -26.22 | -40.606 | -26.652 | -48.05 | -8.238 | -8.041 | -16.99 | -21.28 |
| std dev | 92.07 | 29.46 | 102.09 | 23.40 | 32.42 | 22.62 | 41.86 | 7.19 | 8.16 | 17.10 | 19.49 |

Table 8. Estimated Cost Shares per Each Expenditure Category by Region

| Region | Food & Bev. | Cloth | Housing | Heat. & Energy | Furnit. & Appl. | Health | Transp. | Comm. | Educ. | Leisure | Other goods |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Piemonte | 0.2175 | 0.0635 | 0.2647 | 0.0639 | 0.071 | 0.0591 | 0.1168 | 0.0175 | 0.0201 | 0.0475 | 0.0582 |
| Lombardia | 0.2005 | 0.0616 | 0.2984 | 0.0569 | 0.0751 | 0.0574 | 0.1087 | 0.0179 | 0.0221 | 0.0487 | 0.0528 |
| Trentino Alto Adige | 0.1955 | 0.0657 | 0.2862 | 0.0459 | 0.0769 | 0.0591 | 0.1168 | 0.0164 | 0.0222 | 0.0564 | 0.0587 |
| Veneto | 0.1962 | 0.0624 | 0.2765 | 0.0611 | 0.0793 | 0.0627 | 0.1177 | 0.0182 | 0.0196 | 0.0489 | 0.0574 |
| Friuli Venezia Giulia | 0.2132 | 0.0639 | 0.2822 | 0.058 | 0.0742 | 0.0643 | 0.1073 | 0.0187 | 0.0186 | 0.048 | 0.0516 |
| Liguria | 0.2225 | 0.0662 | 0.2903 | 0.0536 | 0.0939 | 0.0586 | 0.0865 | 0.0159 | 0.0183 | 0.0451 | 0.049 |
| Emilia Romagna | 0.2071 | 0.0598 | 0.2778 | 0.0618 | 0.0748 | 0.0635 | 0.113 | 0.0176 | 0.0205 | 0.0531 | 0.051 |
| Toscana | 0.2153 | 0.0606 | 0.305 | 0.0573 | 0.065 | 0.0597 | 0.1093 | 0.0187 | 0.0174 | 0.0426 | 0.0493 |
| Umbria | 0.2243 | 0.0621 | 0.2626 | 0.0538 | 0.0827 | 0.0544 | 0.1125 | 0.0176 | 0.0161 | 0.0572 | 0.0568 |
| Marche | 0.219 | 0.0627 | 0.2725 | 0.0566 | 0.0746 | 0.0569 | 0.1183 | 0.0181 | 0.0188 | 0.0519 | 0.0506 |
| Lazio | 0.234 | 0.0641 | 0.3118 | 0.05 | 0.0579 | 0.0509 | 0.1058 | 0.0183 | 0.0166 | 0.0395 | 0.051 |
| Abruzzo | 0.2373 | 0.0717 | 0.2513 | 0.0588 | 0.1111 | 0.051 | 0.0975 | 0.0178 | 0.0168 | 0.0407 | 0.046 |
| Molise | 0.2329 | 0.0725 | 0.2331 | 0.0569 | 0.1274 | 0.0536 | 0.094 | 0.0189 | 0.0233 | 0.0407 | 0.0468 |
| Campania | 0.2674 | 0.0749 | 0.2696 | 0.0509 | 0.0698 | 0.0484 | 0.096 | 0.0191 | 0.0219 | 0.0352 | 0.0468 |
| Puglia | 0.2458 | 0.0814 | 0.2527 | 0.0567 | 0.0828 | 0.0575 | 0.0995 | 0.0188 | 0.0215 | 0.0368 | 0.0464 |
| Basilicata | 0.2459 | 0.0844 | 0.2005 | 0.0723 | 0.0938 | 0.0532 | 0.1105 | 0.0211 | 0.0245 | 0.0408 | 0.0528 |
| Calabria | 0.2663 | 0.0854 | 0.209 | 0.0764 | 0.0825 | 0.0565 | 0.1054 | 0.0184 | 0.0227 | 0.0356 | 0.0419 |
| Sicilia | 0.264 | 0.0847 | 0.2511 | 0.0513 | 0.0851 | 0.0565 | 0.0937 | 0.0185 | 0.0161 | 0.0364 | 0.0425 |
| Sardegna | 0.2192 | 0.0788 | 0.2708 | 0.0577 | 0.0893 | 0.0586 | 0.1057 | 0.0181 | 0.0177 | 0.0374 | 0.0468 |
| Std dev | 0.0224 | 0.0091 | 0.0293 | 0.0073 | 0.0160 | 0.0043 | 0.0093 | 0.0011 | 0.0026 | 0.0071 | 0.0050 |

Table 9. Regional Commodity Specific PPPs and General TCLI and WHRPD PPP

| Region | Food & Bever. | Cloth. | Hous. | Heat. & Energy | Furnit. & Appl. | Health | Trans. | Com. | Educ. | Leis. | Other goods | TCLI PPP | WHRPD PPP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Piemonte | 1.047 | 0.998 | 1.059 | 1.194 | 0.951 | 1.152 | 1.133 | 1.040 | 1.078 | 1.162 | 1.198 | 1.07 | 1.13 |
| Lombardia | 1.060 | 1.075 | 1.292 | 1.165 | 1.208 | 1.194 | 1.208 | 1.167 | 1.392 | 1.281 | 1.194 | 1.19 | 1.15 |
| Trentino Alto Adige | 1.055 | 1.198 | 1.265 | 0.985 | 1.285 | 1.265 | 1.413 | 1.136 | 1.462 | 1.548 | 1.379 | 1.25 | 1.13 |
| Veneto | 1.000 | 1.039 | 1.139 | 1.215 | 1.207 | 1.242 | 1.257 | 1.129 | 1.135 | 1.243 | 1.281 | 1.15 | 0.66 |
| Friuli Venezia Giulia | 1.004 | 0.934 | 1.088 | 1.046 | 1.013 | 1.198 | 1.146 | 1.067 | 0.981 | 1.123 | 1.058 | 1.07 | 0.83 |
| Liguria | 1.066 | 1.003 | 1.106 | 0.985 | 1.245 | 1.071 | 0.859 | 0.906 | 0.881 | 1.058 | 0.999 | 1.03 | 0.65 |
| Emilia Romagna | 1.042 | 1.029 | 1.146 | 1.214 | 1.043 | 1.252 | 1.246 | 1.117 | 1.124 | 1.333 | 1.122 | 1.14 | 1.14 |
| Toscana | 1.039 | 0.979 | 1.207 | 1.096 | 0.863 | 1.120 | 1.148 | 1.133 | 0.939 | 1.021 | 1.020 | 1.08 | 0.71 |
| Umbria | 1.005 | 0.892 | 0.935 | 0.973 | 1.217 | 0.931 | 1.121 | 0.951 | 0.793 | 1.267 | 1.109 | 1.01 | 0.99 |
| Marche | 1.017 | 0.960 | 0.989 | 1.013 | 0.952 | 1.012 | 1.133 | 1.026 | 1.004 | 1.174 | 1.045 | 1.02 | 0.89 |
| Lazio | 1.085 | 1.016 | 1.167 | 0.915 | 0.783 | 0.906 | 0.952 | 1.045 | 0.867 | 0.908 | 1.016 | 1.02 | 0.97 |
| Abruzzo | 0.993 | 0.988 | 0.860 | 0.969 | 1.197 | 0.769 | 0.837 | 0.952 | 0.786 | 0.850 | 0.847 | 0.93 | 1.03 |
| Molise | 0.961 | 0.942 | 0.773 | 0.903 | 1.300 | 0.861 | 0.731 | 0.953 | 1.118 | 0.804 | 0.878 | 0.90 | 0.80 |
| Campania | 1.017 | 0.935 | 0.820 | 0.740 | 0.744 | 0.675 | 0.719 | 0.902 | 0.836 | 0.646 | 0.767 | 0.84 | 0.50 |
| Puglia | 0.928 | 1.009 | 0.774 | 0.804 | 0.917 | 0.807 | 0.736 | 0.878 | 0.860 | 0.670 | 0.773 | 0.84 | 0.63 |
| Basilicata | 0.882 | 1.037 | 0.595 | 1.033 | 1.009 | 0.746 | 0.758 | 0.953 | 1.080 | 0.714 | 0.888 | 0.82 | 1.06 |
| Calabria | 0.878 | 0.935 | 0.576 | 0.985 | 0.714 | 0.725 | 0.675 | 0.756 | 0.869 | 0.555 | 0.608 | 0.74 | 0.55 |
| Sicilia | 0.891 | 0.927 | 0.683 | 0.674 | 0.756 | 0.732 | 0.606 | 0.760 | 0.604 | 0.557 | 0.626 | 0.72 | 0.56 |
| Sardegna | 0.827 | 0.931 | 0.825 | 0.849 | 0.949 | 0.815 | 0.879 | 0.830 | 0.685 | 0.652 | 0.770 | 0.82 | 0.43 |
| std dev | 0.07 | 0.07 | 0.22 | 0.15 | 0.20 | 0.21 | 0.24 | 0.13 | 0.22 | 0.30 | 0.21 | 0.15 | 0.24 |
| corr with TCLI PPP | 0.80 | 0.62 | 0.94 | 0.73 | 0.56 | 0.93 | 0.94 | 0.93 | 0.73 | 0.95 | 0.96 | 0.62 | |
| corr with WHRPD | 0.54 | 0.54 | 0.46 | 0.59 | 0.46 | 0.49 | 0.58 | 0.66 | 0.64 | 0.67 | 0.66 | 0.62 | |

Tab. 10 Regional Cost of Living Indexes, Yearly Incomes and Wages for Dependent Workers (2013)

| Region | WHRPD PPP | TCLI PPP | Wage Index | Nominal Yearly Wages | Real Wages (TCLI) | Real Wages (WHRPD) | Index Indiv. Inc. | Nominal Ind. Inc. | Real Ind. Inc. (TCLI) | Real Ind. Inc. (WHRPD) |
|---|---|---|---|---|---|---|---|---|---|---|
| Italy | 1 | 1 | 1 | 21103 | 21103 | 21103 | 1 | 15566 | 15566 | 15566 |
| Piemonte | 1.13 | 1.07 | 1.09 | 22906 | 21340 | 20295 | 1.07 | 16633 | 15496 | 14737 |
| Lombardia | 1.15 | 1.19 | 1.21 | 25596 | 21588 | 22163 | 1.22 | 19057 | 16073 | 16501 |
| Trentino Alto Adige | 1.13 | 1.25 | 1.02 | 21576 | 17320 | 19112 | 1.21 | 18827 | 15113 | 16676 |
| Veneto | 0.66 | 1.15 | 1.03 | 21684 | 18861 | 32757 | 1.06 | 16526 | 14375 | 24965 |
| Friuli Venezia Giulia | 0.83 | 1.07 | 1.04 | 21961 | 20587 | 26421 | 1.11 | 17323 | 16239 | 20841 |
| Liguria | 0.65 | 1.03 | 1.01 | 21365 | 20668 | 33085 | 1.12 | 17373 | 16806 | 26903 |
| Emilia Romagna | 1.14 | 1.14 | 1.07 | 22657 | 19861 | 19839 | 1.24 | 19235 | 16861 | 16842 |
| Toscana | 0.71 | 1.08 | 0.95 | 19981 | 18466 | 28174 | 1.07 | 16681 | 15417 | 23521 |
| Umbria | 0.99 | 1.01 | 0.88 | 18492 | 18242 | 18685 | 0.98 | 15281 | 15075 | 15441 |
| Marche | 0.89 | 1.02 | 0.87 | 18407 | 18045 | 20718 | 0.98 | 15185 | 14886 | 17091 |
| Lazio | 0.97 | 1.02 | 1.06 | 22273 | 21835 | 22939 | 1.01 | 15694 | 15385 | 16162 |
| Abruzzo | 1.03 | 0.93 | 0.80 | 16924 | 18216 | 16451 | 0.83 | 12857 | 13838 | 12497 |
| Molise | 0.80 | 0.90 | 0.74 | 15558 | 17275 | 19343 | 0.71 | 11120 | 12347 | 13825 |
| Campania | 0.50 | 0.84 | 0.74 | 15614 | 18548 | 31068 | 0.72 | 11265 | 13381 | 22414 |
| Puglia | 0.63 | 0.84 | 0.74 | 15575 | 18485 | 24583 | 0.81 | 12624 | 14983 | 19925 |
| Basilicata | 1.06 | 0.82 | 0.72 | 15098 | 18423 | 14241 | 0.74 | 11568 | 14115 | 10911 |
| Calabria | 0.55 | 0.74 | 0.67 | 14187 | 19185 | 25675 | 0.73 | 11389 | 15402 | 20612 |
| Sicilia | 0.56 | 0.72 | 0.74 | 15674 | 21798 | 27982 | 0.68 | 10526 | 14639 | 18792 |
| Sardegna | 0.43 | 0.82 | 0.76 | 16018 | 19471 | 37453 | 0.78 | 12171 | 14794 | 28458 |
| St dev | 0.24 | 0.15 | 0.16 | 3418.13 | 1501.97 | 6251.70 | 0.19 | 2980.06 | 1118.67 | 4824.78 |

Tab. 11 Quality Adjustment: Estimates of the Price Scaling Parameters and Specification Test

| | Model w/out Quality Adjustment | Model w/ Amenity Index | Model w/ Affluence Index | Model w/ Amenity and Affluence Index |
|---|---|---|---|---|
| Amenity Parameter | | -0.22292 | | -1.01998 |
| std dev | | *-0.0148* | | *0.0739* |
| Affluence Parameter | | | -0.26496 | 0.77128 |
| std dev | | | *-0.0199* | *0.0698* |
| Loglikelihood value | 328588.6 | 328726.4 | 328749.1 | 328785.1 |
| Likelihood Ratio Test | | 275.7 | 320.9 | 393.1 |

Table 12.a Relative Poverty (%) for Nominal, Real and Quality Adjusted Cost of Living by Region

Relative Poverty Line - 0.6 Median (Nominal 1341.8, Real 1360.6, Quality 1291.6)

| Region | Nominal Cost of Living | Real Cost of Living | Quality Adjusted Cost of Living |
|---|---|---|---|
| Piemonte | 0.0611 | 0.1023 | 0.0974 |
| Lombardia | 0.0356 | 0.0996 | 0.0692 |
| Trentino Alto Adige | 0.0439 | 0.1198 | 0.0429 |
| Veneto | 0.0331 | 0.0932 | 0.1233 |
| Friuli Venezia Giulia | 0.0667 | 0.0803 | 0.0833 |
| Liguria | 0.0672 | 0.0995 | 0.0336 |
| Emilia Romagna | 0.0486 | 0.0938 | 0.0754 |
| Toscana | 0.0615 | 0.0936 | 0.1009 |
| Umbria | 0.0883 | 0.0901 | 0.0505 |
| Marche | 0.0716 | 0.0955 | 0.1601 |
| Lazio | 0.0964 | 0.1182 | 0.1055 |
| Abruzzo | 0.1612 | 0.1007 | 0.1538 |
| Molise | 0.2266 | 0.1634 | 0.2288 |
| Campania | 0.2013 | 0.1104 | 0.1190 |
| Puglia | 0.2305 | 0.1005 | 0.1589 |
| Basilicata | 0.2426 | 0.1255 | 0.1255 |
| Calabria | 0.3277 | 0.1060 | 0.1277 |
| Sicilia | 0.2829 | 0.0837 | 0.1242 |
| Sardegna | 0.1941 | 0.0823 | 0.0932 |
| North | 0.0482 | 0.0993 | 0.0789 |
| Centre | 0.0790 | 0.1012 | 0.1065 |
| South | 0.2390 | 0.1037 | 0.1362 |
| Italy | 0.1235 | 0.1012 | 0.1048 |

Table 12.b Inequality: Gini Index for Nominal, Real and Quality Adjusted Cost of Living by Macro-Region

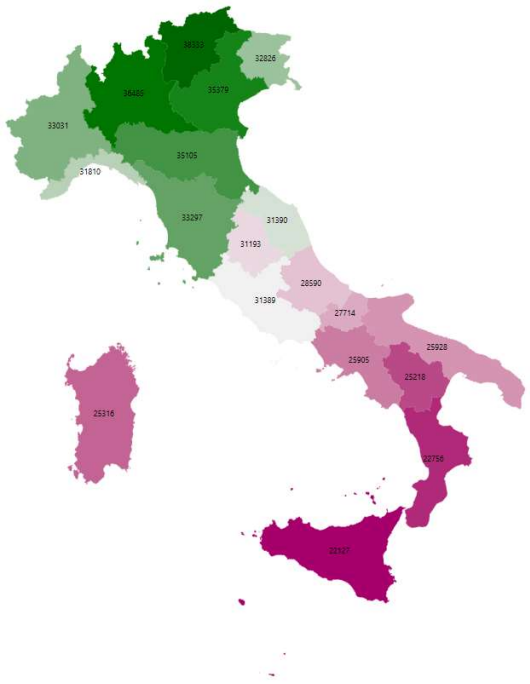
| Macro-Region | Nominal Cost of Living | Real Cost of Living | Quality Adjusted Cost of Living |
|---|---|---|---|
| North | 0.2551 | 0.2534 | 0.2584 |
| Centre | 0.2519 | 0.2516 | 0.2538 |
| South | 0.2550 | 0.2516 | 0.2521 |
| Italy | 0.2679 | 0.2524 | 0.2571 |

Tab. 13 Quality Adjusted Real Wages, Individual and Household Incomes (yearly figures)

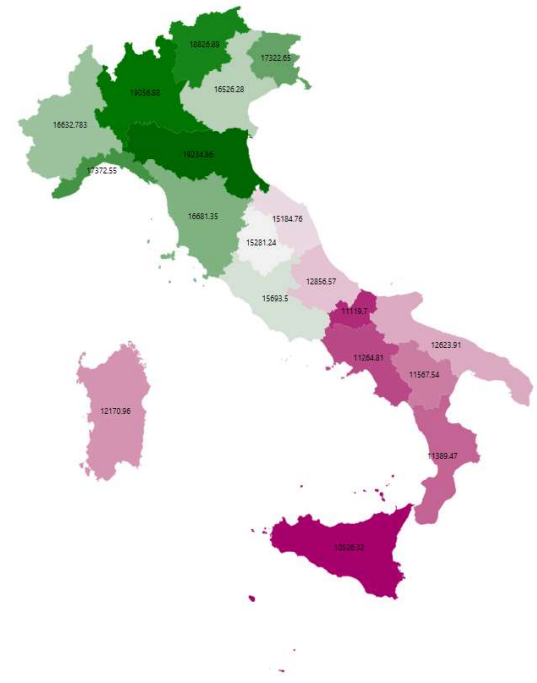
| Region | Amenity Index | Affluence Index | Quality Adjusted TCLI | Real Wages | Real Ind. Incomes | Real Hh. Incomes | Quality Adjusted Real Wages | Quality Adjusted Real Ind. Incomes |
|---|---|---|---|---|---|---|---|---|
| Piemonte | 109.4 | 1286.9 | 112.1 | 21340 | 19971 | 33803 | 23924 | 22390 |
| Lombardia | 104.1 | 1316.1 | 117.4 | 21588 | 17634 | 37378 | 25353 | 20710 |
| Trentino Alto Adige | 112.4 | 1397.5 | 100.7 | 17320 | 14320 | 35291 | 17443 | 14422 |
| Veneto | 115.1 | 1263.3 | 126.9 | 18861 | 17765 | 34223 | 23932 | 22541 |
| Friuli Venezia Giulia | 104.0 | 1239.7 | 109.6 | 20587 | 18499 | 36835 | 22568 | 20279 |
| Liguria | 109.4 | 1332.0 | 93.7 | 20668 | 18519 | 35781 | 19357 | 17344 |
| Emilia Romagna | 107.2 | 1309.3 | 114.9 | 19861 | 16072 | 38617 | 22816 | 18463 |
| Toscana | 100.7 | 1200.4 | 115.3 | 18466 | 17231 | 35676 | 21290 | 19866 |
| Umbria | 98.0 | 1276.4 | 96.9 | 18242 | 18582 | 36129 | 17675 | 18005 |
| Marche | 101.8 | 1109.2 | 119.4 | 18045 | 18498 | 38110 | 21542 | 22082 |
| Lazio | 97.7 | 1231.4 | 106.9 | 21835 | 21658 | 35410 | 23350 | 23160 |
| Abruzzo | 93.9 | 1036.8 | 102.2 | 18216 | 22055 | 34472 | 18621 | 22545 |
| Molise | 96.5 | 955.1 | 104.2 | 17275 | 24182 | 27773 | 18001 | 25199 |
| Campania | 83.5 | 795.9 | 90.7 | 18548 | 25629 | 33414 | 16815 | 23234 |
| Puglia | 85.1 | 887.4 | 94.0 | 18485 | 22793 | 36541 | 17384 | 21436 |
| Basilicata | 88.1 | 846.0 | 85.0 | 18423 | 24791 | 35390 | 15654 | 21065 |
| Calabria | 77.4 | 820.9 | 80.5 | 19185 | 26220 | 36905 | 15439 | 21100 |
| Sicilia | 82.0 | 785.2 | 85.0 | 21798 | 32234 | 35983 | 18518 | 27384 |
| Sardegna | 97.6 | 877.4 | 88.1 | 19471 | 24902 | 36827 | 17158 | 21944 |
| Italy | 100.0 | 1122.1 | 100.0 | 21103 | 15566 | 33802 | 21103 | 15566 |
| CV | 0.1075 | 0.1889 | 0.1272 | 0.0775 | 0.2060 | 0.0649 | 0.1526 | 0.1324 |

Graph 1. Comparison of yearly nominal incomes in levels Euro/year – Regional maps of Italy

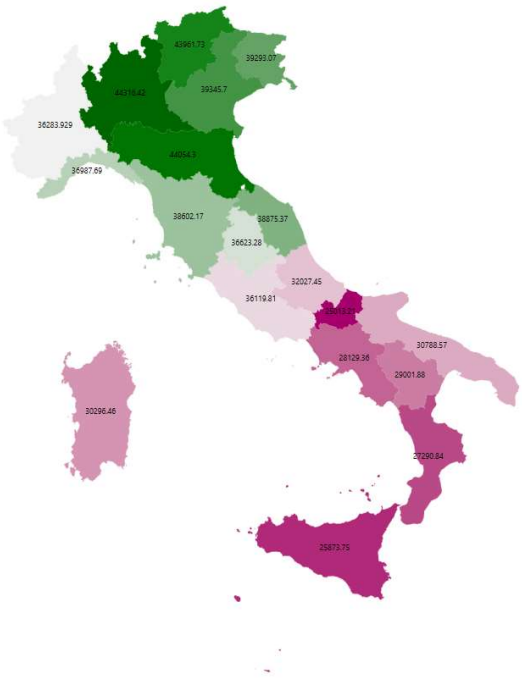
Cost of Living (Euro/Year)




Nominal Individual Income (Euro/year)



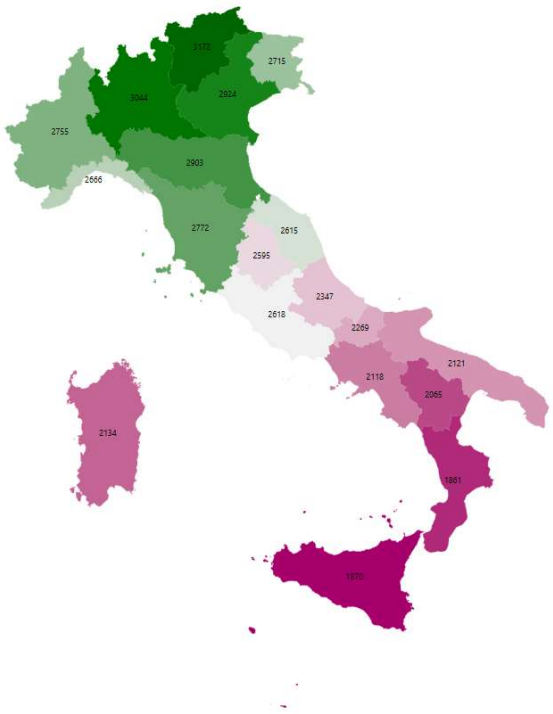

Nominal Disposable HH income (Euro/year)



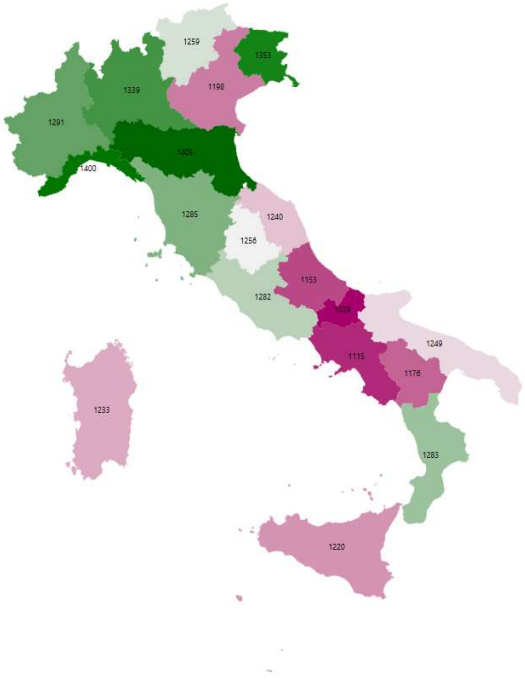

The colors graduate from dark green associated with the highest values of the distribution (top tercile of the distribution) to dark violet associated with the lowest values of the distribution.

Graph 2. Comparison of monthly real incomes in levels Euro/month – Regional maps of Italy

Cost of Living (Euro/Month)




Real Individual Income (Euro/month)

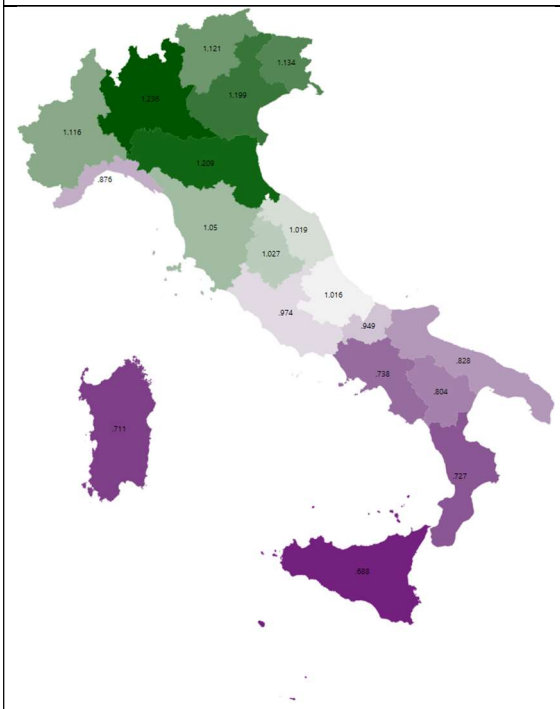



Real Disposable HH income (Euro/month)

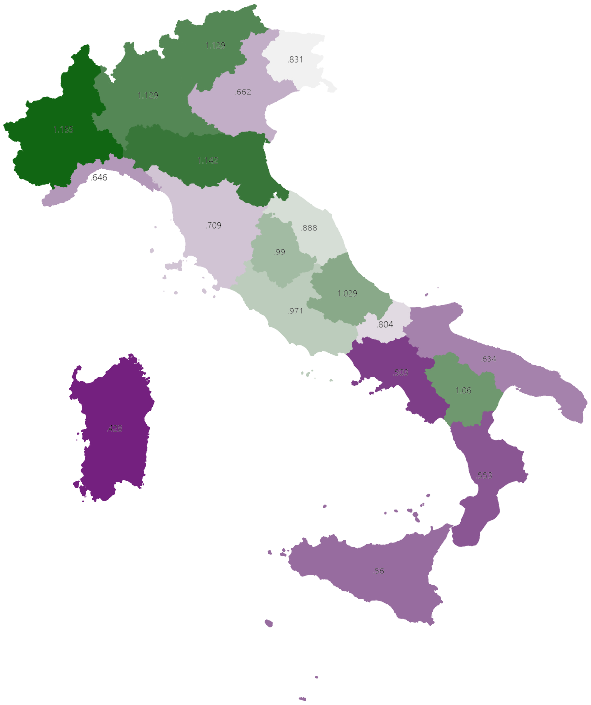

The colors graduate from dark green associated with the highest values of the distribution (top tercile of the distribution) to dark violet associated with the lowest values of the distribution.

Graph 3. DIVISIA, WHRPD and TCLI PPP indexes – Regional maps of Italy

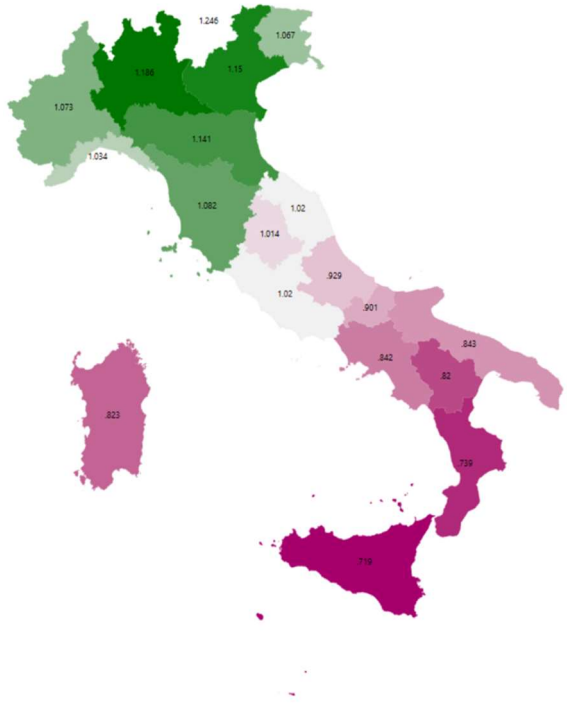
DIVISIA INDEX




WHRDP PPP

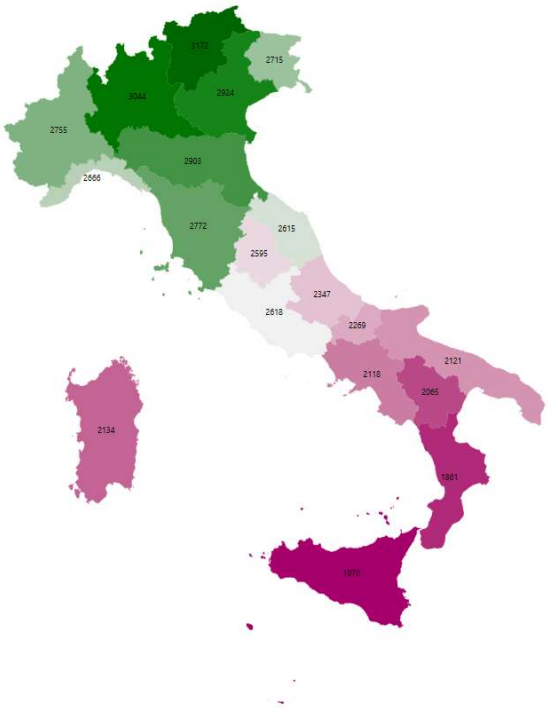
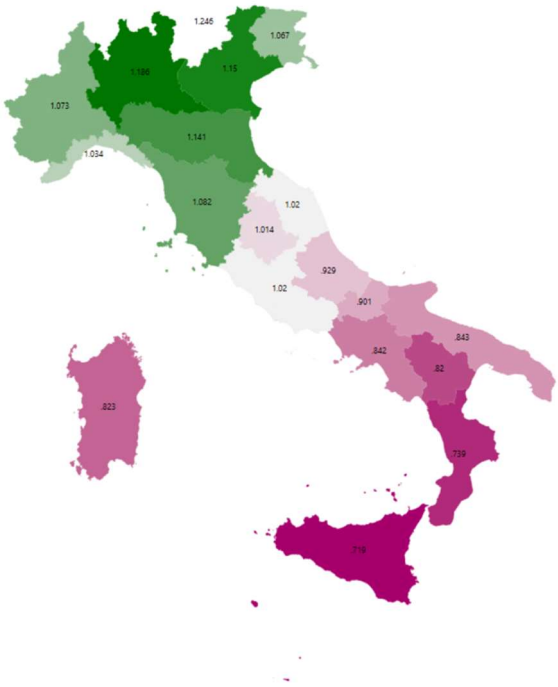
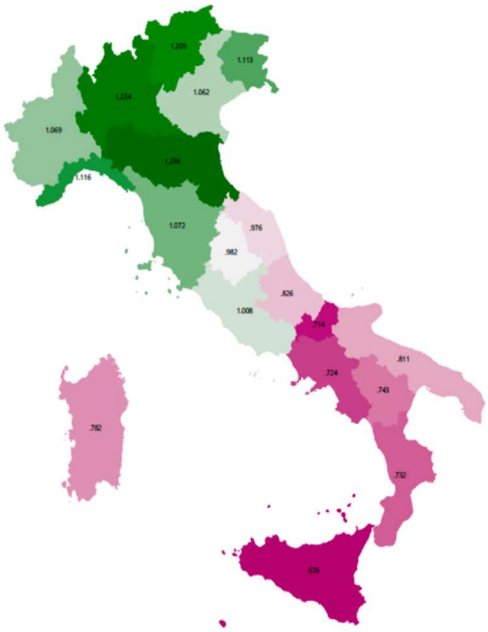
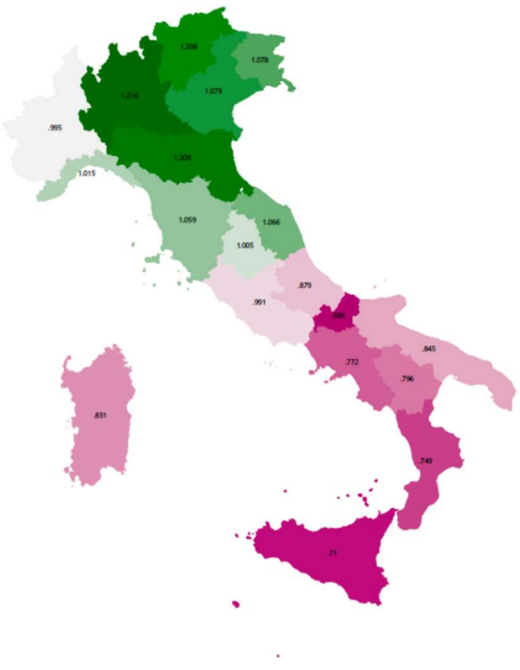



TCLI PPP



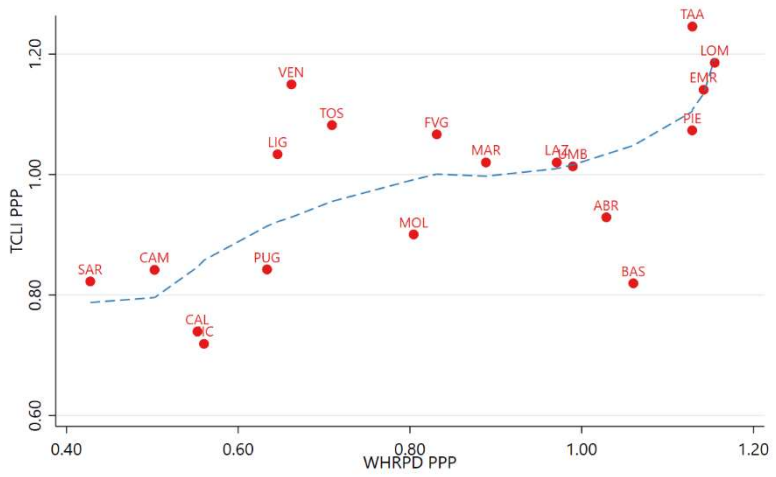

The colors graduate from dark green associated with the highest values of the distribution (top tercile of the distribution) to dark violet associated with the lowest values of the distribution.

Graph 4. TCLI Regional Cost of Living Indexes compared to Individual and Household Incomes

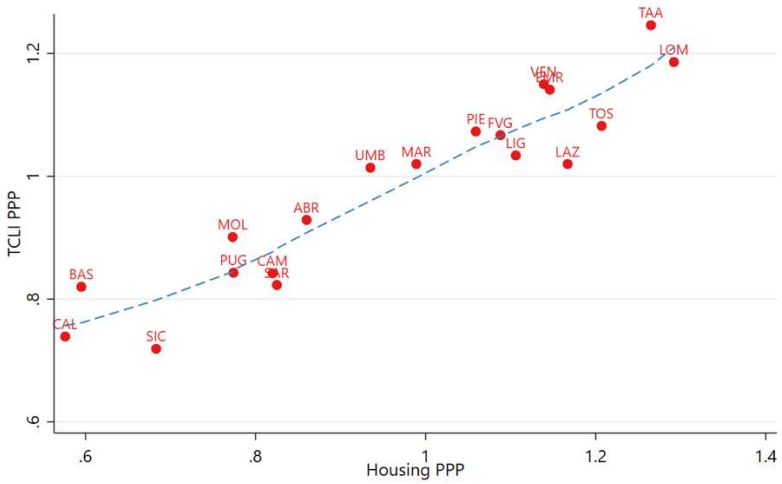
| Regional TCLI in Levels | Regional TCLI PPP index |
|---|---|
|  |  |
| **Index of Individual Income** | **Index of Household Disposable Income** |
|  |  |
| The colors graduate from dark green associated with the highest values of the distribution (top tercile of the distribution) to dark violet associated with the lowest values of the distribution. | |

Graph 5. Correlation between TCLI, WHRPD and Housing indexes

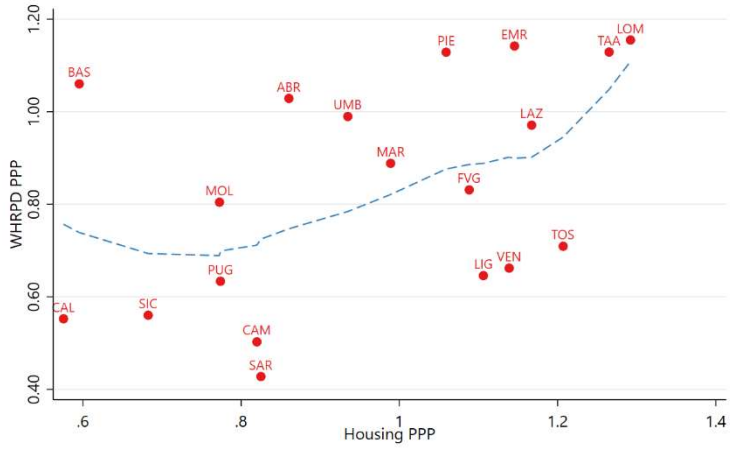
Correlation WHRPD and TCLI PPP - 0.619

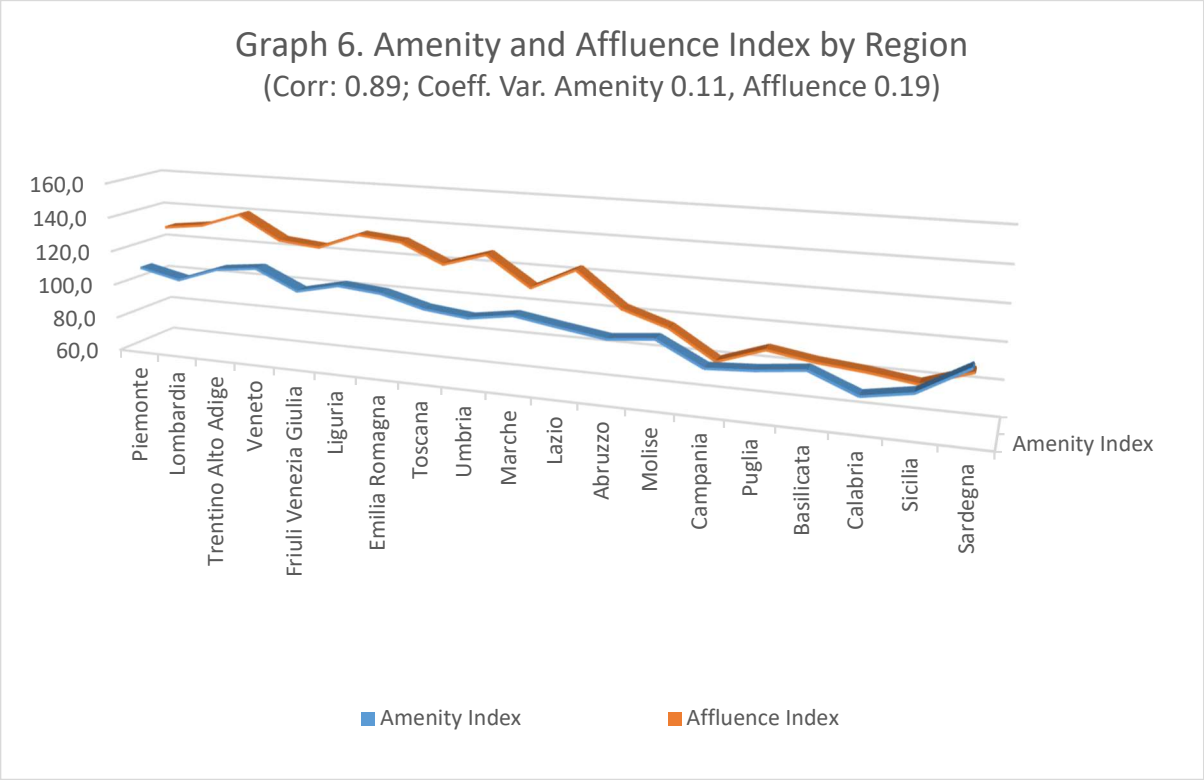



Correlation between TCLI and Housing PPP – 0.941




Correlation between WHRPD and Housing PPP – 0.458






Note: The affluence index has been divided by 10 to represent both indices with the same scale.

Graph 7. (a) The labor market equivalization effect; (b) the quality of services effect