Inequality in transfers in kind: The Case of the National Health Services in Italy and EU

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Abstract

There are many different items which concur, directly or indirectly, to form the income of a person, or a household. This work examines how the income distribution in Italian regions changes when the value of health care expenditure is included in disposable income.

Using the Abul Naga and Yalcin (2008) index, this paper extends previous analyses, focusing the investigation on a regional level. The aim is to obtain a matrix education- health, which improves the classical method, i*nsurance value approach,* based solely on age and gender in order to allocate the value of health care services. Applying the new method on IT-SILC 2010 data, I will show that the health in kind transfer, on the one hand reduces the total inequality, but on the other it increases the inequality between regions. The approach shown in this work can be applied, *mutatis mutandis*, also to observe the impact of the value of health care services on the income distribution between EU countries.

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1. Introduction

The social benefits in the welfare state, are supplied in cash and in kind. In Italy, the share of cash benefits is greater than benefits in kind; there are also countries, such as Denmark, Sweden and United Kingdom, where the share of benefits in kind is greater than in cash (OECD 2011).

In Italy, the cash benefits include income transfers, such as retirement pensions, family and unemployment benefits and social assistance. On the other hand, three of the most important public transfers in kind are: public education services, public health care services, child and elderly care.

In many instances the benefits in kind are not means-tested, which may have consequences for their distributive impact, favouring the rich rather than the poor, as is sometimes affirmed in the literature (Le Grand 1982).

This work has two main purposes. The first one is to present a new method - applied both within a single country, and in the comparison between different countries - for the allocation of transfers in kind. The second one is to extend the previous analysis of the redistributive effects of benefits in kind (health services), paying particular attention to the Italian case.

This work takes only into account the health care services for three principal reasons. The first is that the health services have the largest proportion among the benefits in kind; secondly they present some critical factors when allocated among all beneficiaries; the third reason is linked, in Italy, with the principal role played by the regions in the health care services management (see section 2).

Mutatis mutandis the explanation applied in the Italian context can be used also international context. In European countries, indeed, health services represent the largest share of expenditure (OECD 2011) of the transfers in kind; moreover the health services have the same criticality when they are distributed among the residents and, each country adopts different modality of supply.

As in an international context, the in kind benefits are added to the cash income in order to compare different welfare systems across the countries, also in Italy, I add the benefits in kind to the cash income to compare the differences in the health care system at a regional level, at the same time verifying the role of the different management of the health care among the regions.

In order to improve the analysis I will also show a new method, based on Abul Naga and Yalcin (2008) index to allocate the value of health care services.

Most of the literature which has investigated the size and evolution of income inequalities in Italy depends on the concept of household disposable income computed as gross income minus regular taxes on wealth and social insurance contributions. A share of the personal income tax (PIT)

is used to finance the expenditure on the National Health Service (NHS), so it is important to account for the services which governments provide through these taxes.

The assessment of the value of the in kind transfers raises a number of conceptual and methodological issues: the estimate of the *value* of public services; the method of *allocation* of the value estimated across the population and the use or not of the *equivalence scale*.

In accordance with most of the literature, the *production cost approach* will be utilized in this work to estimate the value of health services; even if it is useful to underline that the costs incurred in producing the service could be different from the benefit enjoyed by the user because of possible inefficiencies in their production (see Aaberge and Langørgen (2006), Bordignon, Fontana and Peragine (2006), Baldini, *et al*. (2006).

In an international context, the value of benefits in kind is allocated according to *actual consumption approach* or *insurance value approach* (IA). (see Smeeding *et al*. (1993), Garinder (1995), Marical *et al*. (2006), Garfinkel *et al*. (2006), Vaalavuo, M. (2011)). Using the *actual consumption approach* the value of public services is allocated to the individuals who are actually using the service; this method implies, paradoxically, that sick people are better off than healthy people just because they receive more health care services. The IA, allocates an equal amount of a service – considered as the premium that should be paid to be insured against the risk of illness – to everybody sharing the same characteristics (age or gender).

In international studies – including the Italian case compared with other countries – such as: Marical *et al*. (2006), Paulus *et. al.* (2009), Tsakloglou P. *et. al.* (2009) Vaalavuo M. (2011), the impact on income distribution given by the health care system is examined, while in the Italian context there are only a few papers: Citoni (2001), Sonedda and Turati (2005), Pacifico (2006), Baldini *et al*. (2006), D'Ambrosio and Gigliarano (2009).

The results of the studies mentioned above show that the benefits in kind (health care) have a redistributive effect, reducing income inequality. Most of these studies, with the exception of D'Ambrosio and Gigliarano, using the insurance value approach assume that individuals with the same age and gender have equal needs of health care services, without considering other variables which describe the real needs of health care. D'Ambrosio and Gigliarano introduce improvements which reduce the discretionary criteria in the allocation of resources, but this approach presents some critical factors (see section 5.1).

In this work I am introducing a new procedure, still based on the insurance value approach, which nevertheless solves some problems present in past papers. Starting from health care consumption used in IA, I will adjust it with different weights which take into account the relationship between the health and educational level. This relationship could be considered a proxy

of the different needs of health care among individuals overall. The new weights are assessed through the inequality index proposed by Abul Naga and Yalcin (2008) for the self-reported health status (SRHS).

As demonstrated by Allison and Foster (2004), an ideal measure of dispersion for ordinal data (SRHS) cannot be mean-based because it requires imposing a cardinal scale. In accordance to with Allison and Foster, Abul Naga and Yalcin propose a parametric family of inequality indices for ordinal data. The Naga Yalcin inequality index is in the range [0 1], and it is at a minimum when everyone is in the same category and at a maximum when half of the population lies in the lowest category and half in the highest category.

The last part of the paper is dedicated to analysing the empirical evidence where, firstly, I will compare the new method with the classical method and I will show that it improves the main inequality index. Secondly, I will investigate how inequality changes among the regions and the disposable income, when the health care services are allocated to the inhabitants.

The paper is organized as follows: section 2 describes The Italian National Health Service; in section 3, I briefly summarize the main approaches and relative issues to estimate the in kind transfers. In section 4 presents the data used in this work. Section 5 refers the method used to estimate the effects on income of the benefits in kind and in 5.3 the new method is shown. Section 6 analyses the empirical evidence and section 7 concluded the work.

2. The Italian National Health Service

This section briefly describes the Italian health care system, paying particular to attention on different levels of responsibilities governmental and financing procedure of health care expenditure.

The Italian Republic safeguards health as a fundamental right of the individual and as a collective interest, and guarantees free medical care to the indigent.

The National Health System (NHS), founded in 1978, is universal system which provides comprehensive health insurance coverage and uniform health care to the entire population.

In 1992-1993, during its first reform, in the Italian NHS the regions were granted greater responsibility and autonomy regarding health matters in the local health units and hospitals.

In 1998-1999, the second reform of the NHS was focused on the decentralization of health governance from the central government to the regions, including the control of healthcare expenditure.

In 2000-2001, fiscal federalism led to new responsibilities for the regions in the management of the health care system and of potential deficits. Moreover, fiscal federalism has had to guarantee the implementation of the Title V of the Italian Constitution; currently the Italian NHS is governed both at a national and a regional level.

The national level, (Central Government and the Ministry of Health) is responsible for defining "*essential levels of care*" (*Livelli Essenziali di Assistenza*) (LEA). The LEA constitute a list of services, chosen at national level (as provided by art. 117, 2th subsection to letter m. of the Constitution) which should guarantee uniform treatments in all regions. The evaluation of the state of implementation of the LEA is entrusted to the Ministry of Health and it is based on the work of the "Permanent Committee to verify the supply of essential levels of care" (Comitato permanente per la verifica dell'erogazione dei Livelli Essenziali di Assistenza). Specifically, the assessment made by the Permanent Committee is based on a set of 21 indicators (Grid)[1] allocated to describe activities in the areas of life and work, community care and hospital care.

The regional level (19 regions and the 2 autonomous provinces) has the responsibility of carrying out the governance and spending to achieve the country's health objectives. The regions have *exclusive* competence regarding regulation and organization – also regarding the management control and the quality – of healthcare services and activities and in establishing the criteria for financing the local health authorities and hospitals.

Moreover, the Conference of State-Regions joins the national and regional authorities to ensure equal rights in healthcare for all citizens.

The NHS funding is mainly guaranteed by regional and national taxation and by other transfers from the Central Government and Private source. In particular, in 2009, the Fund "Fondo per il fabbisogno sanitario ex D.Lvo 56/00" – financed by value-added tax (VAT) and other indirect taxes (i.e. Excise duty on mineral oils) – supported 46.5% of the total revenue, the Regional tax on productive activities (IRAP) and Regional Personal income tax (Addizionale Regionale IRPEF) funded the 37,1%; other transfers from the Central Government and Private sources 9,9%, National Fund ("Fondo Sanitario Nazionale" linked with autonomous Regions and provinces) 3,8% and "Own revenues" – including co-payments imposed for specialist consultations, drugs, ambulatory treatments, diagnostic particulars and laboratory tests – 2,7%. (See Ministero dell'Economia e delle Finanze, 2010 and Ministero della Salute).

The expenditure side, on the other hand, will be examined in section 4, in this section it is only useful to underline that: in Italy in the 2009 the health expenditure was 110.474 billion of euros

[1] Adempimento «mantenimento dell'erogazione dei LEA» Metodologia e Risultati dell'anno 2010. Marzo2012 Ministero della Salute (www.salute.gov.it)

equal to 7.3% of GDP; the fact that the amounts, used in this work, are adjusted for interregional mobility at regional level.

Indeed, the NHS, is a universalistic system and the patients can choose the structure where they will be treated. This right has generated free mobility (interregional mobility) of the patients throughout the country. In particular, the interregional mobility is concentrated in hospital care. There is a range of reasons causing patients to choose a hospital far away from their place of residence. Hospital migration can be due (Petrelli ed alt. 2012) to:

- The patients' health conditions. They are in need of highly specialised services which are not available in their own region;
- Greater trust in the hospital services in other regions because the patients know that there is a shortage of quantitative or qualitative supply, in their regions;
- geographical proximity to structures belonging to other regions;
- patients' temporary presence in other regions for reasons of work or study.

3. The main approaches and relative issues to estimate the in kind transfers: a brief review

There are many different items which concur, directly or indirectly, to form the income of a person, or a household, in a year. Different scholars have concentrated their attention on the effects on income distribution, when publicly provided services are included in the income, estimating "extended income" (cash + health in kind transfer). The assessment of the value of the in kind transfers raises a number of conceptual and methodological issues. In this paragraph it is useful to recall the main problems which arise when we want to estimate the monetary value of in kind transfers.

The literature is agreed on identifying three main issues: the estimate of the *value* of public services; the method of *allocation* of the value estimated across the population and the use or not of *equivalence scale*.

According to Smeeding (1982), the value of publicly provided services can be estimated as: *market value*, *government cost*, *cash equivalent value*, *poverty budget share value*. The last two methods are more appropriate for the purpose of measuring poverty, so they are not taken into account in this work. In Italy, application of market value method could be misleading because private health market is very small and there is a universal system of health.

Therefore I follow the *government cost approach* in this work. The latter is based on the production cost approach to estimate the monetary value of public services. This approach assumes that the transfers to the beneficiaries are equal to the average cost of providing or producing these public services (Marical *et al*., 2006; Smeeding *et al*., 1993); in this way the costs, including the administrative cost for producing the health transfers are used as a proxy of such benefits. Moreover, I assume that the marginal costs to produce health by the state are equal to the marginal benefits received by the patients who ask for health care.

The production cost approach has two main problems: it neglects differences within and across the regions in the quality and efficiency in the provision of these services and It does not necessarily reflect the user's value of the service, because there are possible inefficiencies in their production.

The second issue associated with in kind transfers concern the methods used to *allocate* the value estimated across overall individuals: *actual consumption approach* and *insurance value approach.*

In the literature there are many papers which investigate the impact of the in kind transfers on the income distribution and all these papers use either the actual consumption approach or insurance value approach (in an international context see Smeeding *et al*. (1993), Garinder (1995), Steckmest, (1996), Marical *et al*. (2006), Garfinkel *et al*. (2006)).

Using *actual consumption approach* the value of public services is allocated to the individuals who are actually using the service. This method is not appropriate if the actual beneficiaries cannot easily be identified (i.e. health care). However, it will be most appropriate, if they are easily identified (i.e. education). The principal critique of this approach is that sick people are better off than healthy people because they receive more health care services. Furthermore, since of health care consumption (see section 5.3) is usually concentrated greatly in the last year of an individual's life ("death related costs"), a re-ranking of elderly people in the income distribution could be create with misleading results.

The second method, the i*nsurance value approach,* allocates an equal amount of a service to everybody sharing the same characteristics, such as age, gender or region where individuals live. The individual amount may be considered as the premium which an individual should paid to be insured against the risk of illness. In this case, we assume that all individuals with similar characteristics benefit from a service knowing that, in case of need, they would have access to it. The insurance value approach is easier to implement; in fact, it does not require information on the individual health condition nor on the usage of healthcare services. This method makes a strong assumption: the health conditions only depend on demographic characteristics, such as age and gender and so we do not take into account other individual differences combined with other factors.

The studies mentioned above , with differences in the data set used or in the country observed, show the combined effect of the in kind transfers on the income distribution and, in particular, observe: health, education and housing. The main results, *ceteris paribus*, show that the combination of the three non-cash transfers considered has a levelling and different effect on income distribution. Moreover, the in kind transfers have different effects on the socio-economic groups.

Usually, when Italy is examined in international studies (Marical *et al*. (2006), Paulus et. al (2009), Tsakloglou P. et. al (2009) Vaalavuo M. (2011)) which estimate the distributive implications of health, education and housing in different OECD countries, these works show that public health care services are distributed uniformly across quintiles, inducing a reduction in the inter-quintile ratio for all the countries. Furthermore, in the OECD report "Divided We Stand" (chapter 8) we can read: «Broadening the income concept to account for in-kind benefits considerably increases households' economic resources and impacts on inequality and poverty outcomes. If all social public services were imputed in disposable cash income, households' resources would increase by close to 30% on average» […]«Publicly provided service benefits also contribute to reducing income inequality. Depending on the indicator, in-kind benefits as a whole reduce income inequality by between one-fifth (on the basis of the Gini coefficient) and one-third (using alternative inequality measures, which give more weight to the bottom and the top of the income distribution)». The literature on the Italian case is not very broad, and the impact on the income distribution, given by the Italian health care system, is examined only in a few papers: Citoni (2001), Sonedda and Turati (2005), Pacifico (2006), Baldini *et al*. (2006), D'Ambrosio and Gigliarano (2009).

Citoni (2001) applies the actual consumption approach. He concludes that the degree of inequality in income distribution is reduced after including healthcare transfers.

Sonedda and Turati (2005) use a mixture between the actual and insurance approach. They achieve the results that inequality marginally increases after adding the health related transfers.

Baldini *et al*. (2006) and Pacifico (2006), using either the insurance or actual approach, seek to clarify the distributional impact of the health care system in Italy. They draw the conclusion that inequality is reduced more with the insurance approach than the actual consumption approach.

D'Ambrosio and Gigliarano (2009), following Zhen (2006), analyse the incidence and relevance of health related in kind transfers, in Italy and its effect on income distribution, applying the insurance-based approach adjusted to income classes and disaggregated by regions. They find that inequality decrease when health transfers are included in the income of the entire population. Moreover, disaggregating by regions induces very slight re-ranking of the regions in terms of income position. However, they do not derive direct conclusions because they believe that:

«transfers in kind to sick individuals do not make them economically better off hence increasing their well-being"» (cit.).

Finally, the issue of an equivalence scale, that corrects for differences in health care needs between individuals, is not broadly discussed in the literature, but there is not a prevalent position. Some scholars (Garfinkel *et.al* (2006)) adopt the equivalence scale similar to that used for compute an equivalised disposable income; Smeeding *et al*. (1993), Sonedda and Turati (2005) and Lakin (2004), indeed, assume that there are no economies of scale in in-kind transfers while Aaberge and Langørgen (2006) and Paulus *et al* (2009) use different equivalence scales for each publicly provided services.

4. Data

4.1 IT-SILC survey

The empirical analyses in this work are carried out on "Cross sectional UDB IT-SILC 2010 – Versione: 2010-1 del 21/12/2011" (IT-SILC 2010) Italian micro data coherent with the European Union Survey on Income and Living Conditions (EU SILC). It is useful to underline that the Italian survey contains extra variables beyond those common to all the European countries; this variables are used in this work.

The Italian EU-SILC sample contains 19,147 households and 47,551 individuals (40,836 aged 15 and over at the end of the referring income period of time).The income reference period is 2009, while information on the living conditions refers to 2010.

The income variable considered is "HX090" (equivalised disposable income) equal to HX090= (HY020*HY025) / HX050; where HY025 (within-household non-response inflation factor) in Italian case is always equivalent to 1; HX050 is equivalised household size computed with the modified OECD scale, while HY020, the total disposable household income is given by the sum for all household members of gross personal income components (cash or near cash income); company car; gross cash benefits or losses from self-employment (including royalties); unemployment benefits (old-age, survivor, sickness, disability, education-related allowances) plus gross income components at household level; income from rental of a property or land; family/children related allowances; social exclusion not elsewhere classified; housing allowances; regular inter-household cash transfers received; interests, dividends, profit from capital investments in unincorporated business; income received by people aged under 16 minus regular taxes on wealth; regular inter-household cash transfer paid; tax on income and social insurance contributions.

Units of analysis are individuals living in private households and it is necessary to underline that the IT-SILC 2010 data set the individuals aged more than 80 years old were assigned the age of 80; therefore, we are not able to distinguish the differences in age for the over-80s.

The level of education is identified in variable ISTR_C where the educational attainment of a person is recorded, defined as the highest level of an educational programme which the person has successfully completed and the study field of this programme. The educational classification used in ISTR_C is divided into ten categories but are consolidated, in this work, in seven types: "None" (including also illiterate), "primary education", "lower education", "secondary education (2-3)", "secondary education (4-5)"; "tertiary education", "Phd and other".

The self-assessed health status is recorded in PH010. In this variable five answers are proposed: "Very good" and "good" are at the upper end of the scale; "not good, not bad" is an intermediate category that should be translated into "fair"; "bad" and "very bad" are at the lower end.

4.2 Public expenditures on the national health service

According to the government cost approach, the costs for public health care services have been illustrated as indispensable information in order to obtain the value of total health transfer in kind. Below, I will show the procedure used to obtain the expenses in public health care services at regional levels.

The public health care expenditure used in this work is coherent with the values computed in compliance with the European System of Integrated Social Protection Statistics (ESSPROS). The Italian version of Esspros is made available by Istat.

The Esspros ensures a comprehensive and coherent description of social protection in the Member States covering social benefits and harmonising with other statistics, particularly with the national accounts, in its main concepts as *accrual basis*. In detail, the National Account, and consequently in the Esspros, record all transactions on an accrual basis, that is, at the time the events which create the related claims and liabilities occur. In the Esspros, health care is classified as a benefits in kind and these are recorded at the times which the goods are transferred or the services provided, in compliance with accrual basis.

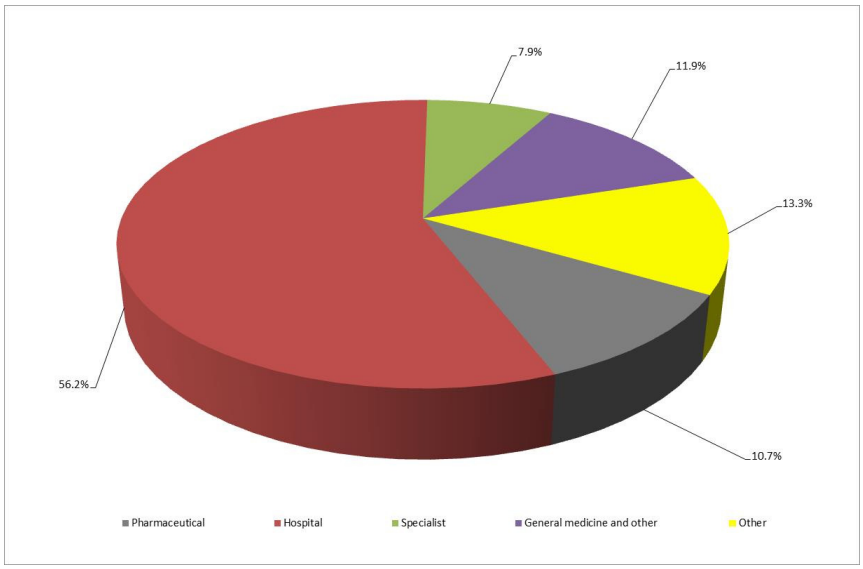
IT-SILC 2010 recorded the income earned in year 2009 and so the health expenditure should also refer to the same year, thereby using the figures according to the accruals basis, in order to ensure the temporal coherence between the income and the value of the in kind benefit.

In Italy in 2009 the health expenditure is equal to 110.474 billion euros where the social protection benefit covered the 92.9% of total expenditure, the administration cost 5.2% and other expenditure the 1.9%

The breakdown of Social Protection Benefit is available in eight types of health services: pharmaceutical, general medicine, specialist, hospital, accredited private hospital, prostheses assistance plus other types of assistance, other assistance and other services. Furthermore, the administration cost and other expenditure have been assigned to the eight types of health services proportional to the share.

Subsequently, the previous eight types of health services are consolidated in five types: pharmaceutical, hospital (including Accredited Private hospital), specialist (including prostheses assistance plus other types of assistance), general medicine and other (including other assistance) and other. The Figure 4.2.1 shows the percentage of each type of health service on the total of the health expenditure. The largest proportion among the health services is hospital expense with 56.2%.

Figure 4.2.1: *Percentage of types of health services (year 2009)*



Source: own computation from Istat

Section 2 shows the central role played by the regions within the Italian health care system, but the same section explains that the NHS is a universal system and so the patients can choose the structure where they will be treated (interregional mobility) throughout the country.

The NHS and MEF take into account the phenomena of interregional mobility, also on the expenditure side, computing the net balance sheet. For each region, the Net lending (+) / Net borrowing (-) is measured as the difference between the total revenue which the region receives from all the regions, the residents of which are treated in that region, minus the money which the region gives to those regions where its residents are treated.

In 2009, Lombardia, Emilia Romagna and Toscana recorded the highest positive interregional mobility, while Campania, Calabria and Sicilia presented the highest negative interregional mobility (see Ministero dell'Economia e delle Finanze, 2010).

Therefore, the regional health care expenditure is obtained using the weights of health care expenditure adjusted to interregional mobility (see Ministero dell'Economia e delle Finanze, 2010).

When I include the interregional mobility in the analysis, very small changes occur in the total expenditure of each region. Consecutively, the regional health care expenditure, split in to five types of health services, has been obtained using the weights available from Esspros.

5. Method

In this paragraph I show the new method of allocating the health expenditure to everybody. The method is still based on the *insurance value approach* but I am introducing a new procedure which solves some problems present in the past works. The method is based on the index of inequality, proposed by Naga e Yalcin (2008), used to obtain a matrix education- health. This matrix will be applied to adjust the weights used by the Ministry of Economy and Finance[2] (MEF) to estimate the health expenditure in the long term.

In order to understand the method better, I will first briefly introduce the method, used into IA, to compute the value of health transfer in kinds, after which I will explain the Naga-Yalcin index, and finally I will show the new procedure.

5.1. Insurance value approach: an introduction

This paragraph show the principal methods used in literature, for the Italian case, to allocate the expenditure in health care. At the same time, it will illustrate the novel features of the approach introduced in this work.

In order to obtain the value of health care for each individual the first step, both in the previous approach and in the new approach, is to compute the per capita expenditure in health care, h_{rk}, adjusted for interregional mobility. The per capita expenditure is obtained as:

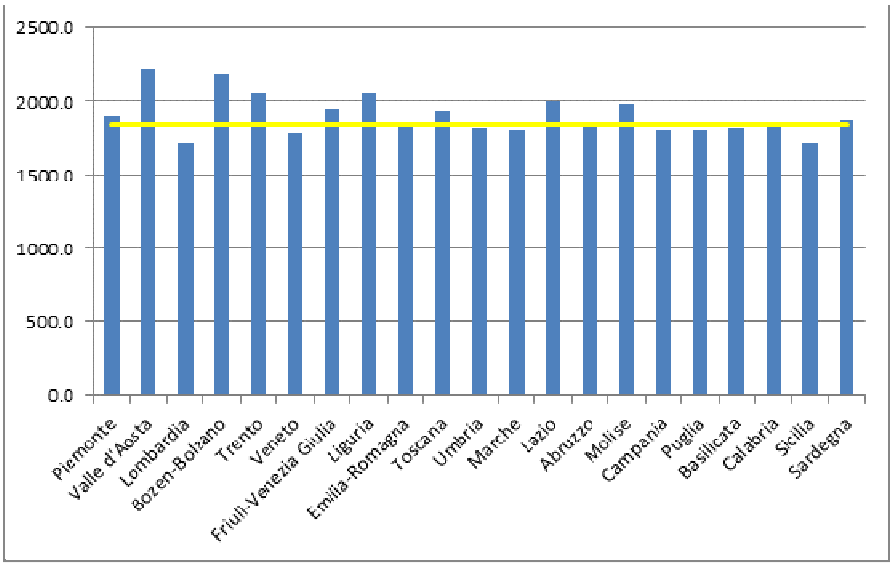
[2] See "*mid-long term trends for the pension, health and long term care systems*"

$$h_{r,k} = \frac{P_{r,k}}{\sum_a n_{a,r}} \qquad (5.1.1)$$

where P is the health expenditure – r are regions (r=1…21), k are types of expenditure in health care – and n_{ar} are inhabitants of the region r (a is the age class).

The results of regionalization of the health care expenditure can be summarize in Figure 5.1.1 which depicts the different levels of per capita health expenditure across the Italian regions.

Figure 5.1.1: *Per capita expenditure in NHS at regional levels (year 2009)*



Source: own computation from Istat

The horizontal yellow line is the average per capita health expenditure in Italy p.a. (1,835 euros), so the figure shows the different levels for each region with a range from a minimum of 1,709 euros per capita in Sicily and a maximum of 2,211 euros in Valle d'Aosta.

Baldini *et.al.* (2006) and D'Ambrosio and Gigliarano (2009) use the breakdown, according to the Ministry of Economy and Finance data, obtaining seven types of specific health service; moreover they use eight age classes as the split used in Ministry of Health. On the other hand, I use the breakdown available in the ESSPROS finding five groups (see section 4.2) of specific health services (k= 1…5); additionally, the age classes are seventeen congruent with the weights of the MEF (see section 5.3) .

The insurance-based approach weighs the per capita expenditure h_{rk} in order to differentiate individuals in terms of health needs. The general equation to obtain the amount of health transfer in kind t is computed as:

$$t_k = h_k \omega_k \frac{\sum n}{\sum n \omega_k} \quad (5.1.2)$$

where *h* and *n* are defined in (5.1.1) and ω are the weights to allocate the health expenditure each for each *k* specific health service. Summing up the *k* types of per capita health transfer, for each individual, the total health transfer in kind *T* is obtained:

$$T = \sum_k t_k \quad (5.1.3)$$

Baldini *et.al.* (2006) choose ω used by the Italian Ministry of Health to allocate the financial resources among regions, and differentiate according to the type of health care drugs, hospital care and specialist care. In this case the implicit assumption is that the benefits from the public health system have the same degree, independent of the health condition of the inhabitants and so the weights remain constant across regions.

D'Ambrosio and Gigliarano, following Zheng (2006), use the income health matrix to compute the individual weights as «the average self-assessed health status of each group identified by region, income, age and gender» (also in this case the age classes are eight).

The approach followed by D'ambrosio and Gigliarano introduces improvements that reduce the discretionary criteria in the allocation of resources. Nevertheless, this approach presents some critical factors. The main drawback is that the Italy has, among the countries in Europe, the highest level of tax evasion and, because of this, survey such as IT-SILC also suffers from the problem of underreporting. The composition of income classes could be distorted, producing a bias in the computation of weights. Furthermore, the only use of the median class for the SRHS, according Allison and Foster (2004), does not make significant elements of distinction.

5.2. Naga Yalcin index

In the literature there is an increasing interest in the use of self-reported health status. This variable could present two principal drawbacks. Firstly, SHRS may appear simple and subjective, but it has been shown to be a powerful predictor of subsequent mortality; Peracchi and Perotti (2010) show that : «male subjective survival probabilities are reasonably close to the longitudinal

predictions from life tables, […], whereas female subjective survival probabilities are always lower than the life-table predictions. This result is consistent with previous evidence on gender differentials in self-assessed health […]». Secondly, SHRS is not a continuous variable like income, but it is qualitative measurement.

This difference introduces a fundamental methodological problem linked with the categories of the variable: in the first case there is a cardinal variable, in the second there is an ordinal variable. While it is possible to compute summary statistics of location and dispersion (e.g. the mean or variance) with the cardinal value and, consequently to calculate the main inequality indices, such as Gini, these operations are not available with ordinal variables (see for example, Kakwani, (1980); Van Doorslaer and Jones, (2003); Allison and Foster, (2004); Erreygers, (2009)). Indeed, as Allison and Foster (2004) have underlined, these conventional inequality indices will be sensitive to the particular scale used to convert subjective health responses to numerical values.

Naga and Yalcin solve this problem proposing a parametric family of inequality indices for SRHS data and derive specific indices within this class. In particular, the authors underline that: «parametric family of indices uses for unique data input the cumulative distribution function, and is thus operational without the adoption of any particular health scale».

Considering a situation where the health status of a person is measured according to a scale $s = (s_1, \dots, s_n)$ in the case of SRHS there is a 5-point scale used to measure responsive class which ranges from very bad to very good. The scale is totally arbitrary and there is a unique restriction such that: $0 < s_1 \leq s_2 \leq \cdots \leq s_n$.

Now, defining z_j as the share of the individual in the class s_j with $0 \leq z_j \leq 1$ such that $\sum_{j=1}^{n} z_j = 1$, and defining a frequency distribution $\theta = (z_1 \dots z_n)$ and a cumulative distribution function Θ (such that $Z_1 = z_1 e\, Z_n = 1$), the inequality index can be defined:

$$I_{\gamma,\delta}(\Theta) = \left(\frac{\sum_{j<m} Z_i^{\gamma} - \sum_{j\geq m} Z_i^{\delta} + (n+1-m)}{K_{\gamma,\delta} + (n+1-m)}\right) \text{with } \gamma, \delta \geq 1 \qquad (5.2.1)$$

Where: $K_{\gamma,\delta} = (m-1)\left(\frac{1}{2}\right)^{\gamma} - \left[1 + (n-m)\left(\frac{1}{2}\right)^{\delta}\right]$ ensure a normalisation whereby the index lies in the interval [0,1], *n* are numbers of responsive classes of SRHS (Very good, good, fair etc) while *m* is the median class. Furthermore γ and δ are the parameters which allow allocation of different judgments regarding inequality below and above the median of the responsiveness distribution.

Conversely, when *m* is different across the overall set of the cumulative distribution function – as demonstrated in Naga and Yalcin (2010) – the following equation is used:

$$I(\Theta) = 1 - \left(\frac{2\sum_{i=1}^{n}|Z_i - 0.5| - 1}{(n-1)}\right) \qquad (5.2.2)$$

5.2.2 is median independent and is derived from 5.2.1, applying γ and δ equal to 1.

In the case of (γ= δ=1) if everyone is in the same category I(Θ) is at a minimum [0], while it is at maximum [1] if half of the population lies in the lowest category and half in the highest category.

Using these indices it is possible to compare measures of pure inequality in responsiveness and not inequality relative to the distribution of economic resources, such as income. In the next section it will be necessary to compute the NY index for the educational level and, in this case, the distributions do not have the same median category, therefore 5.2.2 will be used in this work.

5.3. New approach

Taking into account the criticality shown in the section 5.1, I propose a new method to compute the ω based on the use of Naga e Yalcin index applied on matrix education- health.

There is a strong association between education and health and this relationship has been monitored in different time periods, both in an international context (see Kenkel (1991), Christenson and Johnson (1995), Elo and Preston (1996), Mackenbach *et al* (1999), Deaton and Paxson (2001)) and in Italy (see Rosolia A. (2012)).

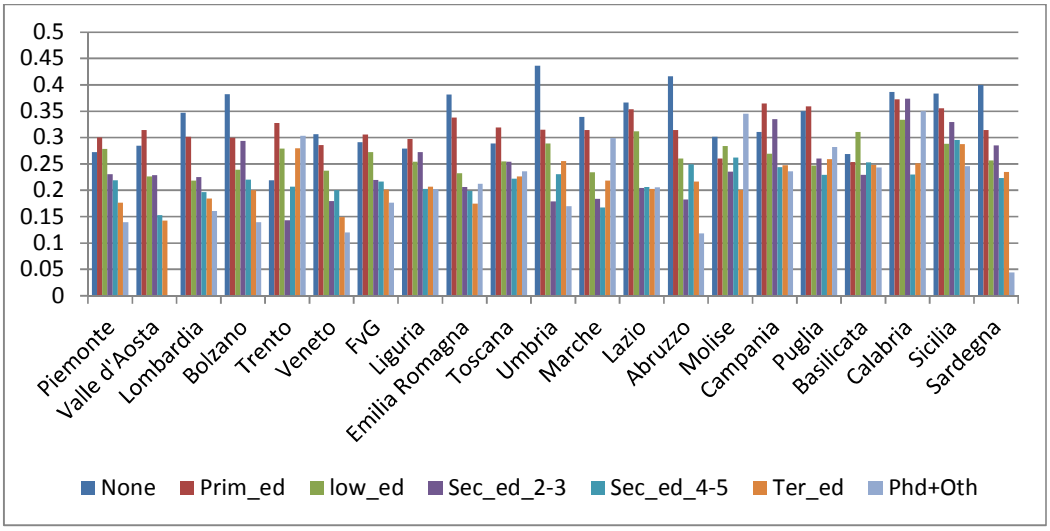
Furthermore, education more fundamental determinant of socioeconomic status and social position, and the educational level is not as underreported as income in surveys.

In order to achieve a new weights w , in the first step I compute for each region r the Naga-Yalcin index, with data on self-reported health status, for education level e[3] (e=1…7) obtaining a vector q^r ($q_1 \ldots q_7$) for each region.

The Figure (5.3.1) depicts the values of the NY index; every region presented a different degree of inequality in health status but, as shown in the picture, the NY index is greater for low educational level than the high educational level; likewise, the Figure 5.31 shows the strong association between education and health status.

[3] The educational level chosen are: none (included also illiterate), primary education, lower education, secondary education (2-3), secondary education (4-5);tertiary education, Phd and other

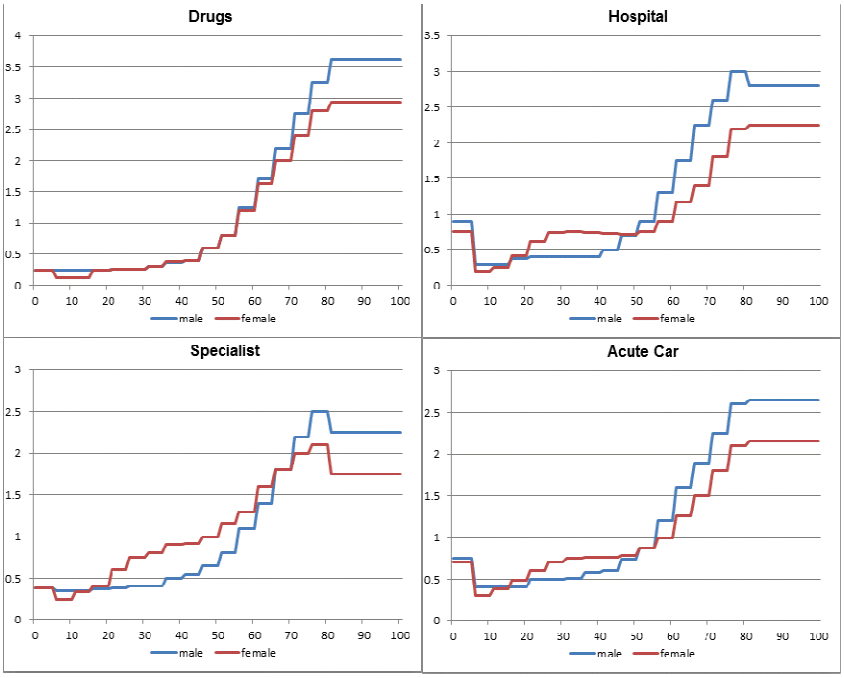
Figure 5.3.1: *Naga Yalcin index for educational level at regional basis (2009)*



Source: own computation from IT-SILC 2010

In the second phase, the relative weight available from MEF (see Figure 5.3.2) is associated with each type of health service. "Hospital" is employed for hospital services, "Specialist" for specialist services, "Drugs" for pharmaceutical services and "Acute care" for general medical services, whereas the weights are not used for the type “other” since its expense is allocated per capita.

Figure 5.3.2: *Health care consumption according to age, gender and type of specific health services*



Source: *own computation from Ministry of Economy and Finance*

Using, therefore, the weights u_a^{gk}: $(u_1^{gk} \ldots . u_{17}^{gk})^T$, specific for age classes, gender *g* (male, female) and type of health consume, I produce for each region, gender and type of health care, the weights matrix W_{ae}^{rgk}, (17x7) (overall 210 matrixes, ten for each region), where the rows representing the age class (a=1..17) and the columns the educational level (e=1…7):

$$W_{ae}^{rgk}, \begin{bmatrix} w_{11}^{rgk} & \cdots & w_{1e}^{rgk} \\ \vdots & \ddots & \vdots \\ w_{a1}^{rgk} & \cdots & w_{ae}^{rgk} \end{bmatrix} \tag{5.3.1}$$

the matrix W_{ae}^{rgk} is obtained as $q^r \otimes u_a^{gk}$ and so each cell is computed as:

$$w_{11}^{rgk} = u_1^{gk} q_1^r; w_{12}^{rgk} = u_1^{gk} q_2^r; \ldots w_{ae}^{rgk} = u_{17}^{gk} q_7^r$$

It is useful to underline that, for the first three age classes a=1,2,3 (0-5;5-10; 10-15), the IT-SILC records for SRHS are missing and so the NY index is not available; in this case I used only u_a^{gk} and so: $w_{11}^{gk} = u_1^{gk} = \ldots = w_{1e}^{gk}$; $w_{21}^{gk} = u_2^{gk} = \cdots = w_{2e}^{gk}$ …etc.;

After the computation of the weights matrix W_{ae}^{rgk}, using equation 5.1.2, it is possible to determinate, for each *k* specific health service, living in region r, the weighted individuals transfer with age *a*, educational level *e* and gender:

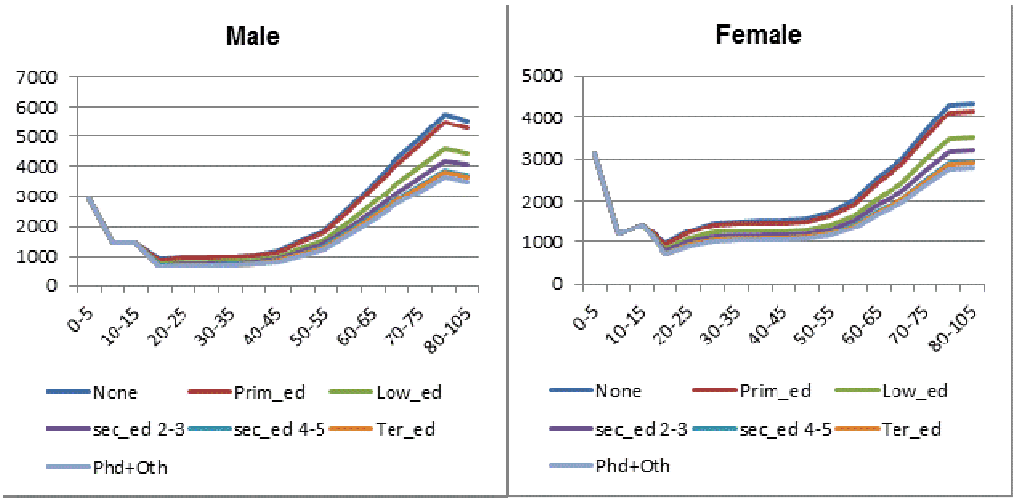
$$t_{ae}^{rgk} = \mathrm{h}_k w_{ae}^{rg} \frac{\sum_{a=1}^{17} n_a^{rg}}{\sum_{a=1}^{17} \sum_{e=1}^{7} n_a^{rg} w_{ae}^{rg}} \tag{5.3.2}$$

Consistent with equation (5.1.3), the total health care transfer in kind *T* for each inhabitants of region r with age *a*, educational level *e*, gender is given by:

$$T^{raes} = \sum_{k=1}^{5} t^{raes} \tag{5.3.3}$$

For all Italians inhabitants, the trend of *T* is shown in Figure 5.3.3. Per capita transfers in kind are higher, both male and female, in the first age group and in those of the elderly; in addition individuals with a lower educational level receive higher amounts.

Figure 5.3.3 P*er capita health care transfer in kind in Italy according to gender, age class and educational level*



Source: *own computation*

The figures in table 5.3.3 show that health care spending is concentrated on the elderly who, in general, have below-average cash incomes (Gardiner *et al*., (1995).

6. Empiric evaluation

In order to verify the effects of the application of the procedure presented in this work, the classical *vs* the new method will be compared in the first part of this paragraph. Using the main inequality indexes the various scenarios are presented in table 6.1[4]: the first column (*Ytote*) describes the base scenario in Italy, when only the cash income is considered. The second column (*Ytotb*) is obtained applying the regionalization health transfers in kind into base scenario, and using the IA (so the per capita health expenditure is attributed to each individual given their relative age and gender group). The value of the Gini index passes from 0.311 to 0.284 decreasing by 8.7%; other inequality indexes also diminish.

[4] *Ytote* is the equivalised disposable income (only cash) for each person; Ytotb is Ytote + transfer in kind allocated with the classical method of IA and regionalization of health care expenditure; Ytots is Ytote + transfer in kind allocated with the new method of IA and regionalization of health care expenditure.

Table 6.1: *Comparison between different methods of insurance value approach*

	Ytote	Ytotb	Ytots
Gini	0.311	0.284	0.283
Δ%		-8.7	-9.1
p90/p10	4.069	3.559	3.54
p90/p50	1.924	1.804	1.789
p10/p50	0.473	0.507	0.506
p75/p25	2.057	1.897	1.888
Theil	0.177	0.148	0.147
within	0.163	0.136	0.135
within %	92.10	92.07	92.01
between	0.0140	0.0117	0.0117
between %	7.90	7.93	7.99

Source: *own computation*

The last column (*Ytots*) describes the result obtained applying the new method presented in this work. The Gini index is 0.283 and diminishes by 9.1%, equal to 2.8 percentage points, if related to the base scenario. At the same time, it is possible to observe how the new method shows a percentage decrease equal to 0.4% also in respected to *Ytotb* (classical method). This difference is mainly due to the accuracy of the new method, which also takes into account other variables (SRHS or educational levels) relative to the age or gender generally used in the literature.

It is also useful to observe the trend of the Theil index. Comparing the *Ytots* with the first column, it is possible to note both the decrease of the value (from 0.177 to 0.147) and the difference in the percentage share of inequality within (from 92.1% to 92.01%) compare to between (from 7.9% to 7.99%) of the regions. Therefore, comparing the two scenarios, if the health in kind transfers of the one hand reduces the total inequality, on the other hand it increases the inequality between regions. This is combined with the different management of the health care at regional level which also entail different values in per capita health expenditure. Applying the new method, therefore, inequality between regions emerges more clearly than the procedure commonly used in the literature.

The difference of income inequality as measured by the Gini index on a regional bases, is presented in table 6.2; it is possible to note that before considering health services, the Gini index is high in Sicily (0.34) and in Calabria (0.32) and comparatively low in Veneto (0.256) and Trento (0.252). When services are included the Gini index falls, on average, by around 10%, deduction rates range from -10.7% (Molise) to -8.2% (Lombardia).

Table 6.2: *Gini index Ytote vs Ytots at regional level*

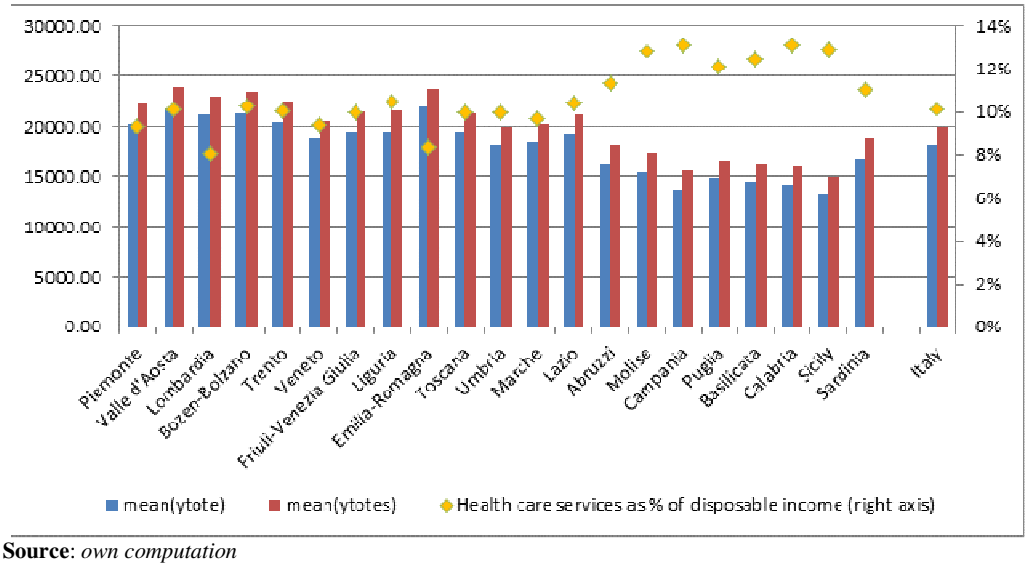
	Gini Ytote	*Gini Ytots*	*Δ%*
Piemonte	0.301	0.273	-9.3
Valle d'Aosta	0.289	0.260	-9.9
Lombardia	0.300	0.276	-8.2
Bozen-Bolzano	0.269	0.242	-9.9
Trento	0.252	0.225	-10.7
Veneto	0.256	0.232	-9.7
Friuli VG	0.271	0.242	-10.6
Liguria	0.281	0.254	-9.8
Emilia-Romagna	0.301	0.274	-8.9
Toscana	0.276	0.249	-9.9
Umbria	0.271	0.248	-8.3
Marche	0.274	0.250	-8.5
Lazio	0.312	0.282	-9.4
Abruzzo	0.274	0.246	-10.0
Molise	0.306	0.273	-10.7
Campania	0.328	0.297	-9.5
Puglia	0.297	0.270	-9.3
Basilicata	0.307	0.276	-10.1
Calabria	0.323	0.292	-9.5
Sicily	0.342	0.308	-9.9
Sardinia	0.276	0.250	-9.4
Italy	**0.311**	**0.283**	**-9.1**

Source: *own computation*

Furthermore, in table 6.2, it is also possible to note that the greatest reduction of the Gini index is present in the regions of the south[5] of Italy.

Considering the impact of the health transfer in kind across the regions, suggests it is useful to observe the data shown in figure 6.1.Taking into account the value of the health benefits in kind described above would the increase individual disposable cash income by 10.1% on average in Italy, or from 18,126 to 19,961 euros.

Figure 6.1: *Income-increasing effect of in-kind benefits from health care services, 2009*



Source: *own computation*

[5] The regions of the of south Italy are: Abruzzi, Molise, Campania, Puglia, Basilicata, Calabria.

The income increasing effect of health care services is highest in the regions of the south of Italy and on the islands[6], with the maximum (13.1%) in Calabria, and lower in the regions of the North Italy with the minimum in Lombardia (8.1%).

The second phase is, therefore, to analyse the increase in individual income resulting from the imputation of services by income groups. Income quintiles are built on the basis of equivalent disposable household income, before and after accounting health in-kind services, with Q1 representing the poorest 20% and Q5 the richest 20% (see table 6.3).

Health care services considered here increase a much higher share of disposable income among those with a lower income than among those with a higher income in each regions: 19.2% of disposable income for the poorest 20% and only 3.1% for the top 20%, so this increase is much more pronounced for the lower income groups and decreases as incomes grow.

Table 6.3: *Income increasing effect of benefits in kind from health services by quintile, regional level, 2009*

	Q1	Q2	Q3	Q4	Q5
Piemonte	20.5	12.0	10.3	7.5	2.2
Valle d'Aosta	18.1	14.3	10.2	8.4	2.2
Lombardia	14.8	12.3	8.3	5.0	1.7
Bozen-Bolzano	22.1	12.5	11.4	8.4	2.6
Trento	21.9	11.1	9.4	6.7	2.7
Veneto	17.0	10.9	8.9	6.8	1.6
Friuli-Venezia Giulia	18.0	11.8	10.9	6.6	5.3
Liguria	18.5	14.9	11.1	8.8	6.1
Emilia-Romagna	18.1	13.1	8.2	5.9	2.2
Toscana	18.8	14.4	9.7	6.1	1.9
Umbria	15.8	14.0	9.2	8.7	1.8
Marche	14.9	13.0	10.3	7.9	7.9
Lazio	21.7	16.9	10.8	6.2	1.6
Abruzzo	21.7	12.7	9.2	10.8	3.9
Molise	31.3	14.6	15.5	8.3	2.3
Campania	19.0	18.4	14.8	9.7	4.2
Puglia	20.5	16.9	14.3	9.7	2.4
Basilicata	22.2	17.5	12.3	10.3	5.6
Calabria	20.6	17.1	16.0	11.5	1.7
Sicilia	23.7	18.1	14.2	12.5	4.0
Sardegna	18.7	13.2	12.4	7.3	5.0
Italy	**19.2**	**14.8**	**10.6**	**7.7**	**3.1**

Source: *own computation*

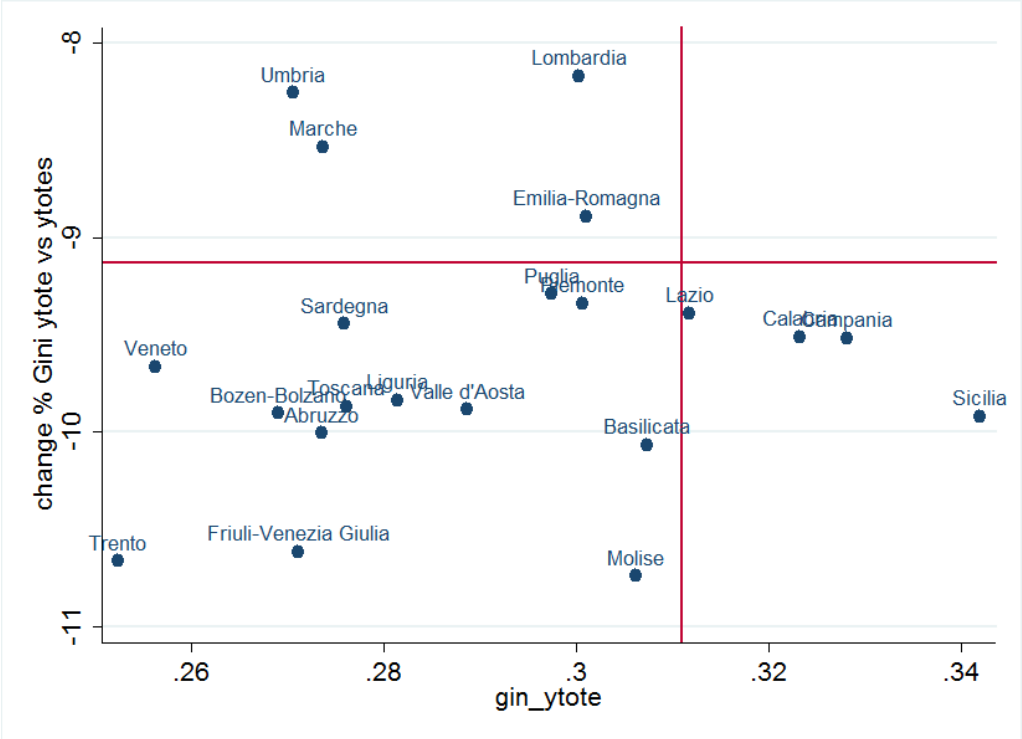
This pattern is especially strong in the regions of the south Italy and, in particularly, to Molise (31.3%) and Sicily (23.7%) where health care increases disposable income in the bottom quintile, whereas in the Marche the top quintile increases about 8%.

[6] The regions of the islands are: Sicily, Sardinia

Figure 6.2, centred on the average (values in Italy), shows for every region, the change in percentage of the Gini index (y axes) after assignment of the total health care transfer in kind in comparison with its starting point before assignment (x axes). The main purpose of the graph is to show to what extent regions starting with a Gini Index higher than average tend to reduce it.

Several facts are highlighted by the graph. First, four regions (Lazio, Calabria, Campania and Sicilia) which had a Gini index over the average before the transfer, reduced it to under the average after the allocation of *T*. Conversely, after the transfer *T*, in Umbria, Lombardia, Marche and Emilia Romagna, the inequality decreases to below the average. In these eight regions, therefore, there is convergence, whereas the other thirteen regions do not converge.

Figure 6.2: *Income-increasing effect of in-kind benefits from health care services, 2009*



Source: *own computation*

Lastly, the lack of convergence after the value of health care services is allocated could be predominantly due to the different management of the health care at regional level.

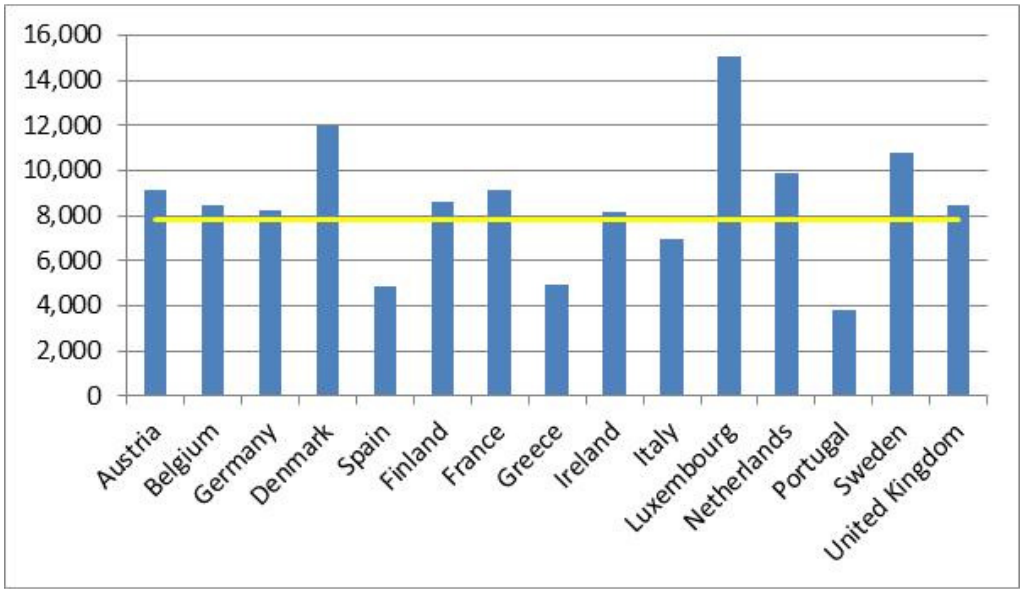
* * *

In this section will be briefly analyzed the trends, in European countries (EU-15), of the variables used in this paper in order to show the possibility to apply the new approach also in international context. Likewise, it is useful to highlight that the "extended income" in EU-15 will not be computed in this section.

The Figure 6.3 depicts the different levels of per capita health expenditure across the European Countries (EU15). The horizontal yellow line is the average per capita health expenditure (7,846 euros), so the figure shows the different levels for each country with a range from a minimum of 3,812 euros per capita in Portugal and a maximum of 15,081 euros in Luxembourg.

The broad range proves the necessity of to use the "extended income" when the income inequality is observed and compared in international context (Garfinkel *et. Al* (2006).

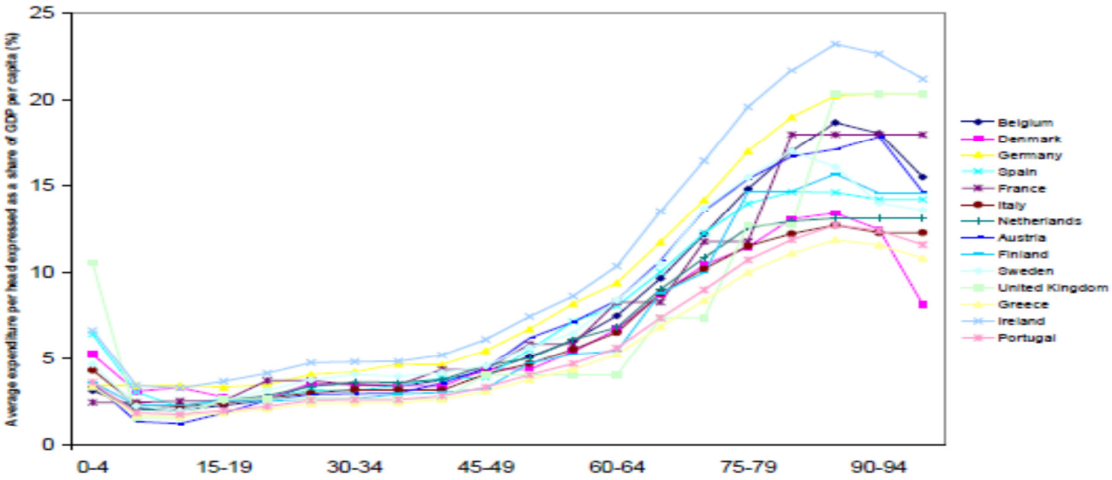
Figura 6.3: *Per capita expenditure in NHS in EU-15 (year 2007)*



Source: *own computation from Eurostat*

The Health care consumption – according to age for each European country – is a key variable in order to apply the new approach. As shown in Figure 6.4, the Health care consumption depicts the "S" shape, as in Italian case (see figure 5.3.3), where the consumptions are higher in the first age group and in those of the elderly; moreover it is useful underline, for instance, as in Ireland the Health care consumptions are higher than in Denmark.

Figura 6.4: *Health care consumption according to age in EU-15*

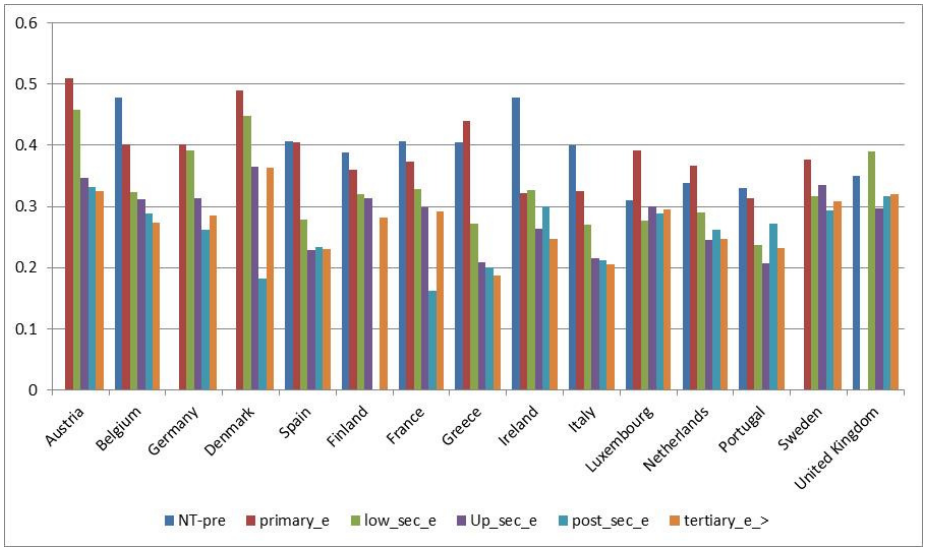


Source: *Enepri*

Figure 6.5, instead, shows the values of NY index computed for educational level. The availability of the NY index is necessary to obtain a matrix education- health, used it later to compute the weights matrix. The latter is used to determinate, for each *country*, the weighted individuals transfer in according to age and educational level.

The trends depicted in Figure 6.5 confirm (see section 5.3) the strong association between education and health status and, likewise, the NY index is greater for low educational level than the high educational level.

Figura 6.5 *Naga Yalcin index for educational level in EU-15 (2007)*

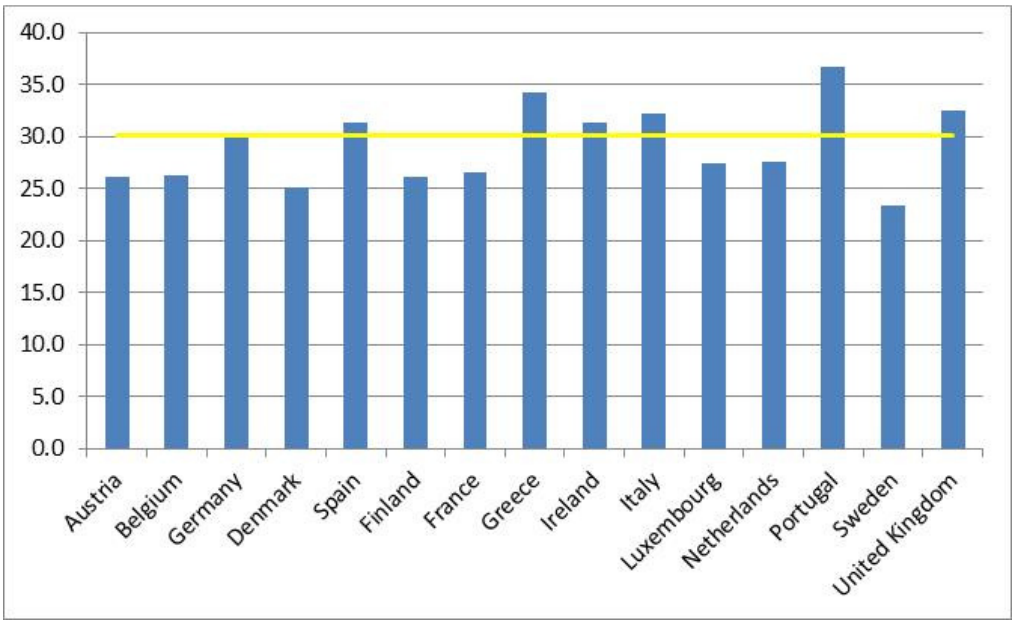


Source: *own computation from Eurostat*

Finally, considering publicly provided services (health care) in the cash income – estimating "extended income" (cash + health in kind transfer) – it is possible to compare the changes in the Gini index between EU country.

The Figure 6.6 depicts the of the Gini index in EU-15, computed only for cash income. Portugal, Greece, UK and Italy show values above the EU-15 average (30.2) (yellow line), while a lowest inequality is observed Denmark (25.2) and Sweden (23.4)

Figura 6.6 *Gini index (cash income) in EU-15 (2007)*



Source: *Eurostat*

In a future research, applying the new approach, will be verified if the income inequality changes between EU country, when we take into account the transfer in kind, as well as shown in this paper for the Italian case.

7. Concluding comments

As in an international context, the in kind benefits are added to cash income in order to compare different welfare systems across the countries, also in Italy, in this work I added the in kind benefits to cash income, obtaining extended income to compare the differences in the health care systems at regional level.

This paper extends previous analyses using a new method to allocate the value of health care services, still based on the *insurance value approach,* but applying the Abul Naga and Yalcin index in order to obtain a matrix education- health. This index computes a parametric family of inequality indices for SRHS data and derives specific indices within this class. This procedure, therefore, improves the classical *insurance value approach* constructed solely on age and gender.

Applying the new method on data IT-SILC 2010, the results confirmed that the benefits in kind (health care) have a redistributive effect, reducing income inequality and further increasing the share of disposable income among the lower income group than among the higher income group in each region, especially in the regions of South Italy.

I show that the health in kind transfers, on the one hand reduce total inequality – the Gini index falls, on average, by around 10% –, on the other hand, they increase inequality between regions by around 1%, as shown by the Theil index (inequality between). This is especially due to the different management of health care at regional level which also entail different values in per capita health expenditure.

Applying the new method, therefore, inequality between regions emerges more clearly than the procedure, *insurance value approach,* commonly used in the literature.

The new procedure, *mutatis mutandis*, can be applied to compare the effects of benefits in kind not only inside the individual country, as in this work, but also among all European or OECD countries.

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