What happens to interregional redistribution upon fiscal decentralization? 
Evidence from the Italian NHS

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Abstract

In this paper we explore how pressures for an increased decentralization of taxing powers and expenditure competencies to sub-national governments may affect the degree of income redistribution across regional territories currently accomplished by the Italian National Health Service. In Italy, political responsibilities for health care are decentralized to regional governments, but the central government retains a critical role in ensuring that all citizens have uniform access to health care. To this end the central government runs a scheme of expenditure needs equalization to top up regional governments own resources. However this system is currently put under question by strong political pressures calling for a weakening of central government involvement. We evaluate the impact of these instances on the degree of interregional redistribution by the NHS on the basis of different assumptions on the degree of taxing powers decentralization and on total resources devoted to health care financing.

Keywords: Health, Interregional Redistribution, Decentralization, Intergovernmental Relations  
JEL classification: E62, H23, H50, H70, R10

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1. **Introduction**

Fiscal decentralization is in the policy agenda of many countries, both developed (OECD, 1997; Joumard and Kongsrud, 2003) as well as developing ones (World Bank, 1997; Bird and Vaillancourt, 1998), and is likely to affect a number of different policy areas, including health policies. The various arguments in support of fiscal decentralization may be grouped in two main sets: an economic argument and a political one. From an economic theory perspective, fiscal decentralization reforms are often recommended on efficiency grounds: decentralization is claimed to allow a better match between public service provision and territorially differentiated fiscal preferences, an increased accountability of local decision makers and a wider experimentation of innovation in public policies and diffusion of best practices (Oates, 1999; Tanzi, 1996). However, there is no clear evidence of the beneficial effects of decentralization from this economic perspective (World Bank 2000). There are also political reasons behind decentralization reforms, such as deflating secessionist pressures (Bolton and Roland, 1997; Panizza, 1998; World Bank, 2000; Le Breton and Weber, 2001; Haimanko et al. 2005), which are often spurred by localised preferences for lower degrees of solidarity across regions with different needs and fiscal endowments. Examples are the federalist constitution passed in Belgium in 1993 under the urge of the Flemish community (Bayenet and De Bruycker, 2007) or the process of fiscal decentralization under way in Italy partially responding to the emergence on the political stage of a new autonomist party. Also in Germany after unification the trade-off between solidarity and subsidiarity became a critical issue (Spahn and Werner, 2007).¹

Fiscal decentralization may yield lower levels of income redistribution across territories (interregional redistribution): if most tax resources are assigned to decentralized governments, the redistributive power of a reduced central government budget becomes obviously limited (due to what we may call an “incidence” effect). However redistribution by the central government may decrease also after the decentralization of limited tax bases, when they are highly

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¹For a discussion on this, see also Bird and Ebel, 2007 and Calsamiglia, Garcia-Milà and McGuire, 2006.
concentrated in the wealthier regions ("progressivity" effect) and the central government does not modify the structure of benefits in order to compensate the weakened redistribution.

The political rationale for fiscal decentralization may explain the decentralization reforms of the last 15 years in Italy may also be interpreted in terms of central government responses to secessionist pressures. As a result, in Italy decentralized governments tax autonomy has significantly increased since the early 1990s (Arachi and Zanardi, 2004). However the public budget still produces relevant redistributive effects (nearly 30% of GDP according to Arachi et al., 2010). These are primarily due to the persistence of a system of central government transfers aiming to equalize expenditure needs. Given the highly uneven territorial distribution of revenues from taxes currently assigned to regional governments, central government transfers strongly differ between rich and poor regions and this makes more explicit the size of the redistribution accomplished by the central government, even if it is not significantly different from the one produced by the former system of limited regional tax autonomy. Further, rather than fading as a result of decentralizing reforms, in Italy secessionist pressures are still important and claim not only for the strengthening of tax autonomy but also for the weakening of territorial equalization.

This description fully depicts the recent evolution of health policies in Italy. In Italy regional governments are involved in the operating of the National Health Service (NHS) since its establishment in 1978, and by the Italian Constitution, health care is now assigned to regional competency. As regards the financing of the NHS, over time the transfers from the central government to the regions have been increasingly replaced by regions’ own taxes. Nonetheless, the central government retains a significant role in regulating and funding the NHS (Cappellaro et al., 2009). In particular the central government is responsible for an expenditure needs equalizing transfer scheme: it tops up regions’ own revenues to allow each region to cover its expenditure standards. Given the highly uneven distribution of both central government and regional government tax bases, these schemes produce a strong interregional redistribution.
This “incomplete” decentralization reform has more recently spurred a new wave of demands for further assignments of taxing powers to regional governments and above all for a weakening of central government equalizing role.

In this paper we analyse how these requests may affect the interregional redistributive properties of the NHS. The paper is organised as follows: Section 2 provides background information on the Italian NHS. Section 3 addresses the relevant methodological issues for the estimation of interregional redistribution by this public programme. Estimates of interregional redistribution by the NHS under different assumptions on the institutional setting and on total resources devoted to health care financing are provided in Section 4. Three different scenarios of intergovernmental fiscal relations are investigated, namely a centralised NHS, a partially decentralized NHS (the current institutional setting) and a fully decentralized NHS. As regards the total amount of resources devoted to healthcare financing, these are set at decreasing levels departing from the current ones. Section 5 concludes.

2. 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 general government total expenditure (2006). Since the early 1990s Italy has experienced strong political demands for the decentralization of public functions and the Italian public sector has undergone radical reforms pursuing higher decentralization 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 transformed: a number of public functions have been decentralized and, according to a recent Constitutional reform, others should soon follow. As the result of the 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, under the supervision of the corresponding regional government, is 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 the funding of health care services to be provided by regional governments. The total amount of public resources devoted to NHS financing is defined every year, as the result of lengthy negotiations between central and regional governments. Given this total amount, each region share is calculated on the basis of regional expenditure needs indicators (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). Regional governments’ revenues are generally not enough to meet these levels (“expenditure standards”), therefore the central government sets up a vertical equalization fund (from the central government to the regions) to top up regions own resources. On the basis of this vertical scheme of expenditure needs equalization, each regional government has at its disposal a total amount of resources for healthcare financing that reflects its expenditure needs. It Given the strong interregional differences in the distribution
of the regional tax bases, central government vertical equalizing transfers are highly differentiated across regions. This institutional framework is confirmed and even strengthened by the 2009 reform of decentralized governments financing system. 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 these services a 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, 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 a regional business tax (IRAP) and a 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 equalizing role of the central government. Indeed, as a result of the combination of the definition of expenditure standards (that is, total regional resources needed for health 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 depends on the levels of health care needs that the central government actually decides to finance. As decentralization discloses the interregional redistributive role of the public budget, the current levels of expenditure needs may be brought into question. In particular, if strong taxing powers are assigned to the regional level, rich jurisdictions have incentives to support low levels of expenditure needs only, and thus to limit interregional redistribution.

3. Estimating interregional redistribution: methodological approach

3.1. The data

The role of the public budget in redistributing income across different jurisdictions has been analysed in a number of studies. 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 public 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

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2 Italianer and Pisany-Ferry, 1992; Sala-i-Martin and Sachs, 1992; Von Hagen, 1992; Bayoumi and Masson, 1995; Obstled and Peri, 1998; Decressin, 2002; Mélítz and Zumer, 2002; Padovano, 2007; Arachi et al., 2009.
to the jurisdiction of the government actually collecting revenues or paying out expenditures.

In the following we estimate the redistributive effects of public intervention in the NHS, and compare them with redistribution accomplished by the overall public budget for 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. We restrict our sample to the 15 Ordinary Statute Regions (OSRs) only, excluding the 5 Special Statute Regions (SSRs), due to their peculiar financing structure and spending autonomy.

Table 1 and figure 1A report revenues and expenditures by regional governments for the NHS on a cash basis (per-capita average over the period 1999-2006) as recorded by the General report on the national economy (Relazione generale sulla situazione economica del paese), published each year by the Italian Ministry of economy. Per-capita expenditures are quite similar across different regions, although slightly lower in southern ones and greater in little regions (Liguria, Umbria and Molise) and in some regions incurring in large deficit (Lazio). As mentioned in Section 2, 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. Given the equalizing nature of the central government transfers, regional taxes and transfers show opposite patterns across regions. Given the moderate variability of regional expenditures, jurisdictions with high tax yield receive little grants from the central government, and the opposite occurs in poor regions.

For our analysis, we adjust these raw data on expenditures and revenues 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 equalizing component of the NHS financing mechanism;

TABLE 1 APPROXIMATELY HERE

FIGURE 1A and FIGURE 1B APPROXIMATELY HERE
3. to offset excess revenues (surpluses) or excess expenditures (deficits).

As regards the first point, data recorded by the General report do 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.3

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, these regional data 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 equalizing 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 equalizing 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 corresponds to netting out central government vertical transfers from regional governments budgets and

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3 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 $i$. 
transforming them in horizontal transfers among regions. Therefore we implicitly transform the actual vertical equalization scheme into an implicit horizontal equalization 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 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, NHS expenditures across regions can be regarded as benefits from the NHS, and revenues 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 ones, 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 negatively 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.4 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.

4 The adjustments applied here are thoroughly described in Arachi et al. (2009).
3.2. Specification of the econometric model

Starting from the regional fiscal balances calculated as reported in Section 3, 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:

\[ \tilde{y}_{it} = \alpha_2 + \beta \tilde{x}_{it} + \eta_{it} \]  

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

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.

4. Interregional redistribution by the Italian NHS
4.1. The redistributive effects of the NHS under the current institutional setting

Italy is a country with stark regional differences in terms of per-capita income, population structure and economic development. Existing studies show that the 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). In the following we apply the methodology described above to estimate the current degree of interregional redistribution by the NHS, when only the balanced budget component is taken into account. The results are reported in table 3 together with redistribution by total public budget. The table also presents the effects of benefits only, whereas those of contributions can be derived as the difference between the overall effects of fiscal balances and the impact of 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, corresponding to 75% of total interregional redistribution). This result could be easily predicted 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 a much larger interregional redistributive effect (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.

TABLE 3 APPROXIMATELY HERE
4.2. Decentralization of the NHS: alternative institutional scenarios

Decentralization in health care policy is a common trend arising in a number of countries (Banting and Corbett, 2002; Saltman et al., 2007; Cavagnero, 2008) also supported by some evidence of the increase in efficiency, effectiveness and quality of services stemming from decentralization (Cantarero Prieto and Pascual Saez, 2006; Robalino et al., 2001). In the Italian political debate the growing pressures calling for a higher degree of regional autonomy in the financing and provision of health care may lead to a revision of central government role in the NHS. These political instances may produce two main changes in the current structure of health care policies:

1. a reduction of the total amount of resources devoted to health care financing (lower expenditure standards) set by central government, allowing higher regional autonomy and increased opportunities for service differentiation across regions;
2. a revision of the financing mechanism that guarantees that expenditure standards are covered in all regions.

Both these changes may impact on the level of interregional redistribution attained by the NHS.

In particular, the lowering of expenditure standards for health care services would imply a decrease of central government equalizing 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.

To evaluate the effect of a reduction of expenditure standards on regional redistribution by the NHS we apply increasing proportional cuts to the current levels of regional expenditure (10%, 20%, up to 90%).

As for the financing mechanism to be adopted to guarantee expenditure needs equalization, we consider three scenarios differing for the growing fiscal autonomy
of regional governments and a decreasing role and involvement of central
government in the management and allocation of NHS financial resources:

1. The first scenario ("transfer-based financing") describes a fully centralised
institutional setting and assumes that the central government has full control of
financial resources: it collects all revenues and transfers resources to all
regions in order to cover expenditure standards. This first scenario depicts a
hypothetical benchmark case, helpful to evaluate the next two, which are
designed more consistently with decentralization instances.

2. The second scenario ("vertical equalizing fund"), describes an institutional
arrangement similar to the one currently existing in Italy: the central
government has control only over a subset of revenues, while the remaining
ones are assigned to regional tax autonomy. The central government runs a
vertical equalizing fund.

3. Finally, the third scenario ("horizontal equalizing fund"), describes a possible
evolution of the current Italian NHS arrangements in terms of increased fiscal
decentralization: the central government has no control over financial
resources, which are all under regional control. The central government role is
limited to defining each region expenditure standards and compelling regional
governments to set up and finance a horizontal equalizing fund to allow the
coverage of expenditure standards in all regions.

All these scenarios share three basic hypotheses: the total amount of resources
devoted to the financing of the NHS remain unchanged at the current level; the
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 the total amount of
resources devoted to health care financing (and therefore the size of the vertical
expenditure needs equalizing fund).

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 cover its expenditure standards. As regions’ expenditure standards are reduced, current revenues are in excess with respect to the total amount of resources needed for health care financing. According to decentralizations instances calling for fiscal resources being left to the jurisdictions where 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 equalizing 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 the regional tier of government). Thus the dual nature of NHS revenues is openly acknowledged with $R_i = R_{i}^{BG} + R_{i}^{CG}$, where $R_{i}^{CG}$ denotes the share of total revenues whose source is region $i$ that are currently collected by central government, while $R_{i}^{BG}$ is the share collected by the regional government of region $i$. 

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For some regions, own resources may be enough to cover expenditure standards, for some other not. The central government sets up a vertical equalizing fund, financed by its own revenues, in order to guarantee all regions sufficient resources to cover their expenditure standards. Obviously, as expenditure standards are cut, the number of regions unable to meet them through their own resources decreases, and consequently the dimension of the central government vertical equalizing fund shrinks. Thus, a growing percentage of current central government revenues are no more needed to finance the vertical equalizing 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 cover their standards with their own resources or not, that is regardless of whether they benefit from vertical equalizing 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:

$$G_i' = R_{i}^{RG} + TR_i + \left( \sum_i R_{i}^{CG} - \sum_i TR_i \right) \cdot \frac{R_{ij}^{CG}}{\sum_j R_{ij}^{CG}}$$

(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 the region’s expenditure standards and own revenues, if this gap is positive, whereas it is zero for regions able to finance cover their expenditure standards with own revenues:

$$TR_i = \overline{G}_i - R_{ij}^{RG} \quad \text{if} \quad \overline{G}_i > R_{ij}^{RG} ;$$

$$TR_i = 0 \quad \text{if} \quad \overline{G}_i \leq R_{ij}^{RG} .$$

(11)

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

If $\overline{G}_i > R_{ij}^{RG}$:
If \( G_i^* \leq R_{i}^{RG} \):

\[
G_i^* = R_i^{RG} + \left( \sum_i R_i^{CG} - \sum_i TR_i \right) \cdot \frac{R_i^{CG}}{\sum_i R_i^{CG}}
\]

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

**Scenario 3: horizontal equalizing 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 revenues and central government ones). However, regions are involved in an horizontal equalizing fund, financed by “rich” regions and assigned to “poor” regions (i.e. those whose own resources are below the expenditure standards) to guarantee all regions sufficient resources to cover expenditure standards set by central government. As before, the overall dimension of the equalizing 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 equalizing fund:

\[
G_i^* = R_i + TR_i
\]

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 equalizing fund. Therefore “rich” regions may belong to two different groups, depending on whether their expenditure 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 resources...
revenues to fully cover expenditure standards may be used. Therefore transfers from the equalizing fund may be defined as follows:

If $\bar{G}_i > R_i$

$$TR_i = \bar{G}_i - R_i$$

(15)

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

$$TR_i = -\left\{ \sum_{j:G_j \leq R_j \text{ and } G_j \geq R_j^{RG}} \left[ (R_j^{RG} + R_j^{CG}) - \bar{G}_j \right] + \sum_{k:G_k \leq R_k \text{ and } G_k < R_k^{RG}} \left[ R_k^{CG} \right] \cdot \sum_{l:G_l \geq R_l} \left[ G_l - R_l \right] \right\}$$

(16)

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

$$TR_i = -\left\{ \sum_{j:G_j \leq R_j \text{ and } G_j \geq R_j^{RG}} \left[ (R_j^{RG} + R_j^{CG}) - \bar{G}_j \right] + \sum_{k:G_k \leq R_k \text{ and } G_k < R_k^{RG}} \left[ R_k^{CG} \right] \cdot \sum_{l:G_l \geq R_l} \left[ G_l - R_l \right] \right\}$$

(17)

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

4.3. Interregional redistribution under alternative decentralized institutional setting for the Italian NHS

Under all the three scenarios just described, we assume that the central government may set different levels of total resources devoted to health care financing and therefore different levels of regional expenditure standards to be covered (90% of the current level of each region expenditures, then 80%, 70% and so on) and then we estimate the corresponding degree of interregional redistribution following the approach illustrated in Section 3.2. Under all scenarios, the level of estimated interregional redistribution decreases as the total amount of resourced devoted to health care financing is lowered. However, the pattern of this reduction in the degree of redistribution is different for each of the three scenarios, as shown in table 4 and depicted in figure 3.
In particular, under scenario 1, the degree of redistribution decreases linearly as expenditure standards reduce. On the contrary, under scenario 2, for higher levels of expenditure 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 scenario 3, the decrease in the degree of estimated redistribution is always steeper than in the other two cases and redistribution becomes null for expenditure standards equal or below 50% of current ones.

TABLE 4 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 expenditure standards and therefore of compulsory expenditures, while the expenditure in excess of standards is distributed according to the distribution of revenues and therefore its net redistributive effect is zero. As expenditure 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 equalizing role of transfers is due to the combined effect of two factors: first, the reducing difference between expenditure standards and own revenues of the regions actually receiving these transfers and, second, the decreasing number of regions that benefit from the equalizing fund. This latter effect is easily illustrated: as expenditure standards are reduced, an increasing number of regions become able to cover these standards by means of their own
revenues and therefore those regions are not entitled to receive equalizing 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 expenditure 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 expenditure standards plus an additional component, as described in equation (9) and (12), respectively. In equation (9) – scenario 1 – 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 – equation (12) – 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 expenditure 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 expenditure 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 their expenditure standards and no extra money, whereas “rich” regions are endowed with expenditure standards plus all resources that are not required by the horizontal equalizing fund.

More detailed information about the effects of the reduction of the total amount of resources devoted to healthcare financing 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 5 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 expenditure standards gives rise to a wide differentiation across regions of health care expenditures. In particular, when, as an example, a 30% reduction of expenditure 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 5 APPROXIMATELY HERE

5. Conclusions

In this paper we analyse how fiscal decentralization pressures may affect the interregional redistributive properties of the Italian NHS. To do so we envisage three alternative institutional settings characterised by a growing degree of regional governments’ fiscal autonomy and we account for a reduction of the size of resources currently devoted to health care financing. 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 results 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.

A reform of the NHS in terms of a reduction of expenditure standards to be provided in all regions, always produces a reduction of redistribution across Italian regional jurisdictions. However, as expenditure 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 expenditure 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. As expenditure standards decrease and “poorer” regions cannot afford anything more than these, an increase in the demand for interregional mobility of patients would be likely. In order to cope with interregional mobility, out-flow regions can collect resources to finance in-flow regions by increasing their fiscal effort or cutting other services, or can set administrative barriers to hamper interregional mobility, or finally may choose to go bankrupt relying on a possible central government bailout. Of course all these alternatives may have quite different outcomes in terms of both interregional redistribution and efficiency in public provision.
References

Arachi G., C. Ferrario and A. Zanardi (2010), *Regional redistribution and risk sharing in Italy: the role of different tiers of government*, Regional Studies, 44.1, 55-69.


Cappellaro G., G. Fattore and A. Torbica (2009), Funding health technologies in decentralized systems: A comparison between Italy and Spain, Health Policy, 92, pp. 313–321.


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

<table>
<thead>
<tr>
<th>Gdp</th>
<th>27,279</th>
<th>1,620</th>
<th>698</th>
<th>807</th>
<th>102</th>
<th>1,607</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piemonte</td>
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<td>1,549</td>
<td>951</td>
<td>491</td>
<td>77</td>
<td>1,519</td>
</tr>
<tr>
<td>Lombardia</td>
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<td>774</td>
<td>680</td>
<td>112</td>
<td>1,566</td>
</tr>
<tr>
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<td>1,760</td>
<td>561</td>
<td>1,074</td>
<td>69</td>
<td>1,704</td>
</tr>
<tr>
<td>Liguria</td>
<td>30,818</td>
<td>1,670</td>
<td>810</td>
<td>703</td>
<td>115</td>
<td>1,628</td>
</tr>
<tr>
<td>Emilia-Romagna</td>
<td>27,050</td>
<td>1,623</td>
<td>657</td>
<td>857</td>
<td>99</td>
<td>1,613</td>
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<tr>
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<td>1,572</td>
<td>614</td>
<td>877</td>
<td>85</td>
<td>1,575</td>
</tr>
<tr>
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<td>790</td>
<td>741</td>
<td>72</td>
<td>1,603</td>
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<tr>
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<td>417</td>
<td>1,007</td>
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<td>1,676</td>
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<td>292</td>
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<td>1,425</td>
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<tr>
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<td>Campania</td>
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<td>1,436</td>
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<td>157</td>
<td>1,251</td>
<td>38</td>
<td>1,445</td>
</tr>
</tbody>
</table>

Source: our elaborations on Relazione generale sulla situazione economica del paese. Italian Ministry of the Economy, various years.
Table 2. NHS: benefits, contributions and fiscal balances (per-capita average values 1999-2006, euro 2006)

<table>
<thead>
<tr>
<th>Gdp</th>
<th>Benefits</th>
<th>Contributions</th>
<th>Fiscal balances</th>
<th>Total budget</th>
</tr>
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<tr>
<td></td>
<td>Regional gov taxes</td>
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<td>Fees</td>
<td>Total</td>
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<td>Lombardia (15)</td>
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<td>Veneto (12)</td>
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<td>Marche (8)</td>
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<td>614</td>
<td>941</td>
</tr>
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<td>Lazio (13)</td>
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<td>790</td>
<td>1,084</td>
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<td>417</td>
<td>764</td>
</tr>
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<td>Molise (5)</td>
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<td>1,677</td>
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<td>689</td>
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<td>Puglia (3)</td>
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<td>657</td>
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<td>Basilicata (4)</td>
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<td>1,487</td>
<td>187</td>
<td>602</td>
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<td>Calabria (1)</td>
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<td>157</td>
<td>629</td>
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<td>Italy (OSR)</td>
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<td>1,586</td>
<td>637</td>
<td>960</td>
</tr>
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</table>

Source: our elaborations on Territorial Public Accounts, Ministry of the Economy, various years.
Table 3. Degree of redistribution through fiscal balances and benefits only (NHS and general government total budget, % GDP, 1999–2006)

<table>
<thead>
<tr>
<th></th>
<th>National Health Service</th>
<th>Total budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal balances</td>
<td>6.9%</td>
<td>38.1%</td>
</tr>
<tr>
<td>Robust Standard Error</td>
<td>0.0021095</td>
<td>0.0117604</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.9995</td>
<td>0.9592</td>
</tr>
<tr>
<td>Benefits</td>
<td>5.2%</td>
<td>22.5%</td>
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<tr>
<td>Robust Standard Error</td>
<td>0.0015131</td>
<td>0.0092267</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.9997</td>
<td>0.9772</td>
</tr>
</tbody>
</table>

*Note 1:* redistribution is measured by $1 - \beta_2$, where $\beta_2$ is the estimated coefficient.

*Note 2:* number of observations: 120.
Table 4. Redistribution by the NHS under different assumptions on the level of expenditure standards for health care services and different hypotheses on the financing mechanism (% GDP, 1999-2006)

<table>
<thead>
<tr>
<th>Expenditure standards in percentage of actual recorded expenditures</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>6.906</td>
<td>6.906</td>
<td>6.906</td>
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<tr>
<td>90%</td>
<td>6.215</td>
<td>6.431</td>
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<td>80%</td>
<td>5.525</td>
<td>5.957</td>
<td>3.511</td>
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<tr>
<td>70%</td>
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<td>1.928</td>
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<tr>
<td>30%</td>
<td>2.072</td>
<td>1.438</td>
<td>0.000</td>
</tr>
<tr>
<td>20%</td>
<td>1.381</td>
<td>0.419</td>
<td>0.000</td>
</tr>
<tr>
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<td>0.691</td>
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<tr>
<td>0%</td>
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Table 5. Regional health care expenditures as expenditure standards decrease (% of current expenditure in 2006)

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<tbody>
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<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
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</tr>
<tr>
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<td>6.215</td>
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<td>99.8%</td>
<td>99.8%</td>
<td>97.9%</td>
<td>95.6%</td>
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<tr>
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<td>5.525</td>
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<td>101.5%</td>
<td>97.6%</td>
<td>99.7%</td>
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<td>109.6%</td>
<td>104.8%</td>
<td>97.5%</td>
<td>106.2%</td>
<td>102.3%</td>
<td>96.4%</td>
<td>99.5%</td>
<td>99.3%</td>
<td>93.6%</td>
<td>86.7%</td>
<td>89.1%</td>
<td>91.6%</td>
<td>86.9%</td>
<td>88.1%</td>
</tr>
<tr>
<td>60%</td>
<td>4.143</td>
<td>102.5%</td>
<td>112.7%</td>
<td>106.4%</td>
<td>96.6%</td>
<td>108.3%</td>
<td>103.0%</td>
<td>95.2%</td>
<td>99.4%</td>
<td>99.1%</td>
<td>91.5%</td>
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<td>108.0%</td>
<td>95.8%</td>
<td>110.4%</td>
<td>103.8%</td>
<td>94.0%</td>
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<td>98.4%</td>
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<td>109.6%</td>
<td>94.9%</td>
<td>112.5%</td>
<td>104.5%</td>
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<td>99.0%</td>
<td>98.6%</td>
<td>87.2%</td>
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<tr>
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<td>94.1%</td>
<td>114.6%</td>
<td>105.3%</td>
<td>91.5%</td>
<td>98.9%</td>
<td>98.4%</td>
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<td>116.7%</td>
<td>106.0%</td>
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<td>98.7%</td>
<td>98.1%</td>
<td>83.0%</td>
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<td>92.4%</td>
<td>118.7%</td>
<td>106.8%</td>
<td>89.1%</td>
<td>98.6%</td>
<td>97.9%</td>
<td>80.9%</td>
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Scenario 2
Table 6. (continue)

<table>
<thead>
<tr>
<th>Expenditure standards (% of current expenditures)</th>
<th>Redistribution (%GDP)</th>
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Figure 1A. NHS expenditures and revenues by region
(per-capita average values 1999-2006, Euro 2006)

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

Note: per-capita GDP ranking from the poorer to the richer region in parentheses
Figure 2. NHS fiscal balances by region (per capita average values 1999-2006, euro 2006)
Figure 3. Redistribution by the NHS under different assumptions on the level of expenditure standards for health care services and different hypotheses on the financing mechanism (% GDP, 1999-2006)