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Evidence from the Italian NHS

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# What happens to interregional redistribution as decentralisation goes on? Evidence from the Italian NHS

## Abstract

In this paper we explore how political pressures for an increased decentralisation of revenue and expenditure competencies to sub-national governments may affect the degree of interregional redistribution accomplished by the public sector. We do this by focusing on a specific case, that of the National Health Service (NHS) in Italy. We estimate redistribution across regional jurisdictions by the NHS under the current institutional setting and under hypothetical alternative decentralised scenarios. Using actual regionalised public budget data for the years 1999-2006, we find that the NHS reduces differences in regional per-capita GDP by about 7% of GDP. This effect amounts to approximately 16% of redistribution by the total public budget and is largely driven by NHS expenditures. We then show that these results are subject to significant changes under alternative scenarios of intergovernmental relations, which we construct consistently with current instances emerging from the Italian debate on fiscal decentralisation reform. We show that political pressures for lower central government involvement in decentralised policies, such as health care, may result in lower levels of income redistribution across Italian regions.

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## 1. Introduction

The public budget redistributes resources across citizens (interpersonal redistribution), levels of government (intergovernmental redistribution) or across sub-national or regional territories (interregional redistribution). Interregional redistributive effects may result from policies and programmes purposely designed for that aim (e.g. investments to fill infrastructure gaps, intergovernmental transfers), or from policies and programmes pursuing interpersonal redistribution (e.g. health care, social policies, education, income support). In the latter case, regional redistributive outcomes are an unintended by-product and occur when the personal attributes relevant for accessing welfare state programmes' net benefits are heterogeneously distributed across regions.

As maintained by most of the literature, income redistribution is more efficiently accomplished by the central government (Musgrave, 1959). Recent trends towards a more decentralised setting of intergovernmental fiscal relations, which characterise a number of western countries (OECD, 1997; Joumard and Kongsrud, 2003) as well as many developing countries (World Bank, 1997; Bird and Vaillancourt, 1998), suggest that existing levels of income redistribution across territories may be substantially revised in response to decentralization: when a former central government uniform policy is transferred to the autonomous responsibility of regional governments and these are allocated the former sources of financing, if the latter are not uniformly distributed across regions, then we may expect the interregional redistribution formerly carried out the central government policies is heavily weakened.

While the demand for decentralisation is generally driven by concerns for higher efficiency, increased revenue and expenditure autonomy at the local level, wider differentiation of services across the country and increased accountability of political decision makers (Oates, 1999; Tanzi, 1996), in some cases it is also sustained by localised preferences for lower degrees of solidarity across regions with different needs and fiscal endowments (for instance in the political debate in Germany before the 2006 reform, in Belgium and in Italy)<sup>1</sup>. In addition, when a former central government function is decentralised both as regards revenue and expenditure, if some degrees of equity across the country are desired – for instance to guarantee all citizens uniform

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<sup>1</sup> See for example Bird and Ebel, 2007 and Calsamiglia, Garcia-Milà and McGuire, 2006.

minimum service standards – then explicit vertical or horizontal equalisation schemes may be needed to top up own resources of regions with lower fiscal endowments and/or higher needs. While these schemes may not entail any change to the flows of resources from richer to poorer territories that were implicit in the formerly centralised setting of intergovernmental relations, they however make more explicit who is gaining and who is losing, and how much. Thus these schemes may produce, or further foster, requests for a reduction in the level of interregional solidarity and redistribution.

Italy is a country with stark regional differences in terms of per-capita income, population structure and economic development. Moreover public budget in Italy strongly redistributes income across regional jurisdictions (Decressin, 2002) primarily as a result of the intervention of the central government and social security institutions (Arachi *et al.*, 2009). Italy has also recently experienced strong political demands for the decentralisation of public functions. Since the early 1990s the Italian institutional setting has undergone radical reforms pursuing higher decentralisation of revenue and expenditure responsibilities (Arachi and Zanardi, 2004), primarily from the central government to the regional government tier. Although these processes are not yet completed, intergovernmental fiscal relations are significantly reformed: a number of public functions have been decentralised and, according to a recent Constitutional reform, others should soon follow.

The Italian National Health Service (NHS) provides an interesting perspective on the intertwining of decentralisation processes and interregional redistribution for two reasons, both strongly connected to the peculiarities of the Italian institutional arrangements. First, health care is one of the major fields of public intervention. Second, by the Italian Constitution health care is now assigned to regional competency, but the central government still plays a significant role in the structure, operation and funding of the NHS. In particular, on the expenditure side, the central government sets minimum service standards which all regions should meet. It correspondingly runs vertical equalising transfers to regional governments, in order to top up regions' own revenues and allow minimum standards to be offered all over the country. Hence citizens are guaranteed equal minimum health care services regardless of where they live and of their participation to the funding of health care programmes. Given that average per-

capita income and average tax contributions are unequally distributed across regional jurisdictions, these arrangements have potentially high redistributive effects.

In the lively Italian political debate on decentralisation, the NHS will be probably invested in the in the foreseeable future by requests for a weakening of the interregional redistribution currently carried out by central government equalizing transfers. This may imply a reduction of minimum service standards set by the central government and, as a consequence, may result in substantial disparities in health care services provision across territorial jurisdictions, due to differences in regions' own tax resources.

The aim of this paper is twofold. Firstly it provides estimates of the interregional redistribution currently carried out by the NHS in Italy. Secondly it evaluates the possible impact of political pressures for further decentralization on income redistribution across regional jurisdiction accomplished by the NHS. As a consequence the paper is organised as follows. After a discussion about the main features of the Italian NHS and the methodological issues raised by the estimation of interregional redistribution produced by this public programme (Section 2), Section 3 presents the results on this evaluation under the current institutional setting. These results are also compared with redistribution accomplished by the overall public budget and investigated in terms of the progressivity of the NHS. Then Section 4 evaluates the impact of the future fiscal federalist reform on the interregional redistributive effects of the Italian NHS, on the basis of different assumption on minimum standards of health care services and funding mechanism. Section 5 concludes.

## **2. Institutional and methodological background**

### **2.1. The Italian NHS: fundamental facts**

The NHS is one of the most important public programmes in Italy: the provision health care services accounts for about 14% of the general government total expenditure (2006). As the result of a sequence of major reforms in the 1990s funding and organization of service provision in the Italian NHS is increasingly falling within the regional governments' competence. In Italy, like in many western countries, decentralization is seen as an attractive framework for health system organization and

management, incorporating elements of local control with hoped-for efficiencies in the management of financial and human resources (Banting and Corbett, 2002; Dirindin and Pagano, 2001). As a result of this process, the Italian NHS is currently organized into two tiers: the central government, which has programming and funding responsibilities, and the 21 regional governments, which supervise the provision of health care services in their jurisdiction and apportion the overall financial resources to the productive units (approximately 200 Local Health Units (LHU) and 100 Independent Hospitals over the country).

Each LHU is, under the supervision of the corresponding regional government, directly responsible for the provision of comprehensive care to its entire resident population, regardless of income or occupational status. The regional governments allocate resources among different productive units and also hold some tax-raising powers in order to (partially) fund the delivery of health care services and pick up their LHUs' deficits if actual costs exceed the relevant standards. In addition, regional governments are entitled to charge users with co-payments for the provided services.

Despite this devolution of spending and tax-raising responsibilities, the central government still retains a critical role in ensuring that all citizens have uniform access to health care. To this end the central government sets minimum standards of health care services to be provided by all regional governments and manages a vertical (from the central government to the regions) equalization mechanism in order to transfer funds to those regions that, given the strong interregional differences in the distribution of the regional tax bases, are unable to fully fund minimum standards.<sup>2</sup>

Finally, the reform of the financing system of decentralized governments adopted in 2009 confirms, and even strengthens, this institutional framework. The central government has exclusive legislative powers to set minimum levels of public services, when those services refer to citizens' civil and social rights, to be provided uniformly all over the country. Health services, like education, child care and income support, certainly fall into this area. Moreover the reform requires that for those services a

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<sup>2</sup> Actually the funding of minimum standards is accomplished by an annual decision about the total amount of national public resources to be devoted to health care sector resulting from lengthy central government-regional governments negotiations. The total amount of resources is then allocated across regions according to a formula which fundamentally takes into account the overall dimension and the composition by age groups and gender of regional populations and a set of territorial epidemiologic indexes.

system of equalizing transfers providing for full financing of standardized expenditure needs in different regions should be applied, regardless of different fiscal capacities across regions.

As a result of these institutional arrangements, regional governments' revenues currently financing the NHS can be grouped as follows:

1. *regional taxes*, amounting to 42% of total revenues of the NHS (in the average of 1999-2006), including the regional business tax (IRAP) and the regional surtax on personal income tax;
2. *central government transfers*, including the *National equalizing fund* (amounting to 49% of total revenues and mainly financed by a tax sharing of national VAT) and the *National health fund* (amounting to 4% of total revenues and financed by central government receipts);
3. *co-payments for services*, directly levied by regional governments and amounting to 4% of total revenues.

In addition deficit financing has been occasionally used to meet expenditures.

The composition of the sources of financing shows the enduring relevant equalising role of the central government. Indeed, as a result of the combination of minimum standards of health care services, of central government commitment to top up regions' own revenues, and of strong interregional differences in regional fiscal capacities devoted to health care financing, the Italian NHS produces a strong redistributive effect across territorial jurisdictions. Moreover, the decentralization of taxing powers to the regional level of government, by requiring a transparent intergovernmental equalizing transfer system, makes more evident the size of this redistribution across regional jurisdictions.

However the interregional redistributive power implicit in this institutional framework is conditional on the levels of health care needs that the central government actually decides to finance in different regions. As decentralisation discloses the interregional redistributive role of the public budget, the scope of the current interregional solidarity may be brought into question. In particular, in sectors such as health care, where expenditure needs equalisation requires the setting of minimum service standards, if strong taxing powers are assigned to regional level, rich jurisdictions have incentives to support low "minimum" standards only, and thus to limit interregional redistribution.

## **2.2. The evaluation of interregional redistribution: methodological approach**

### **2.2.1. The data**

The role of the public budget in redistributing income across different jurisdictions has been analysed in a number of studies.<sup>3</sup> Most studies that estimate regional redistribution by the public budget regress a regional “activity” variable (output or income) including net transfers from the public sector on the same regional variable before net transfers across regions. Estimates of regional redistribution may be computed with reference to the action of the general government or of single levels of government (central government, regional governments, local governments). Net transfers may be measured through *fiscal balances*, that is the difference between total expenditure by a given level of government in a given region (net of transfers to other levels of government) and total revenues by that level in the same region (net of transfers from other levels). Revenues and expenditures should be allocated to regional territories according to the benefit principle, that is to the territory residents of which pay the contributions and receive the benefits. This allocation may be significantly different from that resulting from the cash-flow – or expenditure – principle, which assign resources to the jurisdiction of the government actually collecting revenues or paying out expenditures. In order to estimate the redistributive effects of public intervention in the NHS, and then to compare them with redistribution accomplished by the overall public budget, data on regional revenues and expenditures by the public sector respectively for health care and for total programmes are needed. Therefore we collected two different datasets for Italy, both covering the years 1999-2006. The starting year is set at 1999, a year that marks a significant discontinuity in the structure of health care revenues, due to radical changes implemented in the financing of the NHS. Data are referred to the 15 Ordinary Statute Regions (OSRs) only, excluding the 5 Special Statute Regions (SSRs), due to their peculiar financing structure and spending autonomy.

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<sup>3</sup> Italianer and Pisany-Ferry, 1992; Sala-i-Martin and Sachs, 1992; Von Hagen, 1992; Bayoumi and Masson, 1995; Obstfeld and Peri, 1998; Decressin, 2002; Mélitz and Zumer, 2002; Padovano, 2007; Arachi et al., 2009.



The *General report on the national economy (Relazione generale sulla situazione economica del paese)*, published each year by the Italian Ministry of economy, records revenues and expenditures by regional governments for NHS programmes on a cash basis. Table 1 and figure 1A show these data for OSRs in per-capita terms on the average over the period 1999-2006. Per-capita expenditures are quite similar across different regions, although slightly lower in southern regions and greater in little regions (Liguria, Umbria and Molise) and in some regions incurring in large deficit (Lazio). As mentioned in Section 2.1., expenditures largely reflect the criteria the central government follows to assign resources from the equalizing fund in order to supplement regional tax yields devoted to health care financing: differences in the composition of regional populations in age and gender; differences across regions in a number of epidemiologic indexes; differences across regions in mortality rates, etc. Given the equalizing nature of the central government transfers, regional taxes and transfers show opposite patterns across different regions. Given the moderate variability of regional expenditures, the regions where tax yield is high receive little grants from the central government, and the opposite occurs in the poor regions.

TABLE 1 APPROXIMATELY HERE

FIGURE 1A and FIGURE 1B APPROXIMATELY HERE

For our purposes, that is to measure interregional redistribution accomplished by the NHS, these data on expenditures and revenues should be adjusted under three respects:

1. to re-allocate revenues and expenditures across regional governments according to the benefit principle instead of the current cash-flow approach;
2. to remove the equalising component of the NHS financing mechanism;
3. to offset excess revenues (surpluses) or excess expenditures (deficits).

As regards the first point, data recorded by the *General report* does not reflect revenues collected by each regional government from, and expenditures paid to, residents of its jurisdiction. With reference to expenditures, although benefits are mostly delivered by regional governments (through the LHU and Independent Hospitals) to their own constituency, in some cases benefits may accrue to residents of other jurisdictions. This is particularly notable in Italy, due to the significant interregional mobility of NHS

patients (especially from southern to northern regions). Therefore in order to measure the benefits from health care programmes to each constituency, the raw data on regional expenditures are adjusted for net expenditures for interregional patient mobility.<sup>4</sup>

As for regional government revenues, these are recorded by the *General report* and disaggregated by source of financing (regional taxes, central government transfers, co-payments for services). Again, they may include resources collected from other constituencies, in particular due to the relevant role still played by central government transfers in the financing of the Italian NHS. Vertical transfers from the central government are financed through central government tax revenues, the source of which is not necessarily located in the jurisdiction where they are then transferred to. As stated in point 2, the equalising component of the NHS financing mechanism need to be netted out in order to derive the regional distribution of revenues according to the benefit principle and thus vertical transfers need to be re-allocated to the jurisdiction where they were collected. This is done by re-regionalising the two funds of interregional transfers working in the NHS (the *National equalising fund* and the *National health fund*) according to the regional distribution of central government receipts. The *National equalizing fund* is re-regionalised according to the regional distribution of VAT receipts, and the *National health fund* is re-regionalized according to the regional distribution of overall central government taxes. This amounts to netting out central government vertical transfers from regional governments budgets and transforming them in horizontal transfers among regions. Therefore we implicitly transform the actual vertical equalisation scheme into an implicit horizontal equalisation scheme. No adjustment is applied to the other sources of regional governments' revenues: regional taxes and co-payments for services. For the former, we assume that each regional government collects revenues from its own constituency only.

Finally, regional governments' revenues and expenditures are adjusted to offset excess revenues (surpluses) or, more frequently, excess expenditures (deficits). When calculating fiscal balances, we take into account that they have two components (as clearly recognised by Ruggeri, 2008): the first is the balanced budget component that is the part of fiscal balances that, for the overall country, records the same amounts for

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<sup>4</sup> Net expenditures for inter-regional patients mobility are recorded by the *General report* for each region  $i$  as expenditures for services to non-residents less expenditures by other regional governments for services to the residents of region  $i$ .

revenues and expenditures. The second component is overall excess revenues or expenditures (surplus/deficit). The essential difference among the two components does not rest in their redistributive power, but in their intertemporal nature. Both components impact on the regional distribution of economic activity in the year when they are registered, but in an intertemporal perspective one can expect the deficit/surplus component to be netted out, as deficits or surpluses cannot be maintained indefinitely. We therefore isolated the balanced budget component of fiscal balances to separately estimate its redistributive effects.

After these adjustments, expenditures of the NHS in different regions can be regarded as benefits from the NHS, whereas, by the same token, revenues can now be considered as contributions paid in each jurisdiction to finance the NHS. The results of this change in perspective are illustrated in table 2 and figure 1B. Per-capita benefits show a pattern quite similar to per-capita expenditures, that is they are distributed almost homogeneously across regions, albeit now they are a bit lower in northern regions, and higher in southern regions, compared to per-capita expenditures given the south-north direction patients' mobility. The major impact is actually on revenues. After removing the equalizing effects of central government transfers, per-capita contributions end up being strongly correlated to regional GDP, higher in richer regions and lower in poorer ones. As a consequence, the shape of figure 1B compared to figure 1A dramatically changes: whereas, before the adjustments, the regions were highly concentrated around the average value of per-capita revenues, now they are widely spread along the vertical axis (contributions).

Fiscal balances, derived for each region, as said before, as the difference between benefits and contributions, give a preliminary picture of the main patterns characterizing interregional fiscal flows accomplished by the NHS (see again table 2). First, there is substantial redistribution from the wealthier to the poorer jurisdictions (i.e., those with per-capita GDP above or below the national average). Moreover, the size of the fiscal balances is to some extent correlated with the surface area of the region – generally higher in smaller regions (Liguria, Umbria, Molise, Basilicata). Figure 2 gives a summary description of the distribution of per-capita fiscal balances implicit in the NHS across the OSRs.

As for the general government, the data are taken from the *Territorial public accounts* (*Conti pubblici territoriali*) currently produced by the Ministry of the economic development, and previously by the Ministry of Economy. The *Territorial public accounts* provide the allocation of revenues and expenditures flows collected/paid by each different level of government (central government, regional government, local government, social security institutions) across the 20 Italian regional territories. These are as well adjusted to transform the territorial allocation of public revenues and expenditures from a cash-flow approach to a benefit approach. In particular, expenditures are adjusted applying different procedures to different kinds of goods (pure public goods, pure private goods, mixed goods), and data on regional expenditures for healthcare are again adjusted for interregional patient mobility.<sup>5</sup> Once these adjustments have been applied, the per-capita fiscal balances corresponding to the difference between benefits and contributions of general government total budget have been derived for each regional jurisdiction. The results are reported in the last column of table 2.

TABLE 2 APPROXIMATELY HERE  
 FIGURE 1A and FIGURE 1B APPROXIMATELY HERE  
 FIGURE 2 APPROXIMATELY HERE

### 2.2.2. Specification of the econometric model

Starting from the regional fiscal balances calculated as reported in Section 2.2.2., first of all we derive a summary measure of the interregional redistribution accomplished respectively by the NHS and the overall public intervention. We take per-capita regional GDP as a measure of economic “activity” before net transfers from the public sector. Following the approach proposed by Bayoumi and Masson (1995), as later developed by Mélitz and Zumer (1998, 2002), applied to Italy by Decressin (2002) and partially modified by Arachi *et al.* (2009), a summary measure of interregional redistribution can be derived by running an OLS estimation on the following model:

$$\tilde{y}_u = \alpha_2 + \beta \tilde{x}_u + \eta_u \tag{1}$$

where:

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<sup>5</sup> The adjustments applied here are thoroughly described in Arachi *et al.* (2009).

- $i (=1, \dots, 15)$  and  $t (=1999, \dots, 2006)$  respectively denote the regions and the year;
- $\eta$  is the error term;
- $y_{it} = \frac{Y_{it}}{\sum_{j=1}^{15} Y_{jt}}$  and  $x_{it} = \frac{X_{it}}{\sum_{j=1}^{15} X_{jt}}$  (2)

where  $X_{it}$  is per-capita GDP in region  $i$  and year  $t$ , while  $Y_{it}$ , is given by  $X_{it}$  plus the corresponding fiscal balance; all variables are divided by nationwide values to control for shocks that are common to all regions and may be absorbed via the national budget;

- tildes denote the trend component of  $y_{it}$  and  $x_{it}$  over time isolated by applying the Hodrick and Prescott (1997) filter.

The amount of redistribution is given by  $1 - \beta$ . For example, if  $\beta = 0.9$ , then a region with per-capita GDP 1 euro higher than the average ends up with disposable resources 90 cents higher than the average, implying a redistribution of 10% of GDP.

### 3. The redistributive effects of the NHS under the current institutional setting

#### 3.1. The results

The estimated values of regional redistribution by the NHS and total public budget – when only the balanced budget component is taken into account – are reported in table 3 (column 2). The table also presents the effect of benefits only (the effects of contributions in isolation can be derived as a difference between the overall effect of fiscal balance and the effect of benefits alone) derived by considering as endogenous variable the per-capita GDP plus benefits.

The NHS significantly reduces differences in per-capita GDP across regional jurisdictions (by 7% of GDP). The bulk of the redistribution in health care can be ascribed to benefits from public expenditures (5.2% of GDP, that corresponds to 75% of total interregional redistribution). This result can be easily predictable by examining figure 1: benefits levels are very similar across Italian regions, which conversely differ significantly in terms of per-capita GDP, and this suggests strong redistributive flows from higher to lower-income regions. Fiscal contributions play only a minor

redistributive role: the mix of taxes used to finance health care are only poorly progressive with reference to GDP.

Compared to the NHS only, the general government total budget has much larger interregional redistributive effects (39.8% of GDP). Again this effect is mainly driven by the regional distribution of benefits and less by contributions. General government contributions, however, redistribute relatively more than NHS contributions: almost 40% of total redistribution compared to only 25% of redistribution in the case of the NHS.

Finally the lower section of table 3 reports the estimated degree of redistribution under the hypothesis that the NHS is totally financed by central government transfers and therefore the distribution of contributions corresponds to that one of central government tax revenues. Under this hypothesis, that is equivalent to the case of a totally centrally financed NHS, interregional redistribution turns out to be lower (6.6% of GDP) than that in the current financing structure of the NHS (as mentioned before, 6.9% of GDP). In other terms interregional redistribution is enhanced, rather than contained, by the decentralisation process. This is due to the main tax source actually devolved to regional governments, i.e. the regional business tax (IRAP). The distribution of the tax base of IRAP is highly polarized between low and high-income regions and this raises the need of stronger redistribution by equalising transfers managed by the central government.

TABLE 3 APPROXIMATELY HERE

### **3.2. On the progressivity of the NHS**

As observed in Section 3.1, NHS has a much smaller redistributive impact compared to overall public intervention. However this does not necessarily imply that health care programmes have a low redistributive power. It may rather result from the limited financial dimension of the NHS compared to public programmes as a whole (as mentioned before about 14% of total public expenditures). In order to investigate the interregional redistributive properties of the NHS, it is useful to resort to a different measure of redistribution, by adapting the Reynolds-Smolensky index for redistribution

originally developed for taxes only. Equations 3 and 4 report the Reynolds-Smolensky-type index of redistribution respectively for contributions and for benefits. In the former case it is defined as twice the area between the concentration curve for regional GDP less contributions and the Lorenz curve for regional GDP before public intervention, in the latter as twice the area between the concentration curve for regional GDP plus benefits and the Lorenz curve for regional GDP before public intervention:

$$RS_T = 2 \int_0^1 [L_{GDP-T}(x) - L_{GDP}(x)] dx \quad (3)$$

$$RS_G = 2 \int_0^1 [L_{GDP+G}(x) - L_{GDP}(x)] dx \quad (4)$$

Table 4 reports the values of the Reynolds-Smolensky index calculated both for the NHS and for all public programmes distinctively for benefits and for contributions. A comparison with table 3 shows that the Reynolds-Smolensky index is consistent with the results drawn from the regression analysis: both the benefits and the contributions components of the NHS have a redistributive impact on regional GDP, with the former playing a greater role than the latter. However the redistributive effects of NHS are more limited than that one of the general government total budget for both benefits and contributions.

A more thorough evidence about the interregional redistributive properties of NHS benefits and contributions can be attained by decomposing the Reynolds-Smolensky index (see Kakwani, 1977 for taxes and the extension to benefits by Lambert, 2001). In particular, the following identities holds, respectively for contributions and for benefits:

$$RS_T = \frac{\bar{t}}{1-t} \cdot KAK_T \quad (5)$$

$$RS_G = \frac{\bar{g}}{1+g} \cdot KAK_G \quad (6)$$

that says that the Reynolds-Smolensky index is equal to the product of a measure of the programme incidence (where  $\bar{t}$  ( $\bar{g}$ ) is the average contribution (benefit) rate)<sup>6</sup> and an index of the programme departure from proportionality (the Kakwani index – KAK).

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<sup>6</sup> Although we imposed that total contributions and total benefits are equal year by year, the average contribution and benefit rates are not equal for the period 1999-2006 (see table 2) due to the construction procedure we adopted. Regional data have been standardised and expressed in current prices by applying a regional price deflator, in order to allow the comparability of contributions and benefits of different years and regions. As a result total contributions and benefits are no more equal and consequently average rates differ.

The specification of this latter index is based on that introduced by Kakwani (1977) for taxes and is extendible to benefits as follows:

$$KAK_T = 2 \int_0^1 [L_{GDP}(x) - L_T(x)] dx \quad (7)$$

$$KAK_G = 2 \int_0^1 [L_G(x) - L_{GDP}(x)] dx \quad (8)$$

The Kakwani index measures programme progressivity as twice the area between the Lorenz curve for regional GDP before public intervention and the concentration curve for taxes and as twice the area between the concentration curve for benefits and the Lorenz curve for regional GDP before public intervention. For taxes only, a positive (negative) Kakwani index implies progressivity (regressivity). The reverse holds in the case of benefits.

Table 4 reports the result of this decomposition applied distinctively to benefits and contributions in the case of the NHS and of total public budget. Of course the smaller redistributive power of the NHS compared to total public budget can be ascribed to the limited size of public intervention when health care sector only is considered (in terms of benefits 6.4% vs 53.6% of GDP). But, in the opposite direction, contributions/benefits turn to be more progressive/regressive in the case of the NHS than in the case of total public budget (0.125 vs 0.101 for benefits; 0.037 versus 0.016 for contributions). Finally, both in the case of the NHS and the total budget, benefits are more regressive than contributions are progressive.

TABLE 4 APPROXIMATELY HERE

#### **4. The impact of fiscal decentralisation on interregional redistribution by the NHS**

##### **4.1. Possible scenarios of future decentralization in the NHS**

As discussed in Section 3, the NHS in Italy currently produces strong interregional redistributive effects, crucially driven by the present level and structure of expenditures, which in turn depend on central government policies under two respects: the setting of



minimum service levels and the peculiar financing mechanism adopted (the central government tops up insufficient regional governments resources).

Both these features may be put under question by the current political pressures calling for a higher degree of regional autonomy in the financing and provision of health care services and therefore implying a revision of central government role in health care policies. These decentralisation trends in the health care sector are not specific to Italy only, but can be identified in a number of western countries (Banting and Corbett, 2002; Saltman *et al.*, 2007) and are also supported by some evidence of increased efficiency, effectiveness and quality of services (Cantarero and Pascual Saez, 2006; Robalino *et al.*, 2001). As regards the NHS in Italy, two main changes to the current structure of health care policies may result from these political instances in favour of decentralization:

1. a reduction of minimum standards for health care services set by central government, allowing higher regional autonomy and increased possibilities of services differentiation across regions;
2. a revision of the financing mechanism to guarantee the minimum standards to be offered in all regions.

Both these changes may impact on the level of interregional redistribution attained by the NHS. In the following we attempt to evaluate these impacts.

In particular, the lowering of minimum standards for health care services would clearly imply a decrease of central government equalising transfers to poorer regions and, as a consequence, of these regions' levels of health care expenditures. This in turn would entail a reduction of the degree of interregional redistribution by the NHS. Given that the political debate on decentralisation process in Italy is still ongoing, we may only make assumptions on the new levels of minimum service standards. Therefore, to evaluate the impact of a reduction of minimum service standards on regional redistribution by the NHS we will apply increasing proportional cuts to the current levels of regional expenditure (10%, 20%, up to 90%).

Similarly, the current political debate does not provide any clear hint on the second policy option, namely the financing mechanism to be adopted to guarantee minimum standards. Therefore we will again make different assumptions on this. In doing so, we depart from the current dual financing structure of the NHS, based on regions' own fiscal revenues and copayment charges on the one side, and on central government

transfers financed by central government tax revenues on the other. We then envisage three alternative scenarios for the financing of new minimum standards. All three scenarios share three basic hypotheses: total amount of resources devoted to the financing of the NHS remain unchanged at the current level; regional distribution of sources of NHS revenues is unaltered and equal to the current one; it is the task of the central government to set compelling minimum service standards for health care services provided by regional governments.

Conversely, the three scenarios entail different roles and involvement of central government in the management and allocation of NHS financial resources and, as the flip side, a growing role of decentralised governments.

1. The first scenario (“*transfer-based financing*”) assumes that the central government has full control of financial resources: it collects all revenues and transfers resources to all regions in order to guarantee the financing of minimum standards. This first scenario depicts a hypothetical benchmark case, helpful to evaluate the next two, which are designed more consistently with decentralization instances.
2. In the second scenario (“*vertical equalising fund*”), the central government has control only over a subset of revenues, while the remaining ones are assigned to regional tax autonomy.
3. Finally, in the third scenario (“*horizontal equalising fund*”) the central government has no control over financial resources, which are all under regional control. Its role is limited to setting minimum service standards and compelling regional governments to set up and finance an horizontal equalising fund to allow the provision of minimum standards in all regions.

#### *Scenario 1: transfer-based financing*

The central government has control over all financial sources, which are treated as central government revenues, disregarding their current nature (regional government revenues and central government revenues). These resources are used to finance a system of transfers to regional governments, so that each region is guaranteed sufficient revenues to provide minimum standards. As minimum standards are reduced, current revenues are in excess with respect to minimum standards to be financed. According to decentralizations instances calling for fiscal resources being left to the jurisdictions they

originated from, we assume that these excess revenues are given back to the regions and distributed among them according to their territorial source.

As stated in equation (9), for each region  $i$  (and for each year, but for simplicity purposes in the following the year index is omitted), we assume that given the current level of expenditures ( $G_i$ ), the new level of expenditure ( $G'_i$ ) is set equal to a given percentage  $\alpha$  of  $G_i$  (90%, 80%, ..., 10%), which we define as compulsory expenditure ( $\bar{G}_i = \alpha G_i$ ) plus an additional expenditure equal to the regional share of remaining resources. As explained above, remaining resources, given by the difference between total revenue and total compulsory expenditure by all regions, are distributed across regions according to the distribution of overall NHS revenues (with  $R_i$  denoting the amount of the NHS total revenue whose territorial source is region  $i$ ). In symbols:

$$G'_i = \bar{G}_i + \left( \sum_{i=1}^{15} R_i - \sum_{i=1}^{15} \bar{G}_i \right) \cdot \frac{R_i}{\sum_{i=1}^{15} R_i} \quad (9)$$

#### *Scenario 2: vertical equalising fund*

The central government has control only on part of the NHS revenues (those that in the current setting are assigned to the central government). Consequently regions have control on the remaining NHS resources (exactly those that are currently allocated to regional tier of government). Thus the dual nature of NHS revenues is openly acknowledged with  $R_i = R_i^{RG} + R_i^{CG}$ , where  $R_i^{CG}$  denotes the share of total revenues whose source is region  $i$  that are currently collected by central government, while  $R_i^{RG}$  is the share collected by the regional government of region  $i$ .

For some regions, own resources may be enough to finance minimum standards, for some other not. The central government sets up a vertical equalising fund, financed by its own revenues, in order to guarantee all regions sufficient financial resources to meet minimum service standards. Obviously, as minimum standards are cut, the number of regions unable to meet standards through their own resources decreases and the dimension of the central government vertical equalising fund consequently shrinks. Thus, a growing percentage of current central government revenues are not needed to finance the vertical equalising fund and are given back to the regions and distributed among them according to their territorial source. This implies that *all* regions receive a

share of excess revenues, regardless of whether they are unable to meet minimum standards with their own resources or not, that is regardless of whether they benefit from vertical equalising transfers or not.

Then for each region  $i$ , the level of expenditure for health care services is given by own resources plus a transfer from the central government plus the regional share of central government excess revenues:

$$G'_i = R_i^{RG} + TR_i + \left( \sum_i R_i^{CG} - \sum_i TR_i \right) \cdot \frac{R_i^{CG}}{\sum_i R_i^{CG}} \quad (10)$$

Under the assumption that the central government covers regional fiscal capacity's gaps through its transfers, the central government transfer in favour of region  $i$  is equal to the difference between minimum standards and own regional revenues, if this gap is positive, whereas it is zero for regions able to finance minimum standards with their own revenues:

$$\begin{aligned} TR_i &= \bar{G}'_i - R_i^{RG} && \text{if } \bar{G}'_i > R_i^{RG}; \\ TR_i &= 0 && \text{if } \bar{G}'_i \leq R_i^{RG}. \end{aligned} \quad (11)$$

Therefore, formula (10), which gives each region's expenditure, may take two alternative forms, depending on whether minimum service standards are higher or lower/equal than regional own revenues:

If  $\bar{G}'_i > R_i^{RG}$ :

$$G'_i = R_i^{RG} + (\bar{G}'_i - R_i^{RG}) + \left( \sum_i R_i^{CG} - \sum_i TR_i \right) \cdot \frac{R_i^{CG}}{\sum_i R_i^{CG}} = \bar{G}'_i + \left( \sum_i R_i^{CG} - \sum_i TR_i \right) \cdot \frac{R_i^{CG}}{\sum_i R_i^{CG}} \quad (12)$$

If  $\bar{G}'_i \leq R_i^{RG}$ :

$$G'_i = R_i^{RG} + \left( \sum_i R_i^{CG} - \sum_i TR_i \right) \cdot \frac{R_i^{CG}}{\sum_i R_i^{CG}} \quad (13)$$

From equation (10) and (13) it is clear that “rich” regions (whose own revenues are higher than minimum service standards), despite receiving no equalising transfers from the central government, are able to provide a level of health care services above minimum standards with their own resources thanks to the central government excess resources given back to regions.

*Scenario 3: horizontal equalising fund*

In a strengthened decentralization perspective, all resources whose source is in region  $i$  are controlled by the regional government of region  $i$  (thus there is no distinction between current regional government and central government revenues). However, regions are involved in an horizontal equalising fund, financed by “rich” regions and assigned to “poor” regions (i.e. those whose own resources are below minimum service standards) to guarantee all regions sufficient resources to provide minimum service standards set by central government. As before, the overall dimension of the equalising fund shrinks as standards are reduced.

Then for each region  $i$ , the level of expenditure for health care services is given by the regional revenues, plus a transfer from the horizontal equalising fund:

$$G'_i = R_i + TR_i \quad (14)$$

The transfer is positive for “poor” regions, negative for “rich” ones. We assume that “rich” regions use only former central government revenues to finance the equalising fund. Therefore “rich” regions may belong to two different groups, depending on whether minimum standards are lower or higher than own revenues. If standards are lower, all former central government tax revenues may be used to finance the fund, if they are higher, only the part of former central government tax revenues that remains after they have been used to top up own revenues to reach minimum standards may be used. Therefore transfers from the equalising fund may be defined as follows:

If  $\bar{G}'_i > R_i$

$$TR_i = \bar{G}'_i - R_i \quad (15)$$

If  $\bar{G}'_i \leq R_i$  and  $\bar{G}'_i \leq R_i^{RG}$

$$TR_i = - \left\{ \frac{R_i^{CG}}{\sum_{j: \bar{G}'_j \leq R_j \text{ and } \bar{G}'_j \geq R_j^{RG}} [(R_j^{RG} + R_j^{CG}) - \bar{G}'_j] + \sum_{k: \bar{G}'_k \leq R_k \text{ and } \bar{G}'_k < R_k^{RG}} [R_k^{CG}]} \cdot \sum_{l: \bar{G}'_l \geq R_l} [\bar{G}'_l - R_l] \right\} \quad (16)$$

If  $\bar{G}'_i \leq R_i$  and  $\bar{G}'_i > R_i^{RG}$

$$TR_i = - \left\{ \frac{(R_i^{RG} + R_i^{CG}) - \bar{G}'_i}{\sum_{j: \bar{G}'_j \leq R_j \text{ and } \bar{G}'_j \geq R_j^{RG}} [(R_j^{RG} + R_j^{CG}) - \bar{G}'_j] + \sum_{k: \bar{G}'_k \leq R_k \text{ and } \bar{G}'_k < R_k^{RG}} [R_k^{CG}]} \cdot \sum_{l: \bar{G}'_l \geq R_l} [\bar{G}'_l - R_l] \right\} \quad (17)$$

For “poor” regions total expenditures, equal to their revenue plus transfers, are exactly equal to minimum standards. Conversely, “rich” regions are generally able to provide service levels above minimum standards.

#### **4.2. The effects on interregional redistribution**

Under all the three scenarios just described, we assume that the central government may set different minimum service standards (90% of the current level of each region expenditures, then 80%, 70% and so on, up to 10%) and then we estimate the corresponding degree of interregional redistribution following the approach illustrated in Section 2.2. Under all scenarios, the level of estimated interregional redistribution decreases as minimum standards are lowered. However, the pattern of this reduction in the degree of redistribution is different for each of the considered scenario, as shown in table 5 and depicted in figure 3.

In particular, under the scenario 1, the degree of redistribution decreases linearly as minimum standards reduce. In the contrary, under the scenario 2, for higher levels of minimum standards redistribution decreases at a lower pace than under the scenario 1, but when standards are very low (70% or less than current expenditures), then the decrease of redistribution becomes steeper than in the first case. Finally, under the scenario 3, the decrease in the degree of estimated redistribution is always steeper than in the other two cases and redistribution becomes null for standards equal or below 50% of current ones.

TABLE 5 APPROXIMATELY HERE

FIGURE 3 APPROXIMATELY HERE

The observed decreasing levels of redistribution are to be imputed to different reasons under the three scenarios. Under scenario 1, they are due to the reduction of minimum standards and therefore of compulsory expenditures, while the additional expenditure is distributed according to the distribution of revenues and therefore its net redistributive effect is zero. As minimum standards reduce, redistribution decreases at the same rate.

Under scenario 2, total expenditures of each region are determined by three components, as described in equation (10). For the first and the latter ones (regional revenues and resources given back to regions by the central government), their territorial distribution is the same as that of their source and therefore they have no net interregional redistributive effect. The whole redistribution is therefore due to the second component that is central government transfers, whose distribution is different from that of the source of revenues that finance these transfers. As transfers decrease, so does redistribution. The decreasing equalising role of transfers is due to the combined effect of two factors: first, the reducing difference between minimum standards and own revenues of the regions actually receiving these transfers and, second, the decreasing number of regions that benefit from the equalising fund. This latter effect is easily illustrated: as minimum service standards are reduced, an increasing number of regions becomes able to finance these standards by means of their own revenues and therefore those regions are not entitled to receive equalising transfers anymore. When we compare scenario 1 and 2, the different slopes of the redistribution patterns may be explained referring again to the formula to calculate regional expenditures. When limited reductions of minimum standards are considered, for all regions, even the “richest” ones in terms of own revenues, holds that  $\bar{G}_i > R_i^{RG}$ . Therefore for both scenarios expenditures are given by minimum standards plus an additional component, as described in equation (9) and (12), respectively. In equation (9) this additional component is distributed across regions as overall revenues (central government plus regional government revenues), and therefore its net redistributive impact is zero. On the contrary, in scenario 2 the additional component is distributed as central government revenues only, which, as explained in Section 3.1., are more homogeneously distributed across regions than overall revenues. For larger cuts of minimum standards (higher than 30%) redistribution starts decreasing at a higher speed than in scenario 1. The reason is that an increasing number of regions are such that  $R_i^{RG} \geq \bar{G}_i$  and therefore equation (13) holds – instead of equation (12). Since  $R_i^{RG}$ , the first element of equation (13), is by definition larger than  $\bar{G}_i$ , the first element of equation (9), and given that this case applies to high per-capita GDP regions, then the reduction of minimum standards for

scenario 2 assigns relatively more resources to high per-capita GDP regions. As a result, in this case the interregional redistributive effect is more heavily weakened.

Finally, under scenario 3, interregional redistribution decreases more sharply than under the previous cases. This is because in this case “poor” regions are guaranteed only minimum standards and no extra money, whereas “rich” regions are endowed with minimum standards plus all resources that are not required by the horizontal equalising fund.

More detailed information about the effects of the reduction of minimum standards when the different scenarios are considered can be drawn by looking at the resources that each region can devote to health care expenditures. For each single region and specifically for the year 2006 only, table 6 shows the level of health care expenditures that those regions could finance as a percentage of current ones. It is worth emphasising that the reduction of minimum standards gives rise to a wide differentiation across regions of health care expenditures. In particular, when, as an example, a 30% reduction of minimum standards is considered, under scenario 1 Lombardia can afford an expenditure of 109.6% of its current one, while Molise, to the other extreme, should reduce its expenditure to 86.7%. This range shrinks when we move to scenario 2 (Lombardia:105.7% compared to Campania: 92.5%) and widely increases under scenario 3 (Lombardia: 129.2% compared to Molise, Puglia, Basilicata and Calabria: 70%).

TABLE 6 APPROXIMATELY HERE

## **5. Conclusions**

The aim of this paper is twofold. First of all, we measure income redistribution among Italian regions accomplished by the NHS under the current institutional setting. The existing intergovernmental fiscal relations concerning the NHS in Italy are explicitly considered as well as the current political pressures for an increased decentralisation of expenditure and revenues responsibilities to regional governments. So, in the second part, the paper evaluates the impact of these pressures on the redistribution effected by



the NHS. However, as the outcomes of these pressures in terms of the future shaping of the NHS financing and expenditure profiles are only partially foreseeable, we make some alternative assumptions on them, and measure the redistribution effects under each of them.

Using panel data for 1999-2006 we find that NHS contributions and benefits reduce regional differences in per-capita GDP of approximately 7 percentage point: a region with per-capita GDP 1 euro higher (or lower) than the national average ends up, as a result of the NHS programmes, about 93 cents higher (or lower). This compares with the redistributive effect of the overall public budget, equal to 38% of GDP. Most of the NHS redistributive impact is due to benefits, almost equally distributed in per-capita terms across regions, while the distribution of the NHS revenues sources show a significant correlation with regional per-capita GDP and thus contributions have a lower redistributive impact. Finally we find that a reform of the NHS in terms of a reduction of minimum compulsory service standards to be provided in all regions always produces a reduction of redistribution across Italian regional jurisdictions. However, as minimum standards are reduced, the rate of the decrease in the interregional redistributive effects crucially depends on the financing arrangements of health care services that will be actually adopted in the future reforms of the Italian NHS.

These results raise some significant policy issues for the design of the NHS financing mechanism. First, obviously, given a certain level of minimum standards, the redistributive effect crucially depends on the regional distribution of revenue sources assigned to regional governments: the more equally distributed in per-capita terms, the lower the redistributive effects. For instance, we show that in the current NHS financing scenario, redistribution across regions would be lower if regional revenue sources were distributed as current central government taxes, instead of the more unequally distributed across regions of current regional government revenues.

Second, enhanced federalist financing mechanisms need to take into account also some implicit incentive effects. For instance, scenario 3 shows that “richer” regions in terms of per-capita revenues are compelled to finance equalising transfers and may end up with resources in excess of minimum standards, while “poorer” regions end up with nothing more than minimum standards. Under this scenario for “poorer” regions it might not be worth to increase their own fiscal effort as long as this would simply allow

them to autonomously finance minimum standards: their additional fiscal effort would simply substitute equalising transfers from “richer” regions. “Poorer” ones would end up with unchanged resources while their effort would simply result in a net benefit for “richer” regions which would need to finance lower equalising transfers. This would happen also if “poorer” regions were able to increase own revenues to a point that their overall resources were slightly in excess of minimum standards: they then would be compelled to finance equalising transfers with their extra resources, leaving them with little of the extra money they collected.

Finally, the effect of more decentralized financing mechanisms need to be considered also with reference to the interregional mobility of patients: as minimum standards decrease and services in “poorer” regions are nothing more than these, an increase of interregional mobility of patients would be likely. If the budget of out-flow regions incurred into deficit owing to the financial effects of patients’ mobility and if the central government decided to ex-post make up those deficits by paying compensations to “richer” regions, then the implicit effect would be a return to central government transfer finance (but with negative redistributive effects) and with efficiency effects to be evaluated. Conversely, if compensations were to be financed by horizontal transfers from “poorer” regions to “richer” ones, then a crucial issue would be how “poorer” regions could fund them and whether these schemes would reduce “poor” regions resources and even threaten the provision of minimum standards.

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*Table 1. NHS: expenditures and revenues (per-capita average values 1999-2006, euro 2006)*

	Gdp	National Health Service				
		Expenditure	Revenue			Total
			Regional gov taxes	Central gov transfers	Fees	
Piemonte	27,279	1,620	698	807	102	1,607
Lombardia	32,314	1,549	951	491	77	1,519
Veneto	28,921	1,601	774	680	112	1,566
Liguria	25,539	1,760	561	1,074	69	1,704
Emilia-Romagna	30,818	1,670	810	703	115	1,628
Toscana	27,050	1,623	657	857	99	1,613
Umbria	23,632	1,644	506	1,025	88	1,618
Marche	24,716	1,572	614	877	85	1,575
Lazio	29,448	1,825	790	741	72	1,603
Abruzzo	20,745	1,595	417	1,007	64	1,488
Molise	18,027	1,676	212	1,264	52	1,528
Campania	16,073	1,521	292	1,082	50	1,425
Puglia	16,376	1,418	289	1,092	51	1,433
Basilicata	17,225	1,392	187	1,209	40	1,436
Calabria	15,818	1,423	157	1,251	38	1,445
Italy (OSR)	25,631	1,596	637	945	83	1,665

*Table 2. NHS: benefits, contributions and fiscal balances (per-capita average values 1999-2006, euro 2006)*

	Gdp	National Health Service						Total budget	
		Benefits	Contributions			Fiscal balances	Fiscal balances		
			Regional gov taxes	Central gov taxes	Fees			Total	
Piemonte (11)	27,279	1,618	698	1,041	102	1,741	-123	-212	
Lombardia (15)	32,314	1,498	951	1,157	77	2,065	-566	-3,425	
Veneto (12)	28,921	1,567	774	1,053	112	1,835	-269	-1,382	
Liguria (9)	25,539	1,751	561	1,035	69	1,575	176	1,894	
Emilia-Romagna	30,818	1,596	810	1,148	115	1,961	-365	-1,806	
Toscana (10)	27,050	1,590	657	1,033	99	1,694	-104	71	
Umbria (7)	23,632	1,602	506	906	88	1,419	183	2,549	
Marche (8)	24,716	1,590	614	941	85	1,551	38	732	
Lazio (13)	29,448	1,823	790	1,084	72	1,843	-21	-1,206	
Abruzzo (6)	20,745	1,582	417	764	64	1,178	403	1,914	
Molise (5)	18,027	1,677	212	689	52	901	776	3,558	
Campania (2)	16,073	1,565	292	643	50	933	632	3,124	
Puglia (3)	16,376	1,446	289	657	51	946	500	2,975	
Basilicata (4)	17,225	1,487	187	602	40	784	703	4,020	
Calabria (1)	15,818	1,521	157	629	38	780	741	4,579	
Italy (OSR)	25,631	1,586	637	960	83	1,586	0	0	

*Table 3. Degree of redistribution through fiscal balances (NHS and general government total budget, % GDP, 1999–2006)*

	<i>Redistribution (% GDP)</i>	
	$1 - \beta_2$	
Number of observations	120	
	National Health Service	Total budget
Benefits	5.2%	22.5%
<i>Robust Standard Error</i>	0.0015131	0.0092267
<i>R-squared</i>	0.9997	0.9772
Fiscal balances	6.9%	38.1%
<i>Robust Standard Error</i>	0.0021095	0.0117604
<i>R-squared</i>	0.9995	0.9592
Fiscal balances (NHS totally financed by CG transfers)	6.5%	
<i>Robust Standard Error</i>	0.0019248	
<i>R-squared</i>	0.9997	

*Table 4. Redistribution, incidence and progressivity of benefits and contributions (NHS and general government total budget)*

		National Health Service	Total budget
	Reynolds-Smolensky index $RS$	0.0077	0.0343
Benefits	Average benefit rate $g$	0.0659	0.5176
	Kakwani index $KAK$	0.1250	0.1007
	Reynolds-Smolensky index $RS$	0.0024	0.0161
Contributions	Average contribution rate $t$	0.0614	0.5049
	Kakwani index $KAK$	0.0372	0.0158



*Table 5. Redistribution by the NHS under different assumptions on the level of minimum service standards for health care services and different hypotheses on the financing mechanism (% GDP, 1999-2006)*

Minimum service standards in percentage of actual recorded expenditures	Redistribution (%GDP)		
	Scenario 1	Scenario 2	Scenario 3
100%	6.906	6.906	6.906
90%	6.215	6.431	5.193
80%	5.525	5.957	3.511
70%	4.834	5.451	1.928
60%	4.143	4.818	0.614
50%	3.453	3.925	0.079
40%	2.762	2.737	0.000
30%	2.072	1.438	0.000
20%	1.381	0.419	0.000
10%	0.691	0.012	0.000
0%	0.000	0.000	0.000

Table 6. Regional health care expenditures as minimum service standards decrease (% of current expenditure in 2006)

Scenario 1																
Minimum service standards (% of current expenditures)	Redistribution (%GDP)	Piemonte	Lombardia	Veneto	Liguria	Emilia-Romagna	Toscana	Umbria	Marche	Lazio	Abruzzo	Molise	Campania	Puglia	Basilicata	Calabria
100%	6.906	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
90%	6.215	100.6%	103.2%	101.6%	99.2%	102.1%	100.8%	98.8%	99.8%	99.8%	97.9%	95.6%	96.4%	97.2%	95.6%	96.0%
80%	5.525	101.2%	106.4%	103.2%	98.3%	104.2%	101.5%	97.6%	99.7%	99.5%	95.7%	91.1%	92.7%	94.4%	91.3%	92.0%
70%	4.834	101.9%	109.6%	104.8%	97.5%	106.2%	102.3%	96.4%	99.5%	99.3%	93.6%	86.7%	89.1%	91.6%	86.9%	88.1%
60%	4.143	102.5%	112.7%	106.4%	96.6%	108.3%	103.0%	95.2%	99.4%	99.1%	91.5%	82.3%	85.4%	88.8%	82.6%	84.1%
50%	3.453	103.1%	115.9%	108.0%	95.8%	110.4%	103.8%	94.0%	99.2%	98.8%	89.4%	77.8%	81.8%	86.0%	78.2%	80.1%
40%	2.762	103.7%	119.1%	109.6%	94.9%	112.5%	104.5%	92.8%	99.0%	98.6%	87.2%	73.4%	78.2%	83.2%	73.9%	76.1%
30%	2.072	104.4%	122.3%	111.2%	94.1%	114.6%	105.3%	91.5%	98.9%	98.4%	85.1%	69.0%	74.5%	80.4%	69.5%	72.1%
20%	1.381	105.0%	125.5%	112.9%	93.3%	116.7%	106.0%	90.3%	98.7%	98.1%	83.0%	64.5%	70.9%	77.6%	65.2%	68.1%
10%	0.691	105.6%	128.7%	114.5%	92.4%	118.7%	106.8%	89.1%	98.6%	97.9%	80.9%	60.1%	67.2%	74.8%	60.8%	64.2%
0%	0.000	106.2%	131.9%	116.1%	91.6%	120.8%	107.6%	87.9%	98.4%	97.7%	78.7%	55.7%	63.6%	72.0%	56.5%	60.2%

Scenario 2																
Minimum service standards (% of current expenditures)	Redistribution (%GDP)	Piemonte	Lombardia	Veneto	Liguria	Emilia-Romagna	Toscana	Umbria	Marche	Lazio	Abruzzo	Molise	Campania	Puglia	Basilicata	Calabria
100%	6.906	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
90%	6.431	100.7%	101.9%	100.9%	100.1%	101.7%	100.9%	99.6%	100.0%	99.2%	98.5%	97.6%	97.5%	98.1%	97.7%	98.2%
80%	5.957	101.4%	103.8%	101.8%	100.2%	103.3%	101.8%	99.1%	100.1%	98.3%	97.1%	95.2%	95.0%	96.2%	95.4%	96.4%
70%	5.451	102.0%	105.7%	102.7%	100.3%	105.0%	102.7%	98.7%	100.1%	97.5%	95.6%	92.8%	92.5%	94.3%	93.0%	94.7%
60%	4.818	101.6%	112.2%	102.5%	99.4%	105.5%	102.4%	97.2%	99.1%	95.7%	93.2%	89.6%	89.2%	91.6%	89.9%	92.0%
50%	3.925	99.3%	120.8%	105.9%	96.6%	110.0%	100.2%	94.1%	96.3%	92.3%	89.4%	85.0%	84.6%	87.4%	85.4%	87.9%
40%	2.737	100.9%	126.0%	110.7%	91.0%	115.0%	102.2%	88.2%	93.4%	93.1%	83.1%	78.3%	77.8%	80.9%	78.8%	81.5%
30%	1.438	104.1%	129.5%	113.9%	89.5%	118.5%	105.4%	86.0%	96.4%	95.8%	77.0%	70.6%	70.0%	73.3%	71.0%	73.9%
20%	0.419	105.9%	131.5%	115.7%	91.2%	120.4%	107.2%	87.6%	98.1%	97.4%	78.5%	61.8%	63.4%	71.7%	62.3%	65.3%
10%	0.012	106.2%	131.9%	116.1%	91.6%	120.8%	107.6%	87.9%	98.4%	97.7%	78.7%	55.7%	63.6%	72.0%	56.5%	60.2%
0%	0.000	106.2%	131.9%	116.1%	91.6%	120.8%	107.6%	87.9%	98.4%	97.7%	78.7%	55.7%	63.6%	72.0%	56.5%	60.2%

Table 6. (continue)

Scenario 3																
Minimum service standards (% of current expenditures)	Redistribution (%GDP)	Piemonte	Lombardia	Veneto	Liguria	Emilia-Romagna	Toscana	Umbria	Marche	Lazio	Abruzzo	Molise	Campania	Puglia	Basilicata	Calabria
100%	6.906	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
90%	5.193	99.8%	115.4%	105.8%	90.9%	108.7%	100.7%	90.0%	95.1%	94.7%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
80%	3.511	102.1%	123.8%	110.4%	89.8%	114.4%	103.3%	86.7%	95.5%	94.9%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
70%	1.928	104.7%	129.2%	114.1%	90.6%	118.6%	105.9%	87.2%	97.2%	96.5%	78.4%	70.0%	70.0%	71.9%	70.0%	70.0%
60%	0.614	106.1%	131.7%	116.0%	91.5%	120.7%	107.5%	87.9%	98.3%	97.6%	78.7%	60.0%	63.6%	72.0%	60.0%	60.2%
50%	0.079	106.2%	131.9%	116.1%	91.6%	120.8%	107.6%	87.9%	98.4%	97.7%	78.7%	55.7%	63.6%	72.0%	56.5%	60.2%
40%	0.000	106.2%	131.9%	116.1%	91.6%	120.8%	107.6%	87.9%	98.4%	97.7%	78.7%	55.7%	63.6%	72.0%	56.5%	60.2%
30%	0.000	106.2%	131.9%	116.1%	91.6%	120.8%	107.6%	87.9%	98.4%	97.7%	78.7%	55.7%	63.6%	72.0%	56.5%	60.2%
20%	0.000	106.2%	131.9%	116.1%	91.6%	120.8%	107.6%	87.9%	98.4%	97.7%	78.7%	55.7%	63.6%	72.0%	56.5%	60.2%
10%	0.000	106.2%	131.9%	116.1%	91.6%	120.8%	107.6%	87.9%	98.4%	97.7%	78.7%	55.7%	63.6%	72.0%	56.5%	60.2%
0%	0.000	106.2%	131.9%	116.1%	91.6%	120.8%	107.6%	87.9%	98.4%	97.7%	78.7%	55.7%	63.6%	72.0%	56.5%	60.2%

Figure 1A. NHS expenditures and revenues by region  
(average per-capita values 1999-2006, Euro 2006)

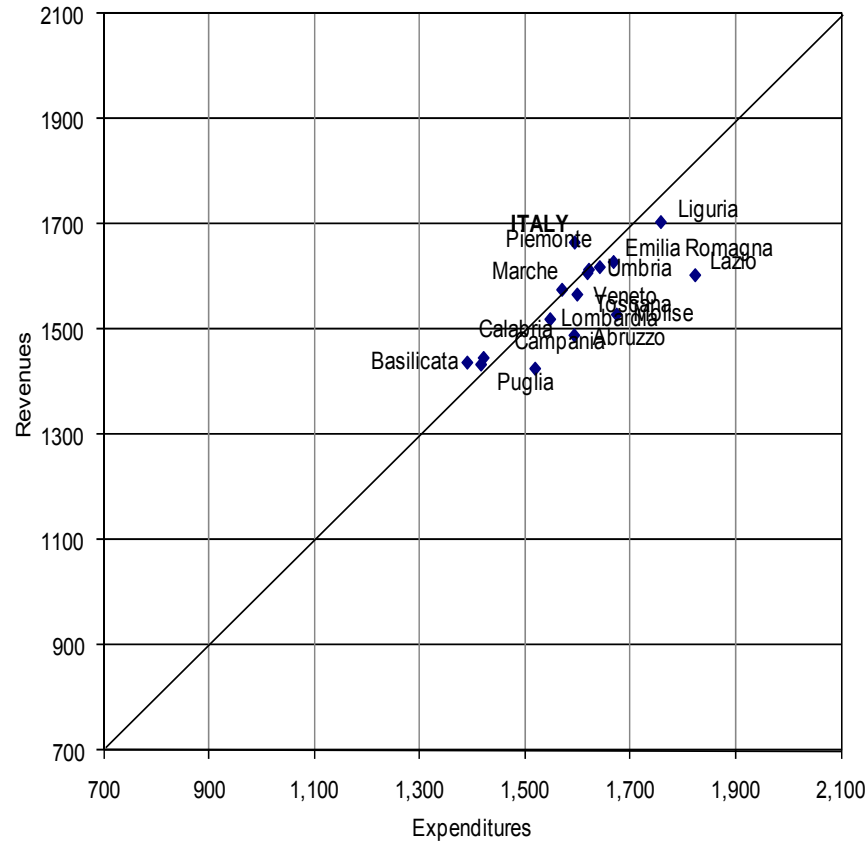
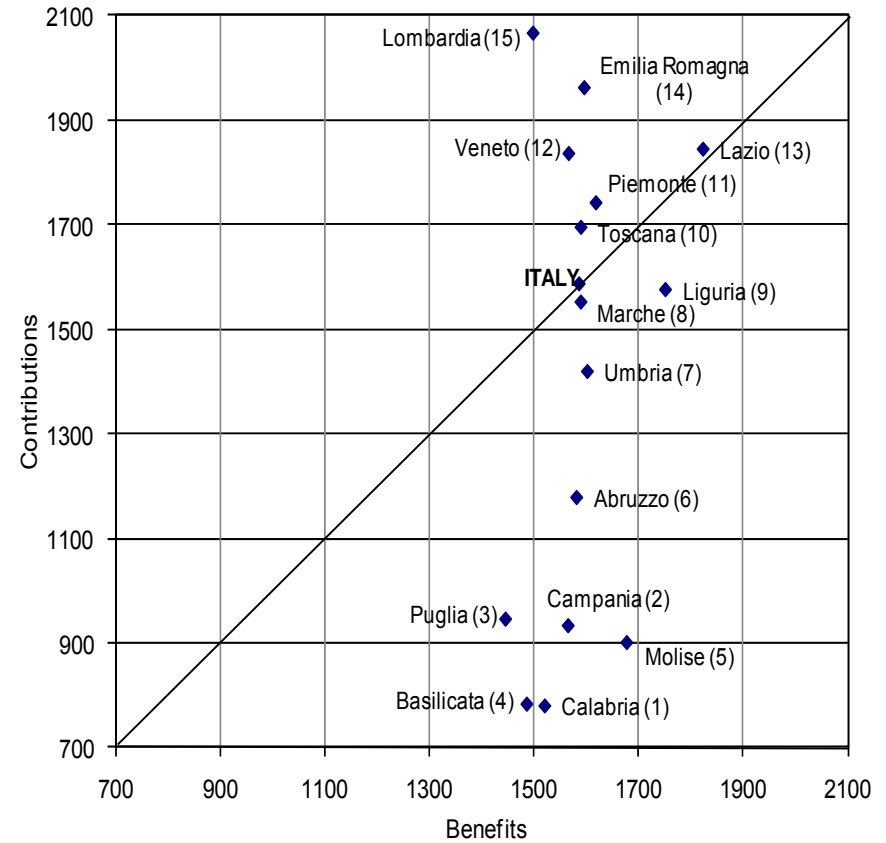


Figure 1B. NHS benefits and contributions by region  
(average per-capita values 1999-2006, Euro 2006)



Note: per-capita GDP ranking from the poorer to the richer region in parentheses

Figure 2. NHS fiscal balances (average per-capita values 1999-2006, Euro 2006)

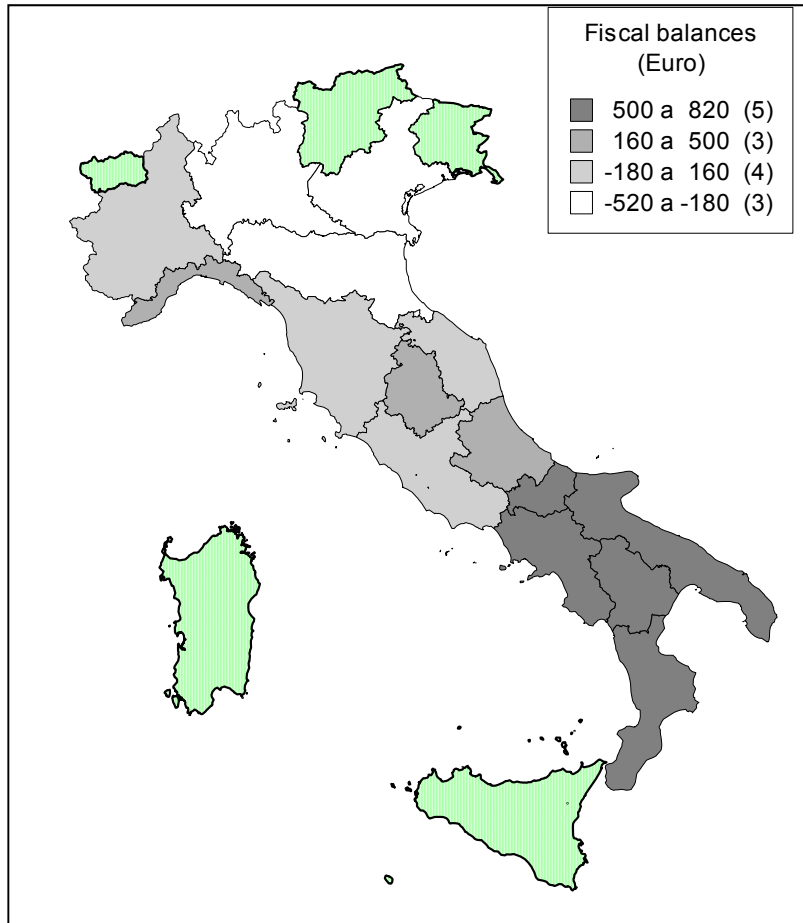


Figure 3. Redistribution by the NHS under different assumptions on the level of minimum service standards for health care services and different hypotheses on the financing mechanism (% GDP, 1999-2006)

