IS THE HEALTH OF OLDER PERSONS IN OECD COUNTRIES IMPROVING FAST ENOUGH TO COMPENSATE FOR POPULATION AGEING?

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TABLE OF CONTENTS

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INTRODUCTION

Population ageing will pose a considerable challenge for OECD societies over the next few decades, particularly in the fields of pensions and health care (OECD, 1998). Besides having potentially important implications for the public finances, population ageing could also go hand-in-hand with a deterioration in the average health status of the population aged 65 and over (the "elderly"). If the latter were to occur, this could have a major impact on social and caring systems. Therefore, it is important to monitor disability trends in any assessment of the impact of the ageing process on the welfare of the elderly population and on the public finances.

The issue of trends in disability among the elderly has been a subject of keen interest for both economists and demographers – see Waidman *et al.* (1995), Manton *et al.* (1997, 1998) and Cutler and Richardson (1997). However, most of this debate to date has concentrated on US data, and little international evidence has been gathered and analysed. This paper extends the investigations on changing patterns of disability at the international level. It examines the impact of ageing on the health status of the elderly and makes projections of the likely effects on the costs of public long-term care. One of its main contributions is to assemble data on cross-country trends in disability rates among the elderly population for a set of OECD countries for which consistent information is available (Australia, Canada, France, Germany, Japan, the Netherlands, Sweden, the United Kingdom and the United States). This allows us to address the following issues:

- Have there been significant health improvements among older persons in OECD countries?
- If there are, what might be their likely consequences in terms of both care for frail older persons and the public finances?

To answer these questions, detailed demographic data are combined with data on trends in severe disability for each country. These data point to a significant fall in severe disability rates, especially in private households. The data on disability rates are then combined with population projections to yield projections of the numbers of disabled elderly persons over the period up to 2020. The paper compares two projections for the number of disabled older persons, one assuming stable rates of disability, and the other assuming that recent trends in disability rates persist over the projection period. Despite the mechanical nature of the projections, this comparison produces some novel insights for economic and social policy.

The implications for public finances depend on country-specific institutional arrangements for long-term care services: public costs of formal home care differ widely, even if they remain well below those of institutional care; the balance between home care and institutional care is also different across countries.

The paper is organised as follows. First, it briefly discusses the demographic background, comparing past trends in ageing and longevity and population projections. Second, it analyses in depth disability among older persons living in both households and institutions; it also presents two projections of the numbers of disabled elderly people. Third, it discusses the economic and long-term care cost implications of these projections, using a schematic framework for the demand for long-term care and combining it with recent macroeconomic evidence on long-term care costs. Finally, it considers some of the implications of the analysis and projections for the future development of long-term care policy.

THE DEMOGRAPHIC BACKGROUND

The challenge of ageing and longevity

Population ageing creates a common challenge for OECD countries which is mainly driven by increased life expectancy at advanced ages. Countries differ, however, in the extent to which this affects their oldest population. The OECD countries as a group are now at the end of a period which saw a steady increase in the ratio of the working-age population to the total population. As Table 1 shows, this prevented elderly dependency ratios from rising steeply between 1960 and 1990 – the elderly dependency ratio is defined as the share of the population aged over 65 to the working-age population (*i.e.* the population aged 15-64). This trend is likely to be sustained for at least another decade, up to 2010. After 2010, elderly dependency ratios in most OECD countries are projected to rise sharply, reflecting the increase in the share of the population aged over 65 in line with life expectancy gains at advanced ages.

Longevity gains are the result of a significant decline in mortality rates at advanced ages which began in the early 1950s and 1960s. The process has been a steady one, prolonged to the most advanced ages. According to Kannisto (1994), mortality rates in the majority of developed countries since the early 1960s have fallen by 1-2 per cent per year for women and by 0.5-1.5 per cent per year for men aged over 80. As a result, current life expectancy at the age of 65 is close to an average of 16 years for men and 19 years for women.[1] Even at the age of 80, average life expectancy is 7.3 years for men and 8.9 years for women. The lowest life expectancies at older ages are in the European countries in transition as well as in Korea and Ireland. The highest longevity is in countries like Japan, France, Australia, Canada,

Table 1. **Evolution of elderly dependency ratios,[1] 1960-2030**

	1960	1990	2000	2010	2020	2030
Australia	13.8	16.7	18.0	19.8	25.9	29.4
Austria	18.3	22.1	21.5	24.0	28.5	33.3
Belgium	18.6	22.6	25.2	26.0	32.6	37.3
Canada	12.7	16.5	18.7	20.7	28.1	32.8
Czech Republic	13.4	18.9	19.6	21.9	31.8	35.1
Denmark	16.5	23.1	22.7	25.8	32.2	34.9
Finland	11.5	19.9	22.2	25.4	36.5	40.5
France	18.8	21.3	24.4	25.3	32.2	35.5
Germany	17.1	21.7	24.0	29.6	33.0	37.0
Greece	12.6	20.4	26.7	30.3	35.0	38.5
Hungary	13.8	20.1	21.5	23.0	29.1	31.5
Iceland	13.9	16.5	18.5	17.9	23.8	27.3
Ireland	19.4	18.5	16.8	18.2	23.4	26.1
Italy	14.1	21.0	26.9	31.4	37.4	41.8
Japan	9.0	17.2	25.0	33.8	43.9	44.7
Korea	6.1	7.2	9.4	13.1	17.5	22.6
Luxembourg	16.0	19.8	21.3	23.3	28.8	32.7
Mexico	9.1	6.9	7.6	9.0	11.7	13.8
Netherlands	14.8	18.6	20.3	23.0	31.7	36.8
New Zealand	14.8	17.0	17.7	18.9	24.0	27.3
Norway	17.6	25.2	23.8	24.3	31.1	34.8
Poland	9.5	15.5	17.5	17.7	25.4	30.0
Portugal	12.7	20.5	23.2	25.2	29.2	32.2
Spain	12.8	20.0	24.9	27.0	31.6	36.0
Sweden	18.1	27.7	27.1	29.7	37.5	40.3
Switzerland	15.2	20.9	21.7	24.7	31.4	36.7
Turkey	6.4	7.1	8.8	9.7	12.1	14.2
United Kingdom	18.0	24.1	24.6	25.9	31.2	34.2
United States	15.3	18.9	19.0	19.5	25.6	29.9
Total OECD	14.1	18.8	20.6	22.9	29.0	32.7

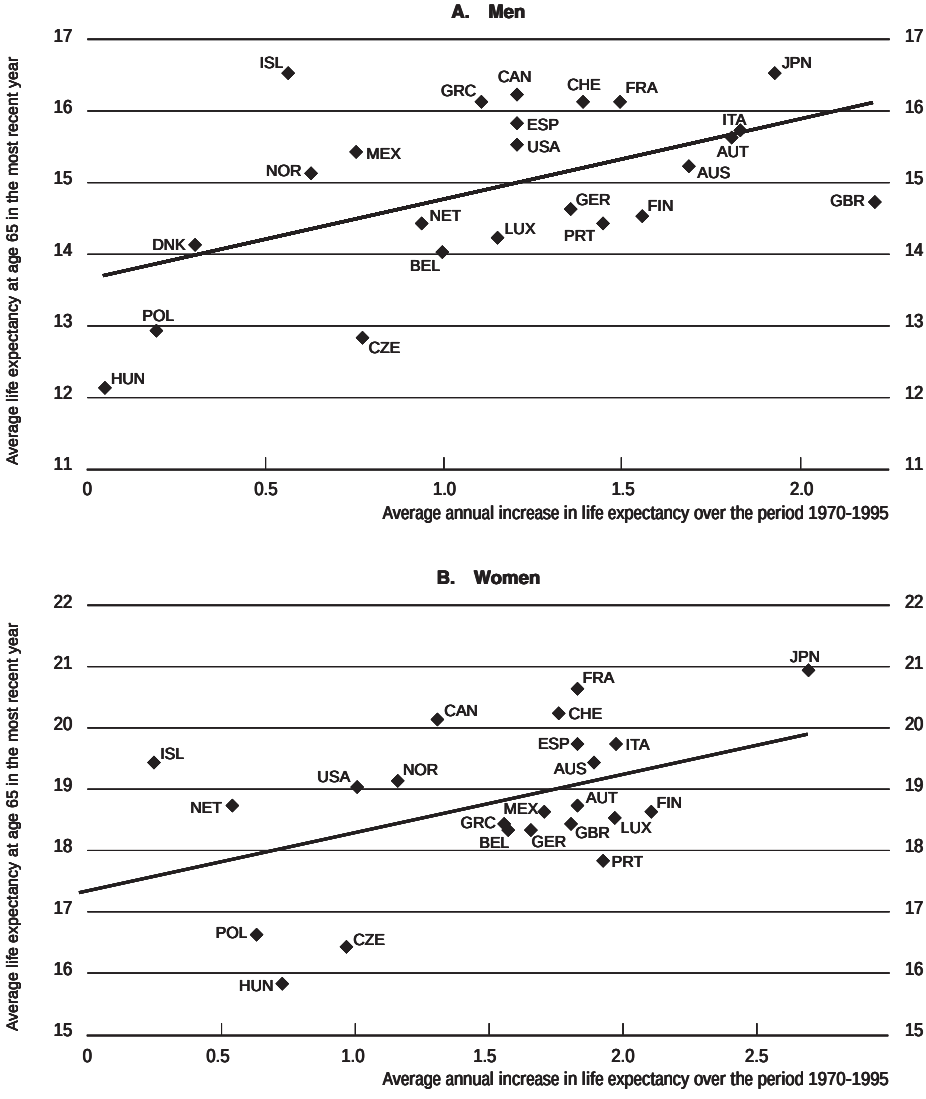
1. The elderly dependency ratio is defined as the population aged 65 and over as a percentage of the working-age population (*i.e.* the population aged 15-64).

Source: United Nations (1998) medium-variant estimates.

Switzerland and the Nordic countries. The increase in life expectancy is generally more pronounced for women.

Examination of the trends in ageing over the past three decades reveals quite a high heterogeneity among countries (Figure 1). The gains in life expectancy in countries like Hungary, the Czech Republic and Poland have been relatively modest. In contrast, Japan is the country with the largest relative gains and one of the longest life expectancies. This country is faced with an ageing process which is unparalleled among the OECD countries. Among EU countries, however, there seems to be a relative convergence in the ageing process.

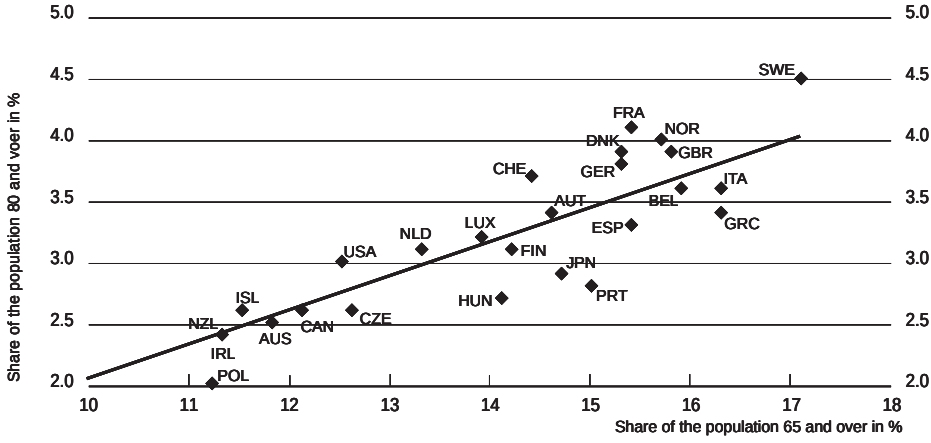
Figure 1. **Links between life expectancy at age 65 and the average increase of life expectancy over the period 1970-95**[1]



1. Data for Germany, Greece, Mexico, United States refer to 1970-1994, Belgium 1970-1993, Canada 1971-1994, Denmark 1982-1994, Finland 1971-1995, Iceland 1979-1995, Italy 1981-1994, Luxembourg 1971-1993, Netherlands 1986-1995, Portugal 1990-1995, Switzerland 1982-1995, United Kingdom 1976-1994.

Source: OECD *Health database* (1998).

Figure 2. **Ageing cycles : share of the population aged 80 and over compared with the share of the population aged 65 and over, 1994-96**



Source: OECD *Health database* (1998).

A counterpart to these heterogeneous trends is different ageing cycles across countries (Figure 2). In the countries where the ageing process began earliest, the share of over-80 year-olds in the population is largest. For example, Sweden, France, Denmark, Norway, the United Kingdom and Germany were confronted earlier than other countries with the consequences of increased longevity at older ages. In contrast, a relatively large share of the population is now aged 65 and over in Southern European countries like Italy, Spain, Greece and Portugal, as well as in Japan, but their over-80 population is still relatively small. These countries are now confronted with the consequences of the ageing phenomenon in terms of increased demands on their pension systems, but they have not had to cope yet with the full implications of ageing among the frail elderly aged 80 and over. A third group of countries, *e.g.* Ireland, Australia, Canada, and to a lesser extent the United States, has still a relatively young population.

Demographic projections and future life expectancy gains

Central United Nations (UN) demographic projections (1996 revision) were used as a common set of hypotheses, with a focus on mortality data. A brief overview of the demographic projections, disaggregated by gender and for groups

aged 65-79 and over 80,[2] is presented in Table 2. Three groups of countries are highlighted in these projections:

- A first group experiences a moderate increase of older populations: Germany, Sweden and the United Kingdom.
- A second group experiences a reasonably strong increase of older populations: France, the Netherlands and the United States. This group shows a strong increase for males aged over 65, and to a lesser extent for females. The increase of the over-80 group is comparable with that projected for the first group of countries.
- The third group of countries experiences a steep increase of older populations: Australia, Canada, Japan. Increases in the projected numbers in the over-80 group are particularly pronounced in these countries, with almost a doubling in Japan.

In most countries, the share of those over 80 years old in the population aged 65 and over is projected to rise over the period up to 2010 when it could account on average for about 25 per cent. In the period 2010-2020, the entry of the post-war "Baby-Boom" generations into this age group tends to offset this rising trend, and the share of the very old population tends to stabilise and even falls a little relative to the total population aged over 65. Among the nine countries covered in this paper, only Japan shows a continuous upward trend in terms of the ageing of its population.

The UN projections for OECD countries typically assume gains of around three years in life expectancies between the base year and 2020, implying an average increase of about one year per decade (Table 3). The United Nations, along with many other agencies, base their projections of life expectancy on the assumption that death rates at advanced ages cannot be reduced substantially and that a life expectancy of around 80 to 85 years is the highest that can be achieved. The implicit life expectancy gains in the projections are a little less than one year per decade on average for women (0.94 year) and a little more than one year per decade on average for men (1.02 year). These numbers are higher for the United States (1 and 1.3 years, respectively) than for Japan (0.8 and 0.75 years, respectively), with an implicit convergence assumed across countries. However, it must be admitted that there is a great deal of uncertainty about projections of life expectancy. The most recent trends would suggest somewhat greater gains in life expectancy than those embodied in the central UN projections.

These projections are based on a widely-held view that most deaths at advanced ages are due to intrinsic and intractable ageing processes. This view implies a *rectangularisation* in the survival curve (Figure 3). On the other hand, Vaupel (1998) and Vaupel and Lundstrom (1996) argue that significant increases in life expectancy for those aged over 80 are indeed possible, calling for a reconsideration

Table 2. **Underlying demographic projections**

Average annual growth rates[1]

	Men			Women		
	1995-2000	2000-2020	2000-2020	1995-2000	2000-2010	2000/2020
Australia						
65-79	1.0	1.6	2.6	0.6	1.3	2.5
Over 80	2.7	3.2	2.5	2.4	2.8	2.2
Total over 65	1.3	1.9	2.6	1.1	1.7	2.4
Canada						
65-79	1.8	1.6	2.7	1.3	1.2	2.5
Over 80	3.0	3.3	2.7	3.1	3.1	2.3
Total over 65	2.0	2.0	2.7	1.7	1.7	2.4
France						
65-79	2.4	0.0	1.4	2.2	–0.4	1.0
over 80	0.4	3.3	2.2	0.2	2.6	1.8
Total over 65	2.0	0.8	1.5	1.6	0.5	1.2
Germany						
65-79	3.5	2.3	1.1	1.3	0.9	0.5
Over 80	–2.9	3.2	3.4	–2.0	1.8	1.9
Total over 65	2.4	2.4	1.5	0.4	1.2	0.8
Japan						
65-79	3.9	2.1	1.8	2.8	1.6	1.4
Over 80	2.4	4.5	4.0	3.5	3.8	3.3
Total over 65	3.7	2.6	2.2	3.0	2.2	1.9
Netherlands						
65-79	1.4	1.7	2.5	0.8	0.9	1.9
Over 80	1.5	2.3	2.2	1.3	1.8	1.6
Total over 65	1.4	1.8	2.4	0.9	1.1	1.8
Sweden						
65-79	–0.9	1.5	1.9	–1.0	0.7	1.4
Over 80	1.0	1.0	1.1	0.9	0.8	0.6
Total over 65	–0.4	1.4	1.7	–0.4	0.7	1.2
United Kingdom						
65-79	0.1	0.6	1.2	–0.4	0.2	1.1
Over 80	1.3	1.3	1.0	0.7	0.9	0.7
Total over 65	0.3	0.7	1.2	–0.1	0.4	1.0
United States						
65-79	0.3	1.1	2.5	0.0	0.8	2.2
Over 80	2.7	2.1	1.5	1.8	1.6	1.2
Total over 65	0.8	1.4	2.3	0.5	1.0	1.9

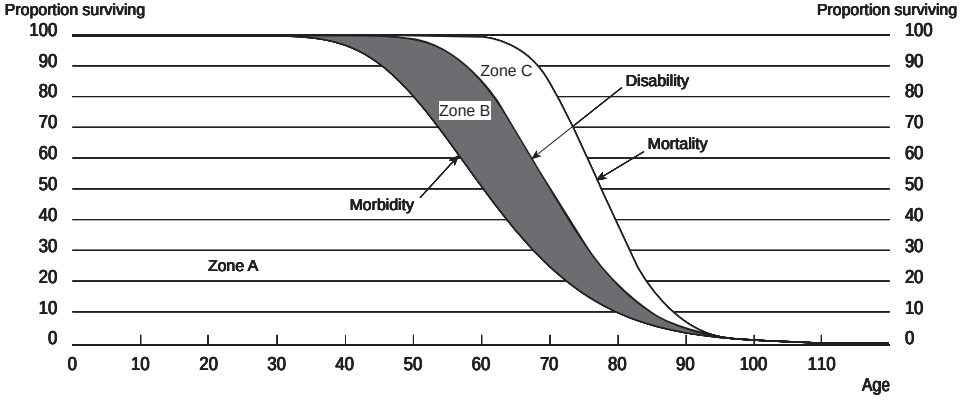
1. For the first period, data refer to 1995-2000 for Canada, Germany and the Netherlands; to 1994-2000 for France and the United States; to 1996-2000 for Australia and Japan; and to 1992-2000 for the United Kingdom.

Table 3. **Life expectancy at birth in years, 1995-2020**

	Men				Women			
	1995	2000	2010	2020	1995	2000	2010	2020
Australia	75.4	76.1	77.1	77.9	81.2	81.7	82.6	83.6
Canada	76.1	76.5	77.5	78.4	81.8	82.4	83.3	84.1
France	74.6	75.4	76.4	77.4	82.9	83.3	84.1	84.9
Germany	73.4	74.2	75.5	76.5	79.9	80.7	81.7	82.7
Japan	76.9	77.3	78.0	78.8	82.9	83.3	84.1	84.9
Netherlands	75.0	75.8	76.8	77.8	80.6	81.2	82.1	83.1
Sweden	76.2	77.1	78.4	79.4	80.8	81.6	82.9	83.9
United Kingdom	74.5	75.3	76.3	77.3	79.8	80.6	81.5	82.6
United States	73.4	74.2	75.8	76.8	80.1	80.6	81.5	82.6
Average of the above countries	75.1	75.8	76.9	77.8	81.1	81.7	82.6	83.6

Source: United Nations (1996) medium-variant estimates.

Figure 3. **Survival curves of morbidity, disability and mortality**[1]



1. The curves represent age-specific prevalences for a living population. Morbidity prevalence is the ratio of ill persons to all living persons (numerator is between morbidity and mortality curves, denominator is between the X-axis and the mortality curve). Disability prevalence by age is the ratio of disabled persons to all living persons in a given age group (numerator is between disability and mortality curves, denominator as just noted).
Zone A is the population living in good health; Zone B is the population ill (morbidity) but not disabled ; Zone C is the population ill and disabled.

Source: Manton and Soldo (1985).

of the whole ageing process. According to this latter school of thought, ageing-related deficiencies are due to specific diseases (*e.g.* osteoporosis, Alzheimer's disease), for which medical research may offer significant improvements in the future. Current developments thus reflect not only an increased *rectangularization* of the life-expectancy curve, but also a *diffusion* process with a general trend towards gains in life expectancy at the most advanced ages. Whilst the debate about life expectancy will only be resolved in the fullness of time, it would seem that a prudent approach to projections of ageing populations should at least investigate the implications of much greater increases in life expectancy than those suggested in the current UN projections. Alternative scenarios are presented by Lutz, Goldstein and Prinz (1996). For most international projections, the variants by mortality only show slight differences over the period up to 2020. Hence, by limiting this study to the period up to 2020, it seems reasonable to side-step this issue and continue to use the central UN projections.

Discussions about gains in life expectancy are closely linked with the discussion on trends in disability. This has given rise to an intense debate between epidemiologists and demographers over the "expansion or compression of morbidity" (Fries, 1989; Waidman *et al.* 1995). The combined effects of ageing on disability are ambiguous: gains in life expectancy, due to a reduction in mortality, are in a dynamic equilibrium with gains in morbidity and reductions in disability in older age groups. If the reduction in mortality is greater than the reduction in morbidity and disability, the lengthening of life expectancy leads to increased incapacity, hence a scenario of "the expansion of morbidity". This would be illustrated in Figure 3 by a relative increase in the zones B and C. On the other hand, if medical progress permits a simultaneous fall in mortality and an improvement in health status, the result is a scenario of the "compression of morbidity": in terms of Figure 3, the mortality, morbidity and disability curves would be moving to the right, with zones B and C remaining constant. If the two effects are balanced, a dynamic equilibrium prevails. Therefore, there is a need to pay particular attention to the measurement of cohort effects, the relative evolution of life expectancy and life expectancy without disability, and the precise definitions of disability to illustrate this debate.

DISABILITY AMONG OLDER PERSONS

Proper measurement of disability is vital. Many studies in the 1970s presented a rather gloomy view of the future, citing evidence of growing prevalence of disease, deteriorating health and increasing disability. However, Waidman *et al.* (1995) have argued that these predictions are subject to serious conceptual and measurement problems. On the other hand, the optimistic conclusions about likely trends in dis-

ability in Manton (1997) relied upon fairly sophisticated and standardised measurement of disability using longitudinal-type surveys.

Measuring disability

In order to measure disability, research involving international comparisons of population health has produced several types of indicators (Cambois and Robine, 1996; Freedman and Soldo, 1994; Waidman and Manton, 1998 and REVES 1995, 1997). Usually, a distinction is made between:

- "Severe disability", which includes those individuals with at least 1 or more Activity of Daily Living[3] (ADL) restrictions. This is almost invariably associated with the need for help with personal care, either at home or in an institution;
- "Moderate disability", which includes those individuals experiencing no ADL restriction but instead facing Instrumental Activities of Daily Living[4] (IADL) limitations. Persons with moderate disability do not usually have to live in institutions;
- "Little or no disability", which includes individuals with no major functional limitations (either ADL or IADL).

Many of the previous studies mentioned above made no clear-cut distinction between "severe" and "moderate" disability. Moderate disability appears to be more subject to measurement errors and differences across countries; in addition, survey design and socio-economic trends can complicate the measurement of trends in moderate disability.

To best ensure international comparability, this study focuses on "severe disability", as measured by ADL. The key assumption is that this sort of disability is both linked with health status in a measurable way, as an "outcome" of past lifestyle and health care, and also represents an objective reason to seek help with personal care, either at home or in an institution. The measure of severe disability is used in this study as a reasonable proxy for need for long-term care.

Trends in the institutionalised population

This paper aggregates data describing "severe disability", both in terms of the population living in institutions and in the community (For data sources, see Annex 1). Institutionalisation remains, however, fundamentally different from living at home. Disability trends among the population living in private households are probably more representative of the evolution of health among older populations since trends in the institutionalised population depend more on explicit policies and the equilibrium between supply and demand for beds in such institutions. It is not feasible, however, at the international level to project trends in

disability independently from the institutional setting in which long-term care will be provided. Thus, the trends will be computed for the institutionalised population too and will be projected as such.

The trends highlighted in this paper illustrate the evolution of long-term care systems at the end of the 1980s and the beginning of the 1990s – the trends for Australia, Sweden and the United States are computed over somewhat longer time periods. The data in Table 4 show that de-institutionalisation is occurring in most countries, particularly at younger ages.[5] These trends reflect the changing equilibrium

Table 4. **Evolution of institutionalisation rates for the countries studied**

Per cent of the population living in institutions to the total population

a) Countries for which trends could be computed

	Men and women				Men and women		
Australia	1985	1993	Gr. rate %	Netherlands	1980	1995	Gr. rate %
65-79	3.0	1.8	–6.0	65-79	3.0	2.0	–2.7
Over 80	24.9	17.6	–4.3	Over 80	27.0	17.0	–3.0
Total over 65	6.7	5.1	–3.5	Total over 65	7.7	5.5	–2.3
Canada	1985	1991	Gr. rate %	Sweden	1980	1995	Gr. rate %
65-69	1.8	1.4	–4.2	65-79	3.6	3.1	–1.0
70-74	2.8	2.4	–2.5	Over 80	27.0	25.1	–0.5
75-79	5.9	5.6	–1.1	Total over 65	8.2	8.8	0.1
Over 80	23.7	23.4	–0.2				
Total over 65	7.8	7.6	–0.4				
France	1990	1994	Gr. rate %	United States	1982	1994	Gr. rate %
65-69	1.4	1.2	–4.0	65-69	1.4	0.9	–2.9
70-74	2.4	2.0	–4.7	70-74	2.3	1.8	–1.9
75-79	7.0	4.8	–9.0	75-79	5.0	3.8	–2.2
Over 80	13.5	17.0	6.0	Over 80	17.6	15.3	–1.2
Total over 65	6.3	6.5	0.8	Total over 65	5.7	5.1	–0.8

b) Countries for which no trend could be computed

Germany	1995	Japan	1996	United Kingdom	1991
65-69	0.5	65-69	1.2	65-74	1.3
70-74	0.9	70-74	2.3	75-79	3.7
75-79	2.2	75-79	4.7	Over 80	14.5
80-84	4.8	Over 80	13.1	Total over 64	4.9
85-89	11.9	Total over 65	5.1		
Over 90	23.6				
Total over 65	3.0				

Note: Gr. rates are annual average growth rates. Definitions of institutions may vary from country to country but have been harmonised as far as possible: long-term care in hospitals has been included for Japan. For other countries, this includes purely nursing homes and old-age homes, but tends to exclude sheltered housing.

between supply and demand for long-term care "markets" (or "activities", when allocated through the public sector). Due to the very decentralised nature of long-term care systems, it is often hard to make generalisations about the causes of these trends. However, a few key points can be made.

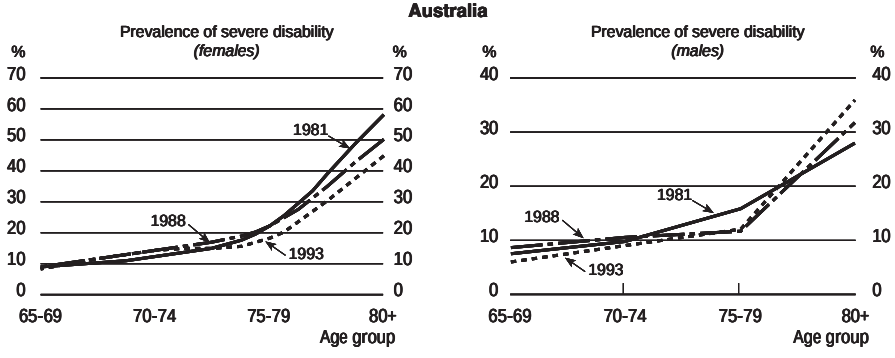
First, in some countries, explicit de-institutionalisation policies are at work. For example, this is the case in Australia, following the Aged Care Reform strategy implemented in 1988-1993 (Australian Department of Health, 1993). This process which also occurred in other countries, is the result of the trend towards "community care", which emphasised care for older persons in a community setting and attempted to limit the number of elderly persons living in institutions. Second, de-institutionalisation has occurred at different times in different countries. In the Nordic countries, where social systems for long-term care were highly developed early on, the need for de-institutionalisation was felt first, in the 1960s. In countries such as Canada and the United Kingdom, pressure for de-institutionalisation came later. Some US States have enacted Certificates of Needs (CONs) for Nursing Homes, reflecting a general desire to turn towards more community care.[6] Third, institutionalisation trends may have resulted in certain countries more from implicit decisions than from an explicit strategy. For example, in countries like France or Germany, no explicit national de-institutionalisation policy existed until recently. In Japan, implicit de-institutionalisation has been the result of an extreme shortage of nursing home beds.

Trends in disability in households

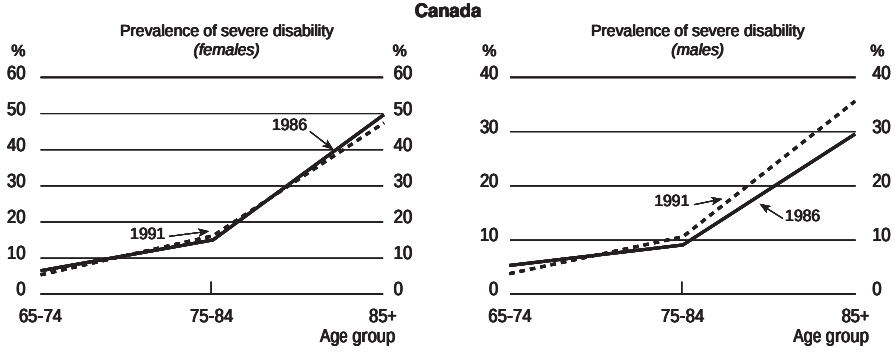
Trends in the prevalence of severe disability rates, disaggregated by age and gender, are shown in Figure 4. More detailed results are available in Jacobzone *et al.* (1998). The significance of differences in *levels* of disability rates across countries should not be overstated, as more restrictive criteria of disability (notwithstanding our attempt at international standardisation) imply lower levels of prevalence across countries. For example, the criteria chosen for France and Japan are rather restrictive compared with those for the other countries. For Australia and Canada, figures include the institutionalised population. For these reasons, the *levels of prevalence are not comparable* across countries. On the other hand, particular care was taken to ensure that *trends be as comparable as possible*, with consistent definitions over time for each country. In general, the trends in disability are most apparent for the youngest age groups among the over-65 population. The picture is more mixed for the oldest groups, where declines are smaller and, in some countries, there are even increases in the prevalence of disability.[7]

In a first group of countries, Australia, the Netherlands and the United Kingdom, there are very moderate or no improvements in disability rates on the whole. The data show declines in severe disability rates among older females but the opposite

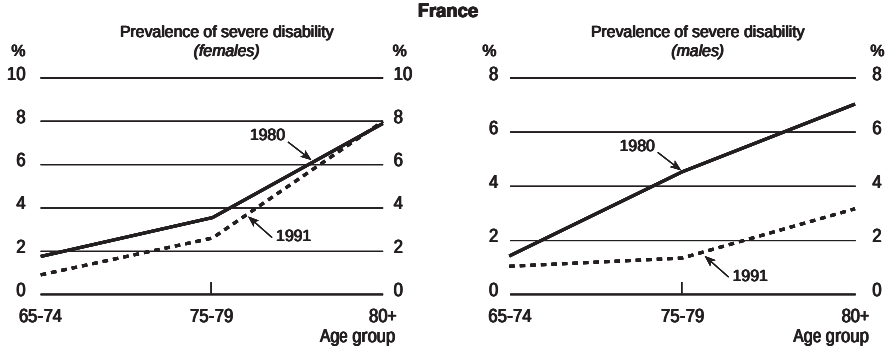
Figure 4. **Trends in prevalence of severe disability in households by age groups and gender**



Note: Severe handicap, households and institutions.

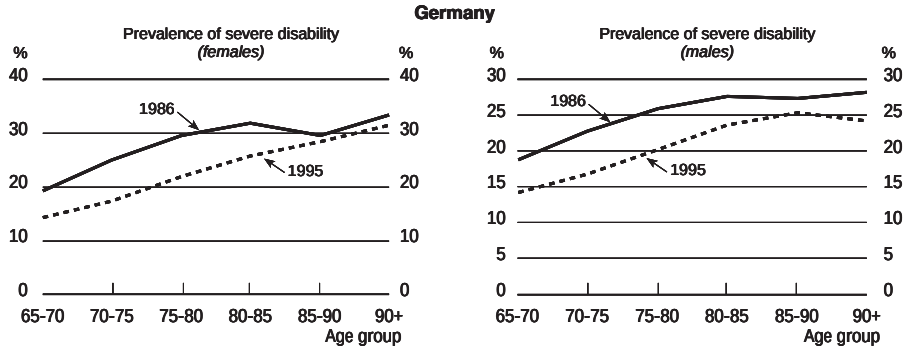


Note: HALS survey, households and institutions, severe disability.

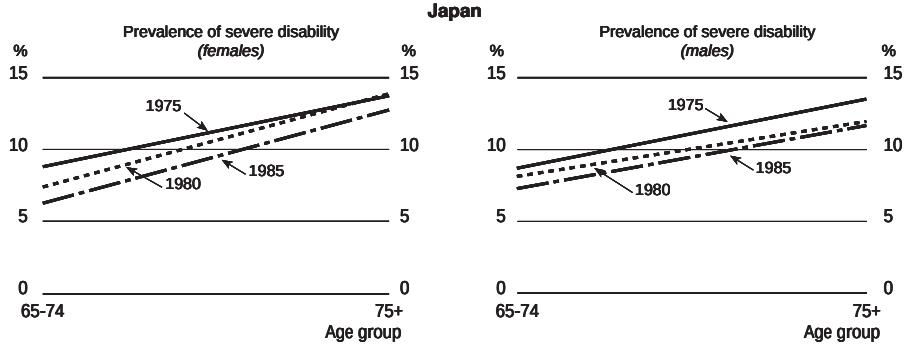


Note: Households, confined to bed.

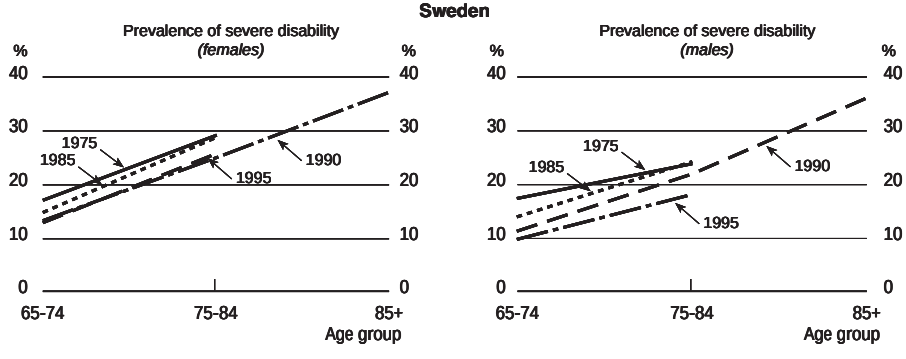
Figure 4. **Trends in prevalence of severe disability in households by age groups and gender** *(cont.)*



Note: Households microcensus, severe disability.

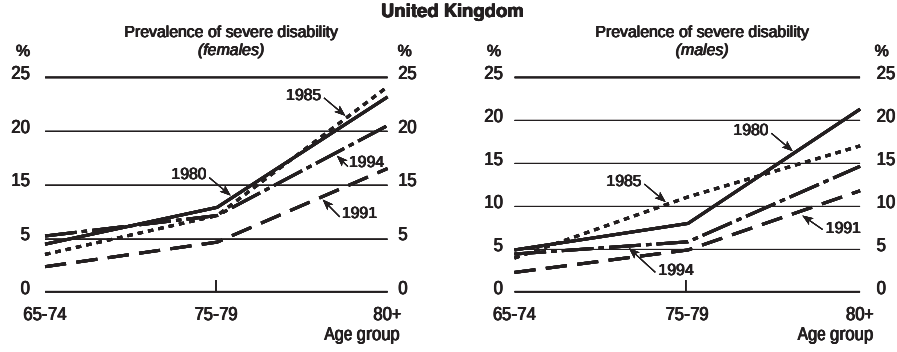


Note: Bedridden persons in households.

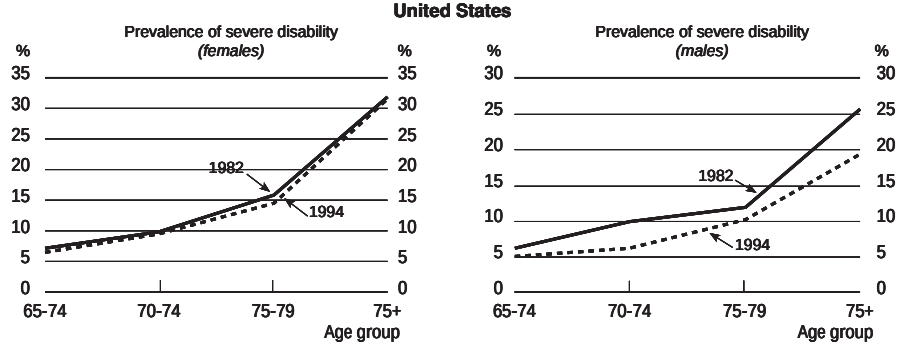


Note: Households and institutions, severe disability.

Figure 4. **Trends in prevalence of severe disability in households by age groups and gender** *(cont.)*



Note: Households surveys, severe disability.



Note: NLTCS survey, prevalence of severe disability households.

trend among older males. In the United Kingdom, there has been a slight decrease in disability for men, even at older ages. On the other hand, disability increased for younger women aged 65-74. For the older population as a whole, there is almost no change in disability given the changing age-sex structure. In the Netherlands, the data show no clear trend in disability rates. Therefore, no trend has been computed or displayed in Figure 4.

A second group of countries (Canada, Sweden) experienced mixed or moderate results in terms of disability reduction. Canada recorded a very mixed pattern, with clear declines in disability for those aged 65-74, but an increase for both genders and most age groups over 75. Moderate declines in the prevalence of disability are recorded in Sweden, and are larger for men than for women.

A final group of countries experienced significant reductions in disability rates (Germany, France, Japan and the United States). While the concepts of severe disability shown in Figure 4 are relatively restrictive for Japan and France, the available evidence for both countries suggests that these trends are consistent with other national data (Sermet and Grandjean, 1998). Declines in disability are recorded for all age groups, but are comparatively smaller for very old persons of both genders. They are very similar by gender. In the United States,[8] data from the National Long-Term Care Survey (NLTCS) show significant declines for men in all age groups, and only moderate declines for women.

The projections of disability

The projections of disability combine age and gender-specific disability rates[9] with the population projections, as do most national studies in the field. This study provides a comparison between a dynamic projection and a static one:

- The dynamic approach projects past trends in institutionalisation rates or disability rates into the future;
- The static projection assumes no change in institutionalisation or disability rates in coming years.

The static projection reflects the impact of demographic change alone. Trends in institutionalisation rates are more likely to be influenced by policy orientations. The trends in disability in households are more reflective of underlying epidemiological trends. As a result, comparison of the outcomes of the two projections, both for households and institutions, allows us to separate out the impacts of policy, epidemiological and demographic trends.

For all countries, the dynamic exercise provides for a projection of disability rates in households. The institutionalised population is projected separately for all countries except for Canada and Australia.[10] In the event that data describing households and institutions were taken from the same global survey, as in Canada and Australia, global trends in the number of disabled older persons were first computed using the general data. Second, the evolution of institutionalisation rates was measured using supplementary data. Estimates for disability trends in households were then derived by subtracting the estimates of disabled older persons in institutions from the total number of disabled older persons.

Projections start from a base year, for which disability rates in older households and institutionalisation rates were gathered together. This base year is normally 1995, but there are some differences across countries. We then present the trends between this base year and the year 2000, and the trends from 2000 up to 2010 and 2020.[11]

In terms of the institutionalised population, the pure demographic effect is, not surprisingly, strongest for countries which are projected to have a very

strong increase in the numbers of the very old: institutionalisation rates are highest in the groups aged 80 and over (Table 5). For example, Canada and Japan experience an annual average growth rate of the institutionalised population of 2.5 per cent or more over the whole projection period (see H2 column). After increasing slightly up to 2010, the prevalence of institutionalisation is projected to fall in those countries by the year 2020, due to the very strong increase in the population aged 65 and over. Similar trends are observed for the United States, with a smaller increase in the institutionalised population.

Taking recent trends in institutionalisation into account has a major impact on projected numbers. Under the dynamic hypothesis (H1 in Table 5), France would experience the strongest increase in the institutionalised population, while the institutionalised population would remain stable in the United States and show little change until 2010 in Sweden. In Australia, the number of institutionalised persons still increases significantly in spite of the de-institutionalisation process. A similar, but less marked, increase is projected for Canada.

In terms of the projection of the number of disabled older persons living in households, the pure demographic-driven trends (see H2 in Table 5) are fastest in those countries where ageing is more pronounced, *e.g.* Japan, Canada and Australia. The number of disabled older persons would also rise very significantly in France. The overall growth is more modest in Germany and Sweden. The rise in the United States appears to be in the middle, with an annual growth rate of 1.5 per cent a year over the whole period. In Australia, Canada, the Netherlands, Sweden and the United Kingdom, total prevalence, combining institutionalisation rates and disability rates in households, would decrease slightly in the population aged 65 and over the whole projection period to 2020. This is due to the very strong growth projected in the population just over 65 under the static hypothesis. This would also be the case for the United States taking into account the decline between 1994 and 2000.

In terms of the dynamic projection which takes recent policy and health trends into account (see H1 in Table 5), the number of disabled older persons living in the community would only increase by around 1 per cent a year in France[12] and a little less in the United States. The influence of these declining trends in disability would also be strong in Germany, Japan and Sweden. As a result, the total number of disabled persons shows a significantly smaller rise under the dynamic projection than under the static projection. On the other hand, countries such as the United Kingdom, Australia or Canada would not see such a large difference as they have experienced a smaller decline in the prevalence of disability in recent years, and even an increase for some age/gender groups. In sum, it appears that recent changes in health status, if they were to persist over the next two decades, could make a large difference to potential future numbers of disabled persons living in the community.

Table 5. **Projection of the numbers of disabled older persons to the year 2020**

Average annual growth rates, institutions, households and total[1]

	H1 dynamic projection			H2 constant trends		
	1995-2000	2000-2010	2000-2020	1995-2000	2000-2010	2000-2020
Australia						
Institutionalised persons	1.6	2.1	2.0	1.9	2.5	2.4
Disabled older persons in households	1.1	1.4	2.2	1.9	1.8	2.3
Total disabled older persons	1.3	1.7	2.1	1.9	2.1	2.3
Total prevalence[2]	0.1	–0.1	–0.4	0.7	0.2	–0.2
Canada						
Institutionalised persons	1.6	1.4	1.1	2.9	2.6	2.4
Disabled older persons in households	3.5	2.8	2.6	2.7	2.5	2.4
Total disabled older persons	2.4	2.0	1.8	2.8	2.6	2.4
Total prevalence	0.5	0.2	–0.7	0.9	0.7	–0.1
France						
Institutionalised persons	2.0	2.6	2.3	1.7	0.6	1.3
Disabled older persons in households	–1.4	–0.6	–0.3	1.8	2.8	2.2
Total disabled older persons	0.2	1.1	1.1	1.7	1.9	1.8
Total prevalence	–1.5	0.5	–0.2	0.0	1.2	0.4
Germany						
Institutionalised persons	n.a.	n.a.	n.a.	1.7	0.7	1.2
Disabled older persons in households	–2.4	1.0	0.6	0.4	1.8	1.6
Total disabled older persons	–1.0	0.9	0.8	0.8	1.5	1.5
Total prevalence	–2.2	–0.7	–0.3	–0.3	–0.2	0.4
Japan						
Institutionalised persons	n.a.	n.a.	n.a.	3.4	3.2	2.8
Disabled older persons in households	1.5	1.2	0.9	3.5	3.2	2.8
Total disabled older persons	2.4	2.2	1.8	3.5	3.2	2.8
Total prevalence	–6.9	–0.1	–0.2	–5.9	0.9	0.7
Netherlands						
Institutionalised persons	n.a.	n.a.	n.a.	1.2	1.7	1.8
Disabled older persons in households	n.a.	n.a.	n.a.	1.3	1.3	1.9
Total disabled older persons	n.a.	n.a.	n.a.	1.3	1.5	1.9
Total prevalence	n.a.	n.a.	n.a.	0.1	0.0	–0.2
Sweden						
Institutionalised persons	–0.1	0.7	0.8	0.6	0.6	1.2
Disabled older persons in households	–1.5	–1.3	–0.2	–0.3	0.8	1.3
Total disabled older persons	–0.8	–0.3	0.3	0.2	0.7	1.2
Total prevalence	–0.4	–1.2	–1.1	0.6	–0.3	–0.2
United Kingdom						
Institutionalised persons	n.a.	n.a.	n.a.	0.7	0.7	0.8
Disabled older persons in households	–0.1	0.2	0.5	0.3	0.7	1.0
Total disabled older persons	–0.1	0.2	0.5	0.5	0.7	0.9
Total prevalence	–0.2	–0.3	–0.5	0.3	0.1	–0.1
United States						
Institutionalised persons	0.3	0.0	0.0	1.7	1.3	1.4
Disabled older persons in households	0.5	0.5	1.0	1.2	1.2	1.7
Total disabled older persons	0.4	0.3	0.7	1.4	1.2	1.6
Total prevalence	–1.2	–0.1	–0.5	–1.2	0.4	0.2

1. The starting year for the projections is 1995 for Canada, Germany and the Netherlands; 1994 for France and the United States; 1996 for Australia and Japan and 1992 for the United Kingdom. The dynamic projection could not be performed for the Netherlands, as no trends were available in households.
2. Total prevalence combines institutionalisation rates and disability rates in households.

The results of the global projection in terms of the total number of disabled older persons sum up the two separate projections combining the evolution of disability in private households and in institutions (Table 5). (All persons living in institutions are assumed to be disabled, see Annex 1 on data sources). Under the dynamic hypothesis, Japan's growth rate would become closer to those of Australia and Canada. Germany and Sweden would expect a moderate increase in their disabled older population over the period 2010-2020. Under the dynamic hypothesis, the increase in the total numbers of disabled older persons would be only moderate in the United States, close to those projected for the United Kingdom. France would be in an intermediate position. In all countries, the combined effects of health gains and a strong increase of the population just over 65 are projected to lead to an actual decline in prevalence by the year 2020.

These projections should not be regarded as forecasts, but rather as a way of highlighting the importance of dynamic factors in evaluating the ageing process: demographic changes alone are not sufficient to project potential future social needs. Health and long-term care policies can certainly make a difference in transforming the pure demographic effect of ageing into very different social outcomes. Actual outcomes over the next two decades might fall somewhere between the two projections, as the strong trends observed in some countries over the recent past and which underlie the so-called "dynamic projection", may not be sustainable in the long-term. On the other hand, one should not underestimate the potential for medical innovation and diffusion to affect significantly future trends in disability.

ECONOMIC AND LONG-TERM CARE COST IMPLICATIONS

These trends, to the extent they are sustained into the future, could have major implications for public spending on health and long-term care. In this paper, we do not make any attempt to compute the impact of ageing and disability trends on total public spending on health care because the relationship between health-care spending and disability among the elderly is difficult to assess.[13] In addition, evidence at the international level was not sufficient to allow further investigations. Instead, this section concentrates on quantifying the implications of the projections for public spending on long-term care.

The demand for long-term care: a framework

Many factors are likely to drive the demand for formal care. This study assumes a direct translation of trends in disability to formal care needs. Most of the empirical research on the demand for formal care confirms that disability, expressed in terms of restrictions on the person's ability to perform ADLs, is the main factor driving the demand either for formal care or institutionalisation.

In the field of long-term care, economists have built sophisticated structural micro-economic models with a demand framework to illustrate the impact of ageing on potential costs. These models integrate various determinants of demand such as longevity, frailty, living arrangements and the presence of a spouse and children, to assess needs in terms of formal care, either in the community or in institutions – for an example of such an approach, see Börsch-Supan *et al.* (1996), or Lakdawalla and Philipson (1998). At the national level, researchers have also tried to integrate all existing approaches in dynamic micro-simulation models; such models are, however, too heavy in terms of data requirements to be developed consistently at the international level.[14] Compared with these two approaches, the present study chooses an intermediate approach, using detailed data describing disability trends among the frail, older population.

In policy formulation and implementation, however, attention should also be paid to factors such as various alternative forms of support and resources available to frail older persons. While these factors may influence the demand for long-term care, they cannot be incorporated directly in the current study. Three such factors are worth a mention:

- the living choices of the older populations;
- the perceived price of care in the community, in terms of physical constraints in access and financial incentives;
- the potential availability of informal care, primarily from the spouse and children.

As far as the living choices of older persons and the perceived price of care in the community are concerned, current arrangements in most countries, both at home and in institutions, reflect a certain constrained equilibrium, depending on local conditions and relative prices. However, a number of trends could lead to a greater demand for formal in-home care. Among older persons there may well be an increase in the demand to live alone in the future, as compared with living in institutions or with one's children. The demand for privacy is also likely to rise if the income and wealth of older persons continue to grow. At the same time, a rising number of older persons may be able to live at home in couples, as life expectancy gains are expected to be stronger for men than for women.

The projections implicitly assume that the perceived price of care in the community will remain constant over the projection period. This should not hide the fact that past policies designed to favour community care are likely to be further extended, particularly to offer a relief subsidy for informal carers. At the same time, pressures on the public finances may not allow for open-ended arrangements and for a significant subsidisation of community care. However, additional spending to subsidise community care may also enable societies to avoid paying the higher costs of institutional care. As it would have been hazardous to make any final judgement about the global impact of such effects, the projections provide a neutral

benchmark and assume that institutional arrangements will remain unchanged over the projection period.

The availability of informal care will not influence needs, but may play a role in transforming them eventually into a direct demand for home help. Currently, most international data show that informal care could account for up to 80 per cent of total care. In the case of the spouse, the availability is influenced mainly by the female-to-male population ratio. In this respect, the demographic projections suggest that most countries will experience a re-balancing of these female-to-male population ratios.[15] As far as informal help from children is concerned, the availability may be influenced by how close they live to their parents, but also by their degree of participation in the labour market, since time spent at work creates more strain for care-giving. This availability is likely to be more constrained in situations of higher participation rates of women in paid work. In most countries, the availability of informal care is reduced by modern living choices, more independent life styles and participation by women in paid work in the labour market.

The projection of long-term care spending in this paper assumes a stable share of informal care. This strong assumption is made in order to isolate the effects of pure demographic and epidemiological trends. It does, however, imply that the results should be considered as lower bound estimates for those countries where informal care systems play a significant role, such as the Southern European countries and Japan.

Long-term care costs in the mid-1990s

Baseline estimates, largely based on Jacobzone (1999), use information on long-term care costs in the mid-1990s. To estimate public expenditures, local/national data were aggregated from different sources in ways that sought to ensure better international comparability. The data presented in Table 6 cover a wider range of OECD countries than those included in the projection. Public spending on long-term care as a proportion of GDP is estimated to range from below 1 per cent to almost 3 per cent in the base year. Lower levels of expenditure are found in southern Europe than in other OECD countries. Proportionally, there is a relation between the share of private financing for health and for long-term care, which may reveal national preferences about the extent of public intervention in this field. The share of public spending is relatively lower in the United States compared with the Nordic countries, Australia and the United Kingdom. It was not possible, however, to obtain consistent estimates of private financing disaggregated between home care and institutional care for most countries. It is particularly difficult to measure private financing, the difference between columns (1) and (2), especially direct out-of-pocket payments. As a consequence, the projections will consider only public spending.

Table 6. **Long-term care costs in the mid-1990s**

	Estimated total spending on LTC (1992-1995)[1]	Estimated public spending on LTC (1992-1995)[1]	Share of spending on institutions in total public spending on long-term care[2]
	% GDP	% GDP	% of total
ustralia	0.90	0.73	73
ustria	1.4	n.a.	n.a.
elgium	1.21	0.66	53
anada	1.08	0.76	67
enmark	n.a.	2.24	80
inland	1.12	0.89	86
rance	n.a.	0.50	59
ermany	n.a.	0.82	48
apan[3]	n.a.	0.15/0.62	n.a.
etherlands	2.70	1.80	76
orway	2.80	2.80	63
weden	2.7	2.7	n.a.
nited Kingdom	1.30	1.00	70
nited States	1.32	0.70	67
reece[4]	0.17	n.a.	n.a.
reland[4]	0.86	n.a.	n.a.
taly[4]	0.58	n.a.	n.a.
ortugal[4]	0.39	n.a.	n.a.
pain[4]	0.56	n.a.	n.a.
witzerland [4]	0.75	n.a.	n.a.

.a. = Information is not available.

. Long-term care spending refers to the care needed to help older persons lead an independent life, at home or in an institution. It excludes informal help. For home care, it should include all home care services, including district nurse services, excluding medical visits. For institutions, it includes all the costs related to care and lodging, including help for all self-care activities, but excluding medical costs. Public costs include all costs incurred by public institutions, municipalities, sickness funds or old-age funds. Private spending refers to out-of-pocket payments or payments by private long-term care insurance when the definitions are available. Definitions for the lower part of the table may be a little more restrictive than for the upper part. Definitions across countries are not always totally homogenous as information was provided from two different sources. Most of the information was derived from Pacolet et al. (1998) and other national sources (See details below).

. This shows the proportion of public funding devoted to institutions as opposed to supporting help in a community setting.

. The estimate of 0.15 corresponds to present spending for care to older persons in 1995 (not including hospitalisation costs) while 0.62 corresponds to the additional spending involved by the current long-term care insurance scheme.

. Data is derived from Markus Schneider et al. Gesundheitssysteme im internationalen Vergleich, (1994), BASYS. Data refer to the years 1992-1994 as supplied by the authors.

Table 6. **Long-term care costs in the mid-1990s** *(cont.)*

ational sources:

eneral	Pacolet, J., Versieck, K., Bouten, R., Lanoye, H. (1997) *The State of the Debate on Social protection for Dependency in Old age in the 15 EU Member states and Norway,* Research project for the European Commission DGV and the Belgian Minister of Social Affairs, Katoliek Universiteit Leuven.
ustralia	Key facts, provided by the Department of Health (1998).
ustria	Leichsenring, K. (1998), *Social Protection for Dependency in Old Age,* Vienna, European Centre for Social Welfare Policy and Research, February.
elgium	Pacolet *et al.* (1998). *Country report Belgium, The State of the Debate on Social protection for Dependency in Old age in the 15 EU Member states and Norway,* Research project for the European Commission DGV and the Belgian Minister of Social Affairs, Katoliek Universiteit Leuven.
anada	Chartrand, P. (1993) *Description of long-term care services in provinces and territories of Canada,* Federal/provincial/territorial subcommittee on continuing care.
enmark	Department of Health, (1998).
inland	Vaarama, M., Kautto, M. (1997) *Social Protection for the elderly in Finland* ISBN 851-33-0495-7, Gummerus Oy. Jyväskylä. STAKKES.
rance	Joël, M.E., (1997) «La dépendance des personnes âgées en France», mimeo, LEGOS, Université de Paris Dauphine.
ermany	Rothgang, H., Schmähl, W. (1995) *The Long-term Costs of Public Longd-term Care Insurance in Germany,* Zentrum für Sozialpolitik Universität Bremen, Arbetispapier n° 9/95.
apan	Data provided by the Ministry of Health and Welfare (1998).
etherlands	Schuijt-Lucaassen, N. (1997) *Social protection for dependent elderly in the Netherlands,* Institute for Applied Gerontology, Vrije Universiteit, Amsterdam.
orway	Daatland (1997) *Social protection for the elderly in Norway,* Norwegian Social Research, NOVA, Skriftserie 4/1997.
weden	Secretariat for Long-term analysis, Ministry of Health and Social Affairs, (1998).
K	HMSO (1996) "Long Term Care: Future Provision and Funding", House of Commons n° 119, London.
S	Wiener, J., Illston, L.H., Hanley, R.J. (1994) *Sharing the Burden : Strategies for Public and Private Long-Term Care Insurance.* Washington DC. The Brookings Institution.

In addition, we need detailed unit public spending data for both homes and institutions to link macroeconomic costs with the number of disabled older persons (see below). Average public unit spending for home care is highly variable across countries (Table 7). It is highest in Sweden which relies upon a highly developed formal long-term care system. It is intermediate in Canada, Germany, Netherlands and the United Kingdom. It is lowest in Australia, France, Japan and the United States. Total yearly per unit costs of institutions are usually around 1 to 1½ times annual GDP per capita.[16] These costs are highest for care provided in medical settings, and are estimated to be around two thirds of annual GDP *per capita* for hybrid forms of housing for older persons. As public subsidisation is not homogeneous, public costs are highest in Japan, Sweden, the United Kingdom and Germany. In addition to these baseline values, the Australian projections take into account the strong movement away from medicalised settings towards cheaper accommodation for older persons, which has been experienced by this country in the 1980s and 1990s. Public spending for home care appears to be much lower than public spending on institutions from this table. While this corresponds to the institutional setting, it clearly carries no implication that the value of home care from a welfare perspective is lower than the value of institutional care.

The projections: a less clear-cut impact in terms of potential public spending

Using a simple growth-accounting approach, we can write the evolution of the share of public spending for long-term care as a proportion of GDP as combining the share of public spending for long-term care as a proportion of GDP in the baseline year, multiplied by the trend in the number of disabled elderly people and divided by the evolution of the workforce[17] (see Annex 2 for a discussion of methodological issues). Separate projections were made for spending on community care and on institutional care:

$$\left(\frac{LTC}{GDP}\right)_n = \left(\frac{LTC}{GDP}\right)_0 * \left(\frac{n_{d_n}}{n_{d_0}.}\right) * \left(\frac{n_{E_n}}{n_{E_0}}\right)^{(-1)}$$

where

$\left(\frac{LTC}{GDP}\right)_n$ is the share of public spending on long-term care in GDP in the year n,

$\left(\frac{LTC}{GDP}\right)_0$ is the share of public spending on long-term care in the baseline year,

Table 7. **Unit public spending assumptions used in the base year of the projections**

Per cent of GDP per capita

	Home care public costs	Institutions	Public cost	Total costs
ustralia 1996	9.8	Nursing homes	105.1	
		Hostels	35.0	
anada 1995	42.2	Nursing homes	72.3	80.3
		Homes for the aged	61.6	68.5
rance 1990	20.2	Less severe	30.7	66.7
		More severe	51.1	111.1
ermany 1995	28.7	Average institutions all grades	77.3	96.7
apan 1996	11.8	Hospitals	146.4	
		Homes for the elderly	62.3	
etherlands 1995	29.6	Average public costs	111.0	
weden 1995	83.8	Average costs	99.6	
nited Kingdom 1992	27.2	Average	89.0	153.5
nited States 1994	16.7[1]	Average nursing homes costs	67.2	137.7

. For the United States, total costs of home help are estimated to be 22.7 per cent of GDP per capita. Total costs of home help are not available for most other countries. The information displayed in this table draws also upon the contribution of Marino *et al.* (1998) to the OECD.

$\left(\frac{n_{d_n}}{n_{d_0}.}\right)$ is the relative evolution of the number of disabled persons between the baseline year and year n; and

$\left(\frac{n_{E_n}}{n_{E_0}}\right)^{(-1)}$ and is the inverse of the evolution of the number of wage earners between the baseline year and year n.

To describe the evolution of the workforce, the number of people in the working-age population (*i.e.* the age group 15-64) was used for all countries over the corresponding time periods.[18] The main implication of this assumption is that the United States and Canada both enjoy a much stronger demographic increase, while the European countries have stagnating populations and Japan experiences a large decline in its active population. The US-Japanese gap reaches 33 per cent by 2020, which implies a significant difference in the ability of the two economies to accommodate the pressure of frail ageing populations on the public finances. (See Jacobzone *et al.* 1998, for the detailed demographic data.)

A much less clear-cut impact emerges from the results of the projection of public spending on long-term care as a proportion of GDP (Table 8). For the United States, the combined effect of a strong demographic increase together with a declining trend in disability, leads to stabilisation in the share of long-term care spending in GDP over the projection period – this does not take into account the increased workload of nursing homes which may be generated by a higher average case-mix within institutions, as institutionalised persons may become more severely disabled over time. Canada experiences less favourable trends in disability than the United States. Therefore, under the dynamic assumption, Canadian spending increases by around 30 per cent over the projection period, a magnitude similar to Germany. Spending increases remain moderate in Sweden, due to projected falls in disability and to de-institutionalisation. However, in all the projections, Sweden continues to have the highest share of long-term care spending in GDP, at close to 3 per cent. In Australia, the moderate increase is due to a shift towards less costly forms of institutionalisation, and in the United Kingdom it is also due to a moderate demographic increase.

On the other hand, under both hypotheses, France would experience some increase in long-term care spending from low base-year levels. This is mainly due to increases projected for spending for institutionalisation, through an increase in disability in the institutionalised population combined with no de-institutionalisation. As home care is minimally subsidised in France, reductions of disability among those living in households do not yield any direct public spending gains. For Japan, even

Table 8. **Projections of publicly financed long-term care as a share of GDP to the year 2020**

	H1 dynamic projection				H2 constant trends			
	1996	2000	2010	2020	1996	2000	2010	2020
Australia								
Home help	0.15	0.15	0.17	0.23	0.15	0.16	0.19	0.26
Institutions	0.66	0.66	0.70	0.76	0.66	0.70	0.88	1.12
Total	0.81	0.82	0.88	0.99	0.81	0.87	1.07	1.38
Canada								
Home help	0.21	0.23	0.28	0.36	0.21	0.23	0.26	0.33
Institutions	0.50	0.51	0.53	0.57	0.50	0.54	0.66	0.81
Total	0.71	0.74	0.81	0.93	0.71	0.77	0.92	1.14
France								
Home help	0.23	0.20	0.18	0.19	0.23	0.24	0.27	0.33
Institutions	0.37	0.41	0.54	0.71	0.37	0.41	0.52	0.66
Total	0.60	0.62	0.72	0.90	0.60	0.65	0.79	0.98
Germany								
Home help	0.32	0.32	0.32	0.35	0.32	0.34	0.39	0.47
Institutions	0.39	0.40	0.45	0.55	0.39	0.40	0.45	0.55
Total	0.71	0.72	0.78	0.90	0.71	0.74	0.85	1.02
Japan								
Home help	0.08	0.09	0.11	0.12	0.08	0.10	0.14	0.19
Institutions	0.66	0.74	1.00	1.28	0.66	0.76	1.12	1.54
Total	0.75	0.83	1.10	1.40	0.75	0.86	1.26	1.74
Netherlands								
Home help					0.49	0.51	0.57	0.77
Institutions					1.18	1.23	1.42	1.82
Total					1.67	1.74	1.99	2.60
Sweden								
Home help	1.35	1.23	1.05	1.17	1.35	1.31	1.38	1.68
Institutions	1.51	1.48	1.54	1.71	1.51	1.53	1.58	1.93
Total	2.86	2.71	2.59	2.88	2.86	2.84	2.96	3.61
United Kingdom								
Home help	0.36	0.34	0.33	0.37	0.36	0.36	0.38	0.44
Institutions	0.69	0.72	0.75	0.86	0.69	0.72	0.75	0.86
Total	1.05	1.06	1.08	1.22	1.05	1.08	1.13	1.30
United States								
Home help	0.24	0.23	0.22	0.25	0.24	0.24	0.25	0.30
Institutions	0.42	0.40	0.37	0.36	0.42	0.44	0.46	0.52
Total	0.66	0.64	0.59	0.61	0.66	0.68	0.70	0.82

Note: % of GDP.

if the hypothesis for trends in disability is rather optimistic, this country would still experience the highest increase in spending, under either hypothesis. The share of GDP would more than double under the static projection to 1.7 per cent in 2020 and would still almost double to 1.4 per cent under the dynamic projection. A stagnating active population and the absence of de-institutionalisation trends, which is embedded in the current projection, explain why the strong demographic increase of the very old population translates into relatively strong growth in public spending on long-term care.

While these projections are not to be considered as forecasts, they do serve to illustrate the importance of different factors for evaluating the potential impact of ageing. They demonstrate that, from a public policy perspective, demography is not the sole factor that must be taken into account; social factors may also play a key role in determining future directions in long-term care.

CONCLUDING REMARKS

This paper shows that, while trends in disability may contribute to reduce significantly the projected numbers of older persons suffering severe disability, their results in terms of public spending would be much less clear-cut. The projections in this paper directly link disability levels and the need for formal personal care under the hypothesis that levels of disability will be reflected in eligibility and take-up of benefits. They thus summarise the direct expenditure implications of care trends. Such projections cannot take account of possible future changes in behaviour, such as increased prevention or an expansion in reliance on disability benefits. However, in spite of their mechanical nature, the projections can still highlight a range of interesting questions for policy makers which require further analysis and discussion.

The results obtained under the assumption that recent declines in disability continue into the future, the so-called "dynamic" projection, often imply strong and continued reforms in the field of long-term care, both to reorient spending towards home care and also to adapt benefits to real needs. As long-term care benefits have a high private value for those individuals receiving them, a strong pressure is likely to be exerted on public schemes. Converting a better functional health into positive social outcomes supposes appropriate gate-keeping mechanisms, both for home care and institutional care, and a combination of appropriate financial incentives.

Even if further declines in disability could generate significant potential savings in the case of long-term care, this may not necessarily apply to health care, where public spending is generally of a much higher order of magnitude. The increase in health-care spending in many OECD countries from 1980 up to the mid-1990s was, by itself, larger than the total spending on long-term care for a significant

number of countries. Therefore, caution is needed in inferring links between improvements in health and health-care spending. It seems that better health can be acquired through better life styles but also through appropriate access to new and costly technologies.

The most important health policy issue raised by this paper is to understand how these relative improvements in severe disability have been generated. Is it through better lifestyles and living conditions experienced by different cohorts? Or is it through the diffusion of new technologies and expensive care which result in better outcomes? Detailed analyses of microdata will be needed to obtain answers to this crucial health policy question.

These results also demonstrate the usefulness of an "active" strategy in the field of ageing (OECD, 1998). An active ageing strategy focuses on reducing the prevalence of disability by putting much greater emphasis on prevention. It also considers that ageing, far from being a pure demographic phenomenon, is a dynamic process which can be influenced by social policy and care systems. There is a wide difference in the projected numbers of disabled older persons between the two scenarios presented in this paper. Decisions taken now in terms of the balance of care, support for informal care and choices offered to older populations will also largely determine the future.

On the other hand, this should not obscure the fact that a further significant decline in the proportion of the frail elderly living in institutions would pose a major challenge to social systems, as increased support for home care, and often for informal carers, would then have to be provided. Another important factor is the change of case-mix experienced by nursing homes accompanying any change in the balance between home and community care. In the future, older persons living in institutions are likely to be more disabled and need more care, which is likely to generate additional costs. All these factors have to be taken into account in the strategies being developed by social and care systems to cope with the caring needs of tomorrow.

NOTES

1. See Jacobzone (1999).

2. For Germany, specific adjustments had to be made to cope with the effects of reunification. We used Schmähl and Rothgang (1996) for the readjustment.

3. Activities of daily living include such elementary tasks as eating, dressing, getting in and out of bed.

4. Instrumental activities of daily living include tasks such as shopping, daily financial accounting, preparing meals.

5. Unfortunately, the limited time-series data for Japan are not comparable so it is impossible to compute a meaningful trend for that country.

6. For the United States, the data in Table 4 come essentially from the National Long-Term Care Survey (NLTCS). Results from other surveys are consistent with these trends. However, the magnitude of the trend may differ slightly between the NLTCS and the National Nursing Home Survey (NNHS).

7. This may well be due to a shift to older groups not captured by the data because of the inability to disaggregate the group aged 80 and over.

8. The US case is particularly difficult to judge because there are several different surveys available, which may show divergent trends. The 1993 National Research Council workshop (Freedman and Soldo, 1994) reached a consensus about the decline of IADL disability, but opinions about severe disability were more mixed. The NLTCS (Manton *et al.,* 1997) shows significant declines in severe disability, together with a shift from higher levels of disability towards lower levels. The Longitudinal Study On Aging (LSOA), which is coupled with the National Health Interview Survey (NHIS) for those individuals aged 70 or more (Crimmins *et al.*, 1997), indicates only minor declines, but could not be used for this study as it refers only to the population aged 70 and above. Recently, however, a wide variety of US sources have converged towards indicating some declines in severe disability for the older population (Survey of Income and Program Participation, SIPP; Medicare Current Beneficiary Survey (MCBS). Freedman and Martin's analysis of SIPP data, mentioned in Waidman and Manton (1998), suggests real improvements in health have caused declines in disability rates. Possible transfers from nursing homes into the community have been cited as one possible explanation of these trends. A close look at disability levels both within institutions and in the community reveals no direct measurable effects of the deinstitutionalisation process on the average health of people living in the community (see Jacobzone *et al.,* 1998 for more detail). Thus, the balance of available evidence suggests that the NLTCS data reflect reasonably well the main trends for the United States.

9. In the projections, again, the focus should be more on the trends, as care was taken to ensure that *trends could be as comparable as possible*, with consistent definitions over time. In a few cases, a different concept of disability was chosen to obtain more relevant levels in the base year.

10. For Germany, Japan, and the United Kingdom, no trend could be computed for institutionalisation. This does not preclude any future trends resulting from current projects being implemented in the field of long-term care, particularly in Germany and Japan. Disability within institutions could only be described for Canada, France and the United States.

11. More detailed results can be found in Jacobzone *et al.* (1998).

12. This is despite the fact that the trend in disability in France is probably overstated as the criteria chosen for disability are very restrictive.

13. Older people without disabilities may need less expenditure on average, but there may also be a need for higher expenditure at younger ages to maintain good health and prevent disability. At a certain point in time, less disabled persons may need less health care. However, they may only be less disabled because they received more care earlier, particularly during an acute episode of care. In addition, patterns of spending at the end of life suggest selection effects at work: more disabled persons may die earlier in their 70s, with more expensive deaths, while pure health-care spending for the remaining very old population may not be as high as one would have thought (see Garber *et al.,* 1998). At the international level, data on spending by broad age group are available, but they are not well suited to the case of the very old.

14. For an example of such a model developed for the United States, see Wiener *et al.* 1997; see HMSO (1996) for a review for the United Kingdom. Models have also been developed for Canada, the Netherlands and France.

15. These ratios are highest today in France, Japan, the United Kingdom and the United States. If such a rebalancing does occur, it may dampen the overall demand for formal institutional care in the future, as the number of ageing couples is likely to increase. These effects, if they do occur, will be strongest for the oldest persons, as the female/male ratios are the highest in the over-80 groups. For details, see Jacobzone *et al.* (1998).

16. We made the hypothesis that yearly per unit costs of institutions would remain constant. However, data available for the United States and France indicate a shift towards higher levels of disability within institutions. This may create additional pressures towards higher costs in the future, but this factor was not incorporated in the projections.

17. This approach is similar to the one used by Manton *et al.* (1997) for the United States.

18. This assumption implies a constant total labour force participation rate over the period in question. Departing from this strong assumption would introduce further labour market considerations which are not the core of this study.

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Annex 1

DATA SOURCES

The institutionalised population

As a caveat, one should note that the cut-off of "severe disability", as measured by persons with at least 1 ADL restriction, is more appropriate for private households than for institutions for two reasons. First, several countries do not measure the health of persons living in institutions. Second, a simple "severe disability" criterion might not be sufficient to fully describe the health status of the institutionalised population (more severe criteria should be examined, *i.e.* 5-6 ADLs, Dementia).

For this reason, the assumption had to be made that *all* persons living in institutions are disabled in several countries: this is the so-called "Sullivan" hypothesis used by demographers. For some countries for which data are available including the United States, no trend could be detected within institutions, as disability levels in terms of at least 1-2 ADLs were already close to 100 per cent for the institutionalised population (This is purely a working assumption and does not necessarily reflect "true needs" as measured from pure disability levels.) This assumption appears to be reasonable for a level of at least 1-2 ADLs. Some analysts consider higher levels of disability, such as 3-4 or 5-6 ADLs, for measuring disability in institutions. However, for the purpose of this study, we considered 1-2 ADLs to be the cut-off. This does not mean that all persons living in institutions deserve to be there due to their disability level. Rather, it implies that these persons under any circumstances would need help with personal care, and would represent potential users of long-term care systems, whether living in institutions or at home.

In Northern European countries, such as the Netherlands and Sweden, data stem mainly from administrative sources describing the populations living in institutions (Table A1). For some countries (Australia, Canada, Sweden), it was necessary to link different sources covering different years. For trends, data were generally selected which allowed for the longest time interval (Germany, Japan, the Netherlands and the United Kingdom do not have data to examine trends in institutionalisation). For levels, the most precise and consistent data were selected in the most recent year. In general, the coverage of institutions was restricted to those that are partly medicalised for nursing activities, or specifically dedicated to older persons; care was taken to avoid the inclusion of acute-care hospitals, as they provide intensive health care and not long-term care. This leads to a more restricted definition for countries such as Sweden but does allow for the inclusion of long-term care hospital beds in Japan. Annual growth rates of the share of the population living in institutions are estimated using end points for each age/gender cell, or simple linear adjustment in case of a couple of cells. These methods are elementary compared with other structural models, such as

Table A1. **Data sources**

	Institutions		Households	
	Survey, data	Comments	Survey, data	Comments
ustralia	*ABS survey on disability, 1981-1988, 1993* *AIHW 1995 data for 1985 up to 1996*	The ABS survey was used to estimate total disability. In fact, actual data describing institutionalisation rates from AIHW were used to obtain a longer interval over 1985-1996. Data cover hostels and nursing homes.	*ABS survey on disability, 1981-1988, 1993* *AIHW 1995 data for 1985 up to 1986*	The trends were estimated from the ABS surveys on disability, ageing and carers. "Severe handicap", corresponds to ADL. The ABS survey was used to estimate total disability.
anada	*NPHS 1994-1995* *HALS 1986-1991*	The National Population Health Survey was used for the base year while the Health and Activity Limitation Survey was used for the trends (need for self care).	*HALS 1986-1991*	The trends were estimated for the whole country from the Health and Activity Limitation Survey (HALS). (criteria used for disability: need for self care) (Wilkins *et al.* 1995).
rance	*EHPA 1990, 1994*	Specific survey for institutions, including disability and need for personal care (Établissements Hébergeant des Personnes Âgées).	*Enquête Santé* *Soins Médicaux 1980-1991* *INSEE CREDES SESI*	Trends were estimated for 1980-1991 using a rather severe disability concept to ensure longitudinal homogeneity (Robine 1994). Similar general trends have been reported, even for milder disability, and also for the period 1970-1980 (see Sermet CREDES-INSERM 1998).
ermany	*Schmähl Rothgang (1996)* *Rothgang Vogler (1997)* *Wille (1998)*	Data on care probabilities for institutions come from Krug and Reh, as presented in Schmähl Rothgang (1996), and updated by Rothgang Vogler (1997). (Officially used in projections (Wille 1998)).	*Schmähl Rothgang (1996)* *Rothgang Vogler (1997)* *Brückner (1997) Wille (1998)*	Data on care probabilities in households come from Infratest 1996 studies as presented in Schmähl Rothgang (1996) and updated by Rothgang Vogler (1997). Trends come from Microcensus data 1989-1995, Statistiches Bundesamt, as provided by Brückner (1997)

Table A1. **Data sources** *(cont.)*

	Institutions		Households	
	Survey, data	Comments	Survey, data	Comments
apan	*Fukawa 1993, 1996*	Institutions include long-term inpatient institutionalisation (hospitals), health institutions, welfare facilities and nursing homes. Some data was available for 1989 but the trend between 1989 and 1996 could not be integrated for the projection period as the decrease was too steep to be projected.	*Fukawa 1996 Nanjo (1975, 1980, 1985)*	The trends were estimated from the Nanjo (1987) longitudinal study (rather severe criteria of disability: confined to bed). Results consistent with Liu *et al.* (1997) (period 1985-1990). Levels for the base year were taken from Fukawa (1996), consistent with Tsuji *et al.* (1997) and International Longevity Center publications.
etherlands	*CBS (1993, 1992, 1996), SCP (1996, 1997)*	Data come both from the Central Bureau vor de Statistik and from specific studies published by the Social and Cultural Planning office (SCP 1996, SCP 1997). Sources described in those publications. The more formal institutions ''nursing homes or old-age homes'' have been selected for international comparability	*CBS (1993, 1992, 1996)*	Data come both from the Central Bureau vor de Statistik and from specific studies published by the Social and Cultural Planning office (SCP 1996, SCP 1997). Sources described in those publications.
weden	*Särsklist Boende, Perner inom Landstingens Längvärd, Social Departementet Välfärdsfakta Social 1997*	Data come from institution broad descriptions, from which age and gender probabilities could be extracted. Data were consistently available over 1980-1995. Given the continuum of old-age homes in Sweden, the more formal institutions only have been selected for international comparability.	*SLC surveys (1975-80, 1981-85, 1986-90, 1991-95)*	Data comes from the Surveys of Living Conditions (Severe Ill Health). Disability over 75 was only measured in a single year (no trend is imputed for the oldest old population by hypothesis).

Table A1. **Data sources** *(cont.)*

	Institutions		Households	
	Survey, data	Comments	Survey, data	Comments
nited ingdom	*Census*	Cross sectional data for 1991, Sullivan hypothesis	*General Household Survey 1980 1985 1991 1994*	The 1976 survey could not be used as comparability was not sufficient. The 1991 results are problematic and could not be directly exploited as well.
nited States	*NLTCS 1982, 1984, 1989, 1994*	Disability within institutions can be obtained for the 1984, 1989, 1994 waves. Institutionalisation rates available for all waves	*NLTCS 1982, 1984, 1989, 1994*	Trends are computed by age and gender, for the groups with at least 1-2 ADL (all severe disabled persons).

the Grade Of Membership (GOM) model developed by Manton *et al.* (1998). But this parsimonious procedure allowed a larger number of countries to be included in the analysis.

Disability in households

Severe disability, as presented here, refers to persons with at least 1 ADL, or who would be in potential need of personal care. For most countries, data come from household surveys, except for Canada and Australia where the surveys also cover the institutionalised population (Table A1). The American case was hybrid. The results presented in this article use the National Long-Term Care Survey (NLTCS). More detailed results are presented in Jacobzone *et al.* (1998) using a combination of other statistical surveys (NNHS/Census/NHIS).

Annex 2

METHODOLOGICAL ISSUES CONCERNING THE PROJECTIONS

The cost of providing care to disabled older persons (LTC) may be written:

$$LTC_d = n_d p_c$$

where n_d is the number of disabled older persons, and p_c is the unit price/cost of care giving.

– GDP can be summarised as follows, from the income side* GDP $\equiv n_E . w_E$ where n_E is the number of employed persons, w_E is GDP per employed person. The share of long-term care in GDP may be written as:

$$\frac{LTC}{GDP} \equiv \frac{n_d}{n_E} * \frac{p_c}{w_E} \qquad (1)$$

where

$p_c = \frac{w_c n_c}{n_d}$, the unit price/cost of care giving, equals the average wage of carers times the number of carers divided by the number of disabled older persons. p_c may be rewritten as follows:

$p_c = w_c * \Pi_c$, where Π_c is the inverse of the unit productivity of care (*i.e.* $\Pi_c \equiv \frac{n_c}{n_d}$, defined as the numbers of carers per disabled older person).

– The share of long-term care in GDP thus becomes:

$$\frac{LTC}{GDP} \equiv \frac{n_d}{n_E} * \Pi_c * \frac{w_c}{w_E}$$

– Π_c is assumed to be constant. In the long run, it is assumed that there are no productivity gains in long-term care activities. This strong assumption has not been adopted in the United Kingdom. For example, HMSO (1996) proposed up to 1 per cent a year of total factor productivity gains, which would mean gains of around 30 per cent for the projection period. However, the view was taken for the purpose of this paper that productivity in long-term care does not mean anything other than carers spending more

* Capital income has been assumed to be incorporated in wages for simplicity in the presentation.

time with patients, and that high productivity gains could not be achieved without damaging quality in the long run.

– w_c/w_E is assumed to be constant. It represents the wage of carers relative to GDP per employed person. This means that the general productivity gains will be channelled into wage increases, themselves redistributed into the "caring economy".

The growth of GDP can be decomposed into demographic growth η, and capital, labour and total productivity factors ($g = \eta * \pi_K * \eta_L *$ TFP). Once productivity gains are neutralised and transformed into wage growth, the only factors left influencing the evolution of LTC/GDP are the growth rate of the number of potential wage earners (n_E) and the number of persons in need of care (n_d). Coming back to the first expression (1), P_c/w_E equals in fact the average unit cost of care divided by GDP per employed person. It can be approximated by the annual unit cost of care divided by GDP per capita in a given country.

This leads finally to:

$$\left(\frac{LTC}{GDP}\right)_n = \left(\frac{LTC}{GDP}\right)_0 * \frac{n_{d_n}}{n_{d_0}} * \left(\frac{n_{E_n}}{n_{E_0}}\right)^{(-1)}$$