A Survey of the Impact of Death-Related Costs on Health-Care Expenditure and Demographics and Health Costs in Italy

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Extracting the Policy Implications from

The Impact of Death-Related Costs on Health-Care Expenditure: A Survey

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and

Demographic Factors and Health Expenditure Profiles by Age: The Case of Italy

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A brief description of the AHEAD project and a list of its partner institutes and publications can be found on the last pages of this Policy Brief.

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Introduction

The demographic projections for the next half century have given rise to concerns that ageing may jeopardise the financial balances of European welfare systems. The impact of ageing on welfare spending is not homogeneous in all sectors, however. Specifically, the effects of ageing on health spending are rather uncertain.

According to Evans et al. (2004), the risks for the health system's sustainability associated with ageing have been greatly emphasised for political reasons: the claim that health expenditure will grow dramatically to meet increasing needs is a way to obtain more resources with which to increase the incomes of healthcare providers. At the same time, ageing may be used as justification for past increases in spending. This may detract attention from the actual causes of expenditure growth, from considerations concerning the appropriateness or effectiveness of care provision and from evaluation and accountability. Finally, the prediction that universal public healthcare systems will collapse strengthens the argument for a shift to a more mixed financing system, with a greater level of private payment. These and similar observations have prompted some experts to wonder whether the risk of huge health expenditure increases due to ageing is not a 'red herring' (see Zweifel et al., 1999, and the reply by Seshamani & Gray, 2004).

These considerations highlight the complexity of health expenditure predictions and suggest the relevance of the political issues that lie behind certain technical aspects. For the reasons just given, the study of health costs prior to death may also help policy-making intended to curb expenditure and foster the efficiency of health systems.

As recognised, the link between ageing and increases in health expenditure derives from the observation that the health consumption pattern by age displays a J-shaped curve, as per capita consumption continuously increases with age. It is thus easy to infer that ageing, in that it increases the share of the population in the old age groups, will generate a huge growth of healthcare spending. The concern about the future increase in health-care costs as a result of population ageing then mostly depends on the use of a static and constant age-related healthcare expenditure profile. But is it theoretically correct to assume the constancy of this profile, or does the age-related pattern change according to ageing as well?

Research shows that the age profile changes for two main demographic reasons: the possible improvement in health status following the increase in life expectancy and the fact that the bulk of individual lifetime health-care costs are concentrated at the end of life (the so-called 'death-related' costs).

With regard to the death-costs factor, it has been suggested that the accelerated rise in costs at higher ages may not be a function of age per se, but rather of individual proximity to death, since age and death are closely correlated (hence the correlation between age and health-care costs may be – at least in part – a spurious one). In fact, it is unlikely that death costs are

increased by ageing: rather, they are postponed, with a change in the health expenditure profile by age.

The papers of AHEAD WP7 focus on the impact of death costs on health-care spending. Thorough examination should be made of these matters in order to obtain better understanding of the actual impact of ageing on the growth of health expenditure.

The papers reviewed the empirical literature on health economics, presenting the main results obtained by studies on the interaction among age, proximity to death and health-care expenditure. Besides, they provide estimates of health expenditure by 'distance from birth' (i.e. age) and by 'distance from death' (i.e. the health expenditure incurred in the last period of life) in different parts of Italy. Specifically, we distinguish between 'old age costs' – healthcare expenditure due to the ageing of the population – and 'death costs' – healthcare expenditure due to the event of dying. Using the methodology proposed by Bartolacci et al. (2001), we estimate hospital costs prior to death in four regions (Tuscany, Lombardy, Abruzzi and Apulia).

The results are then compared with previous estimates of healthcare expenditure by age and prior to death available for Italy. We compare the results with those of some other OECD countries as well.

Methodology

A review of the empirical literature on health economics - presenting the main results obtained by studies on the interaction among age, proximity to death and health-care expenditure - is included in the deliverables of WP7. The structure of this paper is based on a research strategy that classifies the studies depending on their main methodology (descriptive, econometric and forecasting), as shown in Table 1, which also displays the countries in which the impact of death costs has been studied and the analyses performed:

- descriptive studies, which evaluate the evolution of death costs by age and the ratio (at each age) between the health-care expenditures of decedents and survivors;

- econometric studies, which seek to estimate whether age and length of time to death are significant drivers of health-care expenditures;

- projection studies, which aim at calculating the difference between health-care cost projections that include or otherwise the death-costs assumption.

It should be pointed out that empirical studies have focused mainly on healthcare costs (mostly on hospital care costs); only a few of them have examined long-term care as well.

As for the analysis of the Italian case, we have to point out that the decentralisation of the Italian NHS increased the historical differences among regional health systems, with regions developing their own healthcare models. It also fostered fragmentation in the information system that is not easy to overcome. Hence, there is a lack of good quality data at national level, while at regional level they are sometimes of better quality – at least for hospital care.

For the purpose of this study, a network of research institutes (ISAE and Mario Negri Sud) and regions (ARS-Agenzia Regionale di Sanità Toscana, Regione Lombardia) was established in order to pool information and discuss the comparability of data. It was thus possible to obtain information from four regions, one located in Northern Italy (Lombardy), one in Central Italy (Tuscany) and two in the South (Abruzzi and Apulia). The four Italian regions represents more than one third (i.e. around 19 million people) of the Italian population. The coverage is larger than in all the other studies on death related costs (i.e. a lot of studies focus only on people living in very limited areas or enrolled in a single health fund) so far published internationally.

Table 1. Countries of the study and type of analysis

Country	Kinds of analyses
US	Descriptive and projections
Canada	Descriptive
Switzerland	Econometric
Germany	Econometric, descriptive and projections
Italy	Descriptive and projections
Spain	Descriptive
Austria	Descriptive and projections
UK	Econometric, descriptive and projections
Denmark	Descriptive and projections
The Netherlands	Descriptive and projections
France	Descriptive
Sweden	Descriptive and projections
OECD countries	Projections

Source: Author's compilation.

The analysis reported in this paper used a two-step method: in the first step, databases of information on healthcare consumption at individual level were assembled. In the second step, these databases – which contained demographic information on patients – were used to compute health expenditure according to age and gender, and health expenditure prior to death (i.e. in the last 12 months) by age and gender. For this purpose, the available administrative databases on healthcare consumption were linked to the death abstracts databases.

Concerning the procedure for the data linkage, for Lombardy and Tuscany the fiscal numbers were used as subject identifiers (i.e. the error percentage is very low). For Abruzzi and Apulia a statistical linkage method was adopted, based on fiscal numbers and other variables, as name, surname, birth data and sex. Defined rules to merge these variables have been followed. In this case the error percentage is estimated to be about 5%.

To compute healthcare expenditure in the last year prior to death, the subjects were distinguished into 'cases' (subjects deceased in year 2000) and 'controls' (survivors, i.e. subjects alive on 1.1.2001 and surviving for at least 12 months after hospital admission). Hospital admissions in the last year of life of subjects deceased in 2001 were excluded. This meant the exclusion of subjects admitted in 2000 within 12 months before death and deceased in 2001.

The administrative databases on healthcare consumption at individual level in Italy are available on hospital care and (only in some regions) on outpatient specialist care, rehabilitation services either in outpatient departments or at home, nursing homes and pharmaceutical care. These databases contain information on patient characteristics, type of health services received (the procedures and therapies charged to the Regional Health Service) and health service tariffs.

Given the differing availability of data and their varying quality, it was possible to work with data of some regions for hospital care and to carry out only rather preliminary case studies on pharmaceutical and specialist care in Tuscany. It should be borne in mind that, according to the region, hospital care in Italy accounts for between 43% and 49% of the healthcare budget.

The data on hospital care were obtained from the regional Discharge Abstracts Database (years 1999, 2000 and 2001). Tariffs are only a proxy for healthcare costs and expenditure, but they

were the only available information that could be used at patient level. Per-day tariffs – useful for computing monthly costs – were calculated as the admission cost divided by the number of days in hospital, although the costs in fact vary during the stay.

The data on mortality were taken from the Regional Death Abstracts database of causes of death (Tuscany), the Local Health Authorities database (Lombardy) and a national database compiled by the national statistical institute - ISTAT [1] (Abruzzi and Apulia). The demographic data, which were provided by ISTAT, included all residents in the regions.

Even if there are some concerns about the reliability of individual data, mainly in the two southern regions, the databases adopted are the best source currently available.

Main results

The literature review shows that decedent costs are much higher than survivor costs, according to most descriptive studies. The ratio between expenditures of these two groups on healthcare has an age-decreasing character, as do the costs in the last period of life. A different age pattern can be observed in long-term care, however, despite the fact that a shortage of data has led to a paucity of studies that also analyse long-term care.

Econometric studies confirm that proximity to death, rather than age, is the main driver of health-care spending, at least for the over-65 age groups. Yet there is still disagreement on the effect of age, once time to death has been controlled for (as well as on the different methodologies used by certain authors). Concerning the impact of age on death costs, some studies show an 'age neutrality' of death costs; others suggest a constant age-decreasing profile; and still others report a ∩-shaped relationship between age and health-care costs in the last period of life.

At the individual level, the major importance of death costs is confirmed. Projection studies include the differences in per capita costs between survivors and decedents (although they use different methods to define these groups) and seek to predict the growth in aggregate health-care spending related to ageing. The amount of the reduction in spending once death costs have been included in the projection differs significantly among studies, but they all confirm that including death costs reduces the concern that health-care spending will increase exorbitantly in the future. It can consequently be concluded with certainty that age alone is not a good predictor of rises in health-care spending, and that proximity to death must also be used as a predictor of health-care expenditure.

The case of Italy is quite consistent with most other empirical evidence. Average hospital expenditure per survivor is €406 in Lombardy, €419 in Tuscany, €568 in Abruzzi and €460 in Apulia, as the one on deceased reaches €5,593 in Lombardy, €5,868 in Tuscany, €5,770 in Abruzzi and €5,481 in Apulia. While the survivors' per capita expenditure-profile by age for the four regions are J-shaped, as we expected from the literature, costs near death diminish after a certain age. There are wide fluctuations, which progressively diminish, until about the age of 55-59, due to the small number of observations made on young ages and the large share of deaths caused by accidents. What happens after middle age is much more interesting: expenditure constantly diminishes, and the per capita amounts of the various regions tend to coincide. Expenditure on the deceased aged 90 or over is 26% of that for 55-59-year-old men, 18% for women. Summarising per capita expenditure trends on survivors and deceased for all regions, we calculate that expenditure on the deceased aged 90 or over is 26% of that for 55-59-

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[1] ISTAT, Mortalità per causa nelle regioni, 2000, 2001 and 2002.

year-old men, 18% for women. This percentage tends to increase as age decreases: it is 51% at 80-84 years for men (42% for women), and 81% (men) at 70-74 years (70% for women).

The ratio between per capita expenditures on deceased and survivors by age varies, for all ages, between 10 and 14 (12-16 for men and 8-12 for women) among the regions.[2] Like the numerator (deceased expenditure), and for the same reasons, the ratio shows numerous fluctuations for young ages. We observe a downward trend in over 40-year-olds. The ratio is one or two for over ninety-years-olds, whereas for the 35-39 age group it varies between 36 and 43 for men and between 21 and 40 for women (see Figure 1).

Figure 1. Hospital expenditure by age and gender of survivors and of deceased, all regions
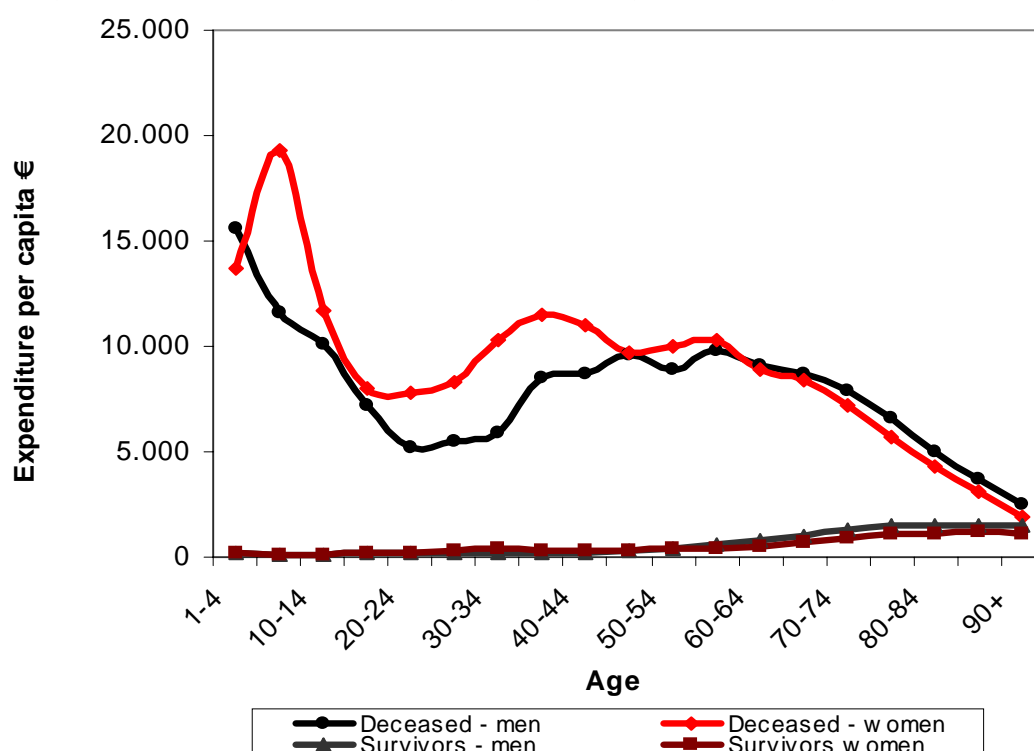
Different methods, datasets and hypotheses notwithstanding, the size of the average ratio and of the ratio at old ages (see Table 2) is rather similar to that found for other countries, for instance the Netherlands[3] (11.5 for all ages), USA[4] (about 9 for 70-74 years, 7 for 75-79, 5 for 80-84, 4 for over 85), Spain[5] (about 9 for 70-74 years, 7 for 75-79, 6 for 80-84, 5 for over 85, but for all ages the ratio is 24).

Per capita hospital expenditure on the deceased, for all ages, constantly increases from the twelfth to the last month before death, and the rise is exceptionally steep in the final month. At

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[2] Using data from Taroni & Nobilio (2004), we also calculated the Emilia-Romagna ratio, which is about 14 (women and men).

[3] Polder & Achterberg (2004).

[4] Lubitz & Riley (1993) and Calfo et al. (2003).

[5] Ahn et al. (2003).

the youngest ages (1-44), expenditure is much higher for deceased women than for men. Yet inspection on all ages shows greater expenditure for men than for women.

In the last month before death, per capita expenditure for all ages is just over €2,000 for men and €1,500 for women in Apulia, between €2,000 and €2,500 for men and between €1,500 and €2,000 for women in Abruzzi and Tuscany, and between €3,000 and €3,500 for men and between €2,000 and €2,500 for women in Lombardy.

In order to get a rough idea, we carried out a very preliminary survey on prescription drugs and outpatient specialist care in Tuscany, adopting for the purpose the same data linkage method as used for the hospital databases. The preliminary results on specialist and pharmaceutical expenditure confirm the death costs trends found for hospital expenditure, even if with different rates of change.

Table 2. Per capita hospital expenditure ratio deceased/survivors by age and gender

Age	Lombardy			Tuscany			Apulia			Abruzzi		
	Men	Women	All	Men	Women	All	Men	Women	All	Men	Women	All
1-4	77,1	67,8	71,8	50,1	151,6	101,3	56,6	63,0	58,8	74,0	91,9	81,8
5-9	109,9	144,4	124,1	12,1	204,4	102,5	71,8	165,9	113,5	0,0	116,5	60,5
10-14	88,7	134,1	109,0	12,5	125,4	73,2	99,5	51,0	81,5	14,0	60,0	32,8
15-19	35,3	46,1	39,4	60,0	38,7	54,6	41,4	60,6	47,3	20,8	23,4	22,0
20-24	30,0	30,3	29,6	22,7	41,4	27,4	27,6	44,0	28,8	7,1	5,0	6,3
25-29	33,4	27,9	28,1	39,0	36,2	32,8	18,0	16,1	14,5	19,3	22,8	17,8
30-34	32,3	28,6	26,8	36,8	24,6	27,3	29,9	22,5	23,0	8,1	45,0	25,0
35-39	42,9	40,0	38,8	42,5	38,8	38,7	36,3	37,5	33,9	35,8	21,4	28,1
40-44	38,4	44,6	40,3	36,9	54,5	43,9	31,7	31,6	31,2	25,0	21,0	22,9
45-49	29,1	31,4	30,1	43,8	44,0	44,2	29,1	26,7	28,0	24,9	23,8	24,3
50-54	21,4	28,0	24,0	27,0	35,2	30,3	18,4	23,9	20,5	16,1	14,4	15,8
55-59	16,9	25,5	20,2	21,2	28,5	24,4	15,5	18,6	17,0	14,1	18,0	15,8
60-64	11,9	17,4	14,3	14,5	21,2	17,4	11,5	12,9	12,5	10,0	14,6	11,9
65-69	8,1	12,4	10,0	10,9	15,5	13,0	7,7	9,3	8,6	7,4	8,9	8,3
70-74	6,1	8,6	7,4	7,6	9,9	8,9	5,5	6,8	6,3	5,6	6,6	6,3
75-79	4,5	5,6	5,2	5,4	6,5	6,1	3,9	4,1	4,2	3,9	4,6	4,4
80-84	3,4	3,8	3,8	3,7	4,3	4,1	2,9	3,2	3,2	3,0	3,2	3,2
85-89	2,5	2,8	2,7	3,0	2,9	3,0	1,8	1,9	1,9	2,2	2,1	2,2
90+	1,8	1,8	1,8	1,9	1,8	1,8	1,3	1,2	1,3	1,5	1,3	1,4
All ages	15,9	11,7	13,8	16,1	12,0	14,0	14,2	9,7	11,9	11,7	8,5	10,2

Discussion/conclusions

Our study confirms the results of recent research on heathcare costs prior to death carried out in other OECD countries.

It also suggests that Italian institutional and socio-economic regional differences are not particularly significant with regard to the issue under discussion: although the four regions examined are situated in three different macro-areas, they have similar patterns of prior-to-death per capita expenditure profiles by age. The ratio between deceased and survivor expenditure per age also displays a similar trend in the four regions, falling after 40 years and equalling one or two for over 90 years olds (the regional range is 10-14 for all ages).

Nevertheless, our analysis has mainly concerned hospital expenditure. Hence, to deepen our knowledge of the question, it would be useful to extend our analysis to other items of heath expenditure. The first results on Tuscany could be checked and compared with those for the other regions. We expect confirmation for specialist and pharmaceutical care. By contrast, long-term care is not likely to show a characteristic pattern of costs near death, since the

concentration of the bulk of expenditure in the last months (years) is due to the onset of acute diseases.

A second step to gaining better understanding of the profile of health expenditure per age would be to examine the split between survivors and the deceased over several years. However, it is not possible to perform this analysis with Italian data since they are not available. In fact, administrative databases of healthcare consumption at individual level are not available for many years in the past, and the older databases are generally not as complete and reliable as the more recent ones.

From a microeconomic point of view, distance to death is an important factor in explaining the concentration of health expenditure on certain groups of people. In this regard, it would be useful to analyse the healthcare treatments and costs due to certain chronic conditions and terminal pathologies, and to identify and promote cost-effective practices.

From the macroeconomic point of view, the distinction between 'old age costs' (healthcare expenditure due to the ageing of the population) and 'death costs' (healthcare expenditure due to the event of dying) can be used as the basis for long-term healthcare expenditure projections.

In fact, the results of AHEAD WP7 were used by the Ragioneria Generale dello Stato[6] (RGS) in Italy and by the Working Group on Ageing Populations (AWG) and the DG ECFIN at an European level to compute the death related costs scenario, respectively in the Annual Update of the Italian Stability and Convergence Programme (annually assessed by the European Council and by the European Commission) and in the new 2006 European official projections on the evolution of age related expenditures up to 2050.

In light of our new multi-regional data, it is possible to confirm that health spending is likely to grow to a lesser extent than expected when account is taken of costs near death. RGS, applying our data on the hospital expenditure and adopting a dynamic age-related expenditure profile for the other expenditure components, shows a projected health expenditure/PIL ratio for Italy 0.5 points lower by 2050 than in the base case scenario. The AWG report – in its 'death costs scenario' based on a costs-profile by age and survival status calculated as an unweighted average of available European datasets, including the one on Italy provided by AHEAD WP7 – shows an EU healthcare expenditure (as % of GDP) by 2050 0.4 points lower compared to the pure ageing scenario (0.3 for Italy).

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[6] The State General Accounting Department (Ragioneria Generale dello Stato - RGS) is the central control body that supports the Parliament and the Government on budget policies, processes and procedures. The primary institutional objective of the Department is to guarantee the correct administration and the rigorous planning and programming of public resources. The RGS is responsible for the consistency and reliability of national accounts and for the assessment and the analysis of public expenditure trends. It has the responsibility of drawing the annual national budget draft, including associated adjustment and variation measures, the multi-annual national budget and also the Finance Bill and related provisions. The Department's functions have been recently extended in order to allow a more exhaustive monitoring and analysis of expenditure trends, specifically regarding internal growth and Stability Pact targets (cfr.the website http://www.rgs.mef.gov.it/ENGLISH-VE/about-us/index.asp).

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WPI	Health and Morbidity by Age and Socio-economic Circumstances
WPII	Health and Morbidity in the New Member States
WPIII	Incidence of Poor Health and Long-term Care
WPIV	Health Status Transitions
WPV	Healthy Life Expectancy
WPVI	Determinants of Aggregate Healthcare Expenditure focusing on age composition
WPVII	Health Costs Prior to Death
WPVIII	Development of Scenarios for Health Expenditure in European Union Countries
WPIX	Development of Scenarios for Health Expenditure in the New Member States

In February 2004, a CEPS-led consortium of research institutes launched the implementation of a three-year project called AHEAD (Ageing, Health Status and the Determinants of Health Expenditure). Most of the consortium's 18 partner institutes are members of the European Network of Economic Policy Research Institutes (ENEPRI – see http://www.enepri.org for details). As specified in the call for proposals, the main task of the project is to carry out an "Investigation into different key factors driving healthcare expenditures and in particular their interaction with particular reference to ageing" in the (enlarged) European Union.

The strategic objectives of AHEAD are to:

- assess pressures on health spending in the existing EU and in selected candidate countries, looking both at those arising directly from ageing and at those affected by changing incomes, social change and methods of expenditure control;
- develop models for projecting future health spending and
- estimate confidence limits for these projections.

Expenditure on medical treatment has tended to rise as a proportion of national income throughout the European Union. A particular concern is that an ageing population and therefore the presence of more old people will create further pressures for expenditure on healthcare. This issue is of concern both in its own terms and because of its fiscal implications. Rising health expenditures put pressure on the targets of the Stability and Growth Pact. They also raise the question of whether budgetary targets should be tightened ahead of projected growth in public expenditures, so as to 'save up' for future spending and keep expected future tax rates reasonably constant.

This project has aimed to refine existing estimates of the links between reported states of health and use of medical services. As well as looking at the effects of ageing on healthcare, the research has taken account of the link between health expenditure and fertility rates and the demands on health services made by non-native populations. Particular attention is paid to the costs of care near death. One study examined factors other than demand (such as methods of financial control) that may influence health spending. An important aspect of this research is that the work is carried out so as to be able to provide not only the familiar projections and scenarios but also standard deviations and confidence limits for predictions of key variables, such as healthy life expectancy and demand-driven expenditure levels. These will allow policy-makers to judge not only possible outcomes but also the risks surrounding them and to assess their implications.

Participating Research Institutes

Centre for European Policy Studies, CEPS, Belgium
National Institute for Economic and Social Research, NIESR, UK
Netherlands Bureau for Economic Policy Research, CPB, The Netherlands
Deutsches Institut für Wirtschahftsforschung, DIW, Germany
Economic and Social Research Institute, ESRI, Ireland
Research Institute of the Finnish Economy, ETLA, Finland
Federal Planning Bureau, FPB, Belgium
Istituto di Studi e Analisi Economica, ISAE, Italy
Institute for Advanced Studies, HIS, Austria
Institute for Public Health, IPH, Denmark
Laboratoire d'Economie et de Gestion des Organisations de Santé, LEGOS, France
Personal Social Services Research Unit, PSSRU, UK
Fundación de Estudios de Economía Aplicada, FEDEA, Spain
Centre for Social and Economic Research, CASE, Poland
Institute of Slovak and World Economy, ISWE, Slovak Republic
Institute of Economics at the Bulgarian Academy of Sciences, IE-BAS, BG
Social Research Centre, TARKI, Hungary
Department of Public Health, University of Tartu, Estonia