Center for Demography and Ecology
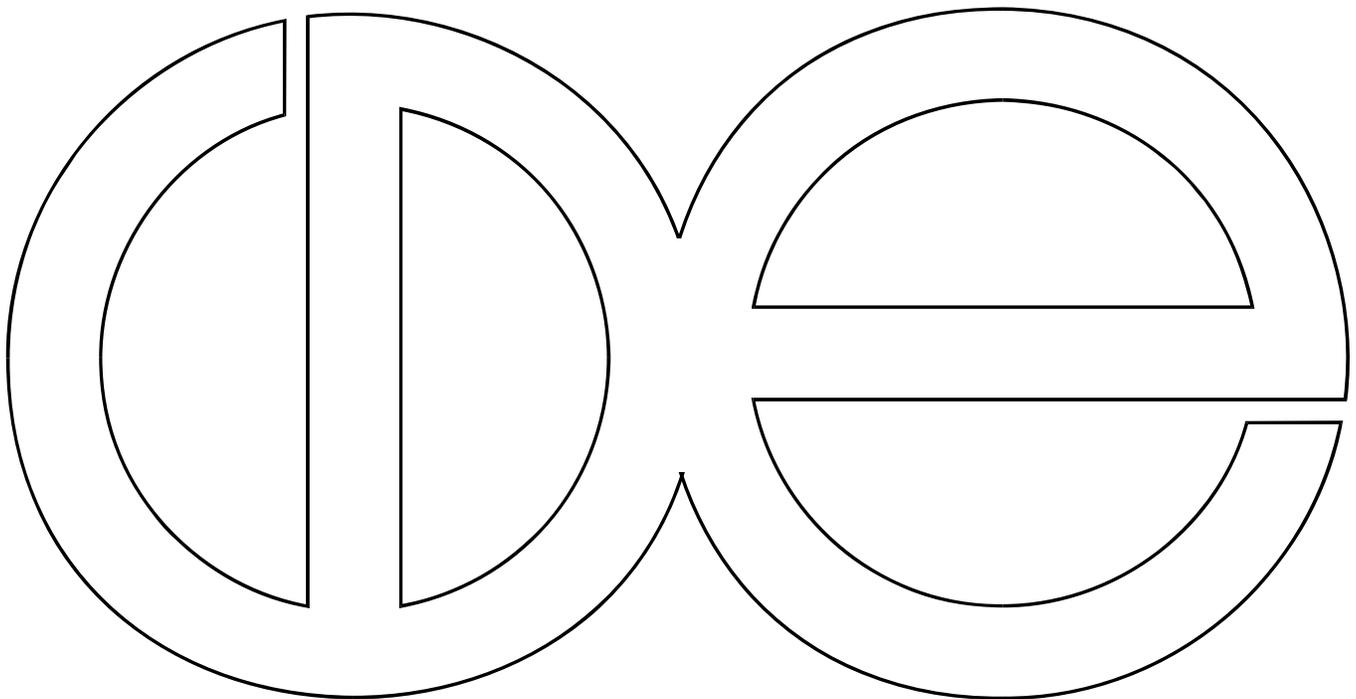
University of Wisconsin-Madison

Longevity, Dependence and Long-Term Care Costs: The Case of Spain

Malena Monteverde

CDE Working Paper No. 2006-02

Longevity, Dependence and Long-Term Care Costs: The Case of Spain

Malena Monteverde[*]

Center for Demography and Ecology and Center for Demography of Health and Aging, University of Wisconsin-Madison

Abstract

Objectives: We combine data on unit costs of services with mortality and morbidity information of the Spanish population aged 65 and over to estimate individual expected costs for long-term care services (CLTC).

Methods: Using data from National Disability, Deficiency and Health Condition Survey (INE, 1999) and mortality statistics from Spain (INE, 2002), we estimate duration in dependence status by using Sullivan's method. Generational trends of prevalence of disability were analyzed by linearly adjusting across cohort groups.

Results: We find that CLTC for women is about 70% higher than for men aged 65 and over. We also show that a care system based exclusively on in-home care generates costs that are twice as high as those borne in a system that combines in-home care with care in daily centers and residential homes. Sensitivity analyses suggest that even under a regime of uniform decline in disability rates on the order of 1.2% annually, no reductions in individual expected costs are obtained.

Discussion: Our calculations of costs rely on approximations of the expected duration of dependence by levels of severity. Despite the fact that these estimates are subject to some uncertainty, our results are robust. Even discounting for a margin of error, these estimates unequivocally suggest that in Spain, as in other Western European countries, we should

expect large increases in the magnitude of costs of long-term care and that rearrangement of social resources is urgently required.

Longevity, Dependence and Long-Term Care Costs: The Case of Spain

Malena Monteverde[*]

Center for Demography and Ecology and Center for Demography of Health and Aging, University of Wisconsin-Madison

I. Introduction

As individuals grow old, they lose functional and cognitive faculties and consequently begin to develop care needs that require the dedicated assistance of other people. These services are known as "long-term care" (LTC), since they are associated with the experience of non-reversible senescence processes that may last a lifetime. A key problems facing societies experiencing rapid aging is the accurate estimation of resources required to satisfy the demand for long-term care of elderly individuals.

Factors affecting the demand for LTC

The demand for long-term care will increase sharply due to the operation of two processes. First, all population projections suggest that there will be a sizeable increase in the absolute number of older people. Second, a continuing substantial increase in longevity could imply increases in the period of time during which older people will need assistance. Although the first process is almost inevitable in just about all populations (and with especially remarkable features in the developed countries), it is not at all clear whether the second process is occurring or is likely to occur in more developed countries (Manton and Singer, 1994). Knowing whether the second process is occurring is crucial for estimating the size of demand for individual long-term care. This involves taking into account the type of morbidity regime that societies are experiencing in the present and are likely to experience in the future. There are two extremes in theories about increases in longevity

and disability. The first is the so-called compression of morbidity theory. This theory presents us with the most optimistic scenario according to which longer life is occurring because individuals are healthier, and additional years of life are lived in good health, with chronic illnesses affecting mostly the last few years of life (Fries, 1980). On the other hand, a more pessimistic theory, known as the expansion of morbidity theory, suggests that chronically ill persons will be kept alive longer and that the stock of new years of life gained at the expense of mortality reduction will be lived in poor health conditions and in disability (Gruenberg, 1977). There are, of course, many alternative theories with predictions that fall between these two extreme ones.

In order to estimate the size of long term care demand it is important to distinguish between "relative" or "absolute" compression and expansion of morbidity. When the number of years lived in a healthy status and those lived in poor health are increasing simultaneously and the years in poor health increase faster, we are faced with a situation of *relative expansion* of morbidity. By contrast, if the years in good health are increasing faster, we have a case of *relative compression* of morbidity. In both cases the duration of life in disability will increase. But only under absolute compression of morbidity do the years lived in a dependent state decrease. In this case, and in this case alone, increased longevity does not imply longer periods of time lived in a dependent status.

The situation in Spain

Spain has experienced major improvements in its economy in recent years and, simultaneously, has had one of the fastest aging processes of all Western countries. The root causes of aging in Spain's population have been significant increases in life expectancy and a sharp reduction in fertility rates. According to the results of the Disability, Deficiency and Health Condition Survey, carried out by the Spain's National Institute of

2

Statistics in 1999, just over 2 million people over 64 years of age experienced some level of dependence. This represents over one third of the people in this age group in a country where the demand for long-term care has become a central issue. The demand for long-term care has become relevant not only because of the fast aging of the Spanish population, but also because of an acute crisis in the system of "informal long-term care." In Spain, informal care is essentially sustained by family help and represents more than eighty percent of the total care provision to dependent individuals (Casado and López, 2001; Monteverde, 2004). The system is under great pressure due to demographics as well as to social changes that curtail the capacity of families to supply any kind of services to older people.

Requirements for estimation of LTC demand

It is clear that understanding and precise assessment of the demand for long-term care requires knowledge about both life expectancies in disability and costs per individual in various states of health and disability. Current literature on these themes reflects two separate schools of thought. On the one hand, there are studies on current and future increases in life expectancy (Andreev and Vaupel, 2005; Akushevich, Manton and Kulmiski, 2005) and life expectancy in disability (Rogers, Rogers and Belanger, 1989, 1990; Robine and Mathers, 1993; Crimmins, Hayward and Saito 1994; Lynch and Brown, 2005). Other recent studies focus on macroeconomic estimations of long-term care costs for different countries (Mayhew, 2000; Comas-Herrera, et al., 2003; Keefe, Legare and Carriere, 2005).

In this paper we propose a methodology to estimate individual expected long-term care costs integrating estimates of expected durations in disability with costs of services provided. Such estimates are essential to evaluate public, private or mixed policy

3

alternatives. These estimates also allow us to assess the magnitude of individual costs under different morbidity and mortality scenarios that influence the duration of disability. We focus only on individuals over 64 years of age in Spain. Males and females are analyzed separately because of the sharp differences in disability prevalence and life expectancies.

II. Data and Methods

The main source for disability data is the Disability, Deficiency and Health Condition Survey (DDHC) conducted by the Spanish National Institute of Statistics in 1999. This is a cross-sectional survey representative of the Spanish population with about 79,000 households and over 220,000 individuals. This survey collects information about individuals who reside in family dwellings and includes people who are in collective homes (like nursing homes), but only if their stays are of a year or less. This means that the survey does not take into account individuals who are permanently institutionalized. Therefore, it is likely to underestimate the prevalence of disability, particularly in the most severe stages. However, since the rate of institutionalization in Spain is quite low (around three percent of the population over 64 years of age) we believe that the associated downward bias will be of only minor importance.

We use a rather broad concept of dependence as we include not only restrictions to activities of daily living (ADLs) but also take into account severe restrictions to instrumental activities of daily living (IADLs) as well as sensorial and severe cognitive restrictions. An individual is considered dependent (on other people) if, in addition to experiencing such restrictions, he or she was not able to overcome the problems using any internal or external technical instruments. Furthermore, since the survey attempted to measure permanent disability we only considered restrictions that lasted over a year.

4

The problem for estimating expected long-term care costs can be broken down into three components. The first consists of assessing the distribution of years of life to be lived in various disability statuses. The second consists of evaluating the magnitude of representative unit costs for the most important long-term care services (e.g., formal and informal in-home care, residential homes and daily centers). Finally, the third component consists of calculating overall costs by blending estimates of unit costs and of the distribution of years of life in dependence.

First component: the measurement of expected duration of dependence

Life expectancy in disability is an index that allows us to simultaneously measure dependence and longevity. Ideally, this index should be constructed using longitudinal data and associated (conditional) transition probabilities between non-disabled and disabled states and from these states to death. The index thus constructed is an exact measure of current durations only under stationarity conditions. However, since the required longitudinal information for Spain is not available to us, we used an indirect method, the so-called Sullivan's procedure. This relies on information about age-specific prevalence of disability and (total) age-specific conditional probabilities of deaths. Because it relies on assumptions that are rarely met, Sullivan's method results in losses of precision in estimated durations. Only under a scenario with homogeneity of mortality risks, absence of recovery and stationarity do we obtain unbiased estimates of life expectancy in disability (Palloni, White, Monteverde, 2005). In practice, one will probably observe higher mortality among disabled people than among the non-disabled (see for example, Lievre, Brouard and Heathcote, 2003), while mortality and disability rates are likely to decrease over time rather than staying constant (Saito, Crimmins and Hayward, 1991; Palloni, Hill and Pebley, 2000; Lievre, Brouard and Heathcote, 2003; Sagardui, et al., 2005). Only the assumption about

5

zero recovery rates is plausible because the definition of disability we are using (i.e., permanent disabilities) makes the existence of a recovery process very unlikely. A recent study shows that when assumptions about homogeneity of risks and stationarity are violated, there will be measurement errors of some importance. The precise magnitude of the errors depends on a set of empirical conditions (Palloni, White and Monteverde, 2005). Thus, for example, if mortality rates of the disabled are approximately twice that of non-disabled people, the error obtained using the Sullivan's method is only of modest magnitude. However, when the gap between mortality rates of disabled and non-disabled individuals is very large, (e.g., if mortality rates for disabled individuals are six times larger) the error can reach considerably higher values (on the order of 10%), especially at old ages (over 90 years of age).

The most realistic scenario for Spain is one where the gap in mortality is only mild, and where the rates of mortality and disability are decreasing over time (Monteverde, 2005). If the mortality gap is mild and both mortality and disability rates are decreasing by about 1% annually, the error resulting from Sullivan's estimation should be lower than 4% at all ages (Palloni, White and Monteverde, 2005).

Second component: the measurement of costs of long-term care services

The empirical unit costs for main long-term care services for Spain are calculated as weighed averages of the unit costs within each autonomous region (IMSERSO, 2000, 2004) where the weights are the proportion of disabled people in each region. Table 1 shows the average unit costs (in hours or years depending on the services) for 1999 and 2003 and the proportionate changes experienced during this period.

Table 1

6

Table 1 shows that costs for the most common types of long-term care services --
in-home care, daily centers and public residential homes -- increased substantially between
1999 and 2003. Only for in-home care were increases similar to the rate of inflation. Costs
for residential homes and daily centers increased at rates well above inflation. The recent
performance of these three main services is used in this paper to define alternative future
scenarios and to project long-term care unit costs.

Third component: Entailed costs of the dependence status

Sullivan's estimates provide us with the average duration in states of dependence,
while the estimates in Table 1 supply us with unit costs for commonly-used long-term care
services. We now need to specify the frequency of use for these various services according
to some criteria. We have chosen to use severity of dependence as the main criteria for
allocating resources. Since each individual can experience one or more disabilities, and
since not all disabilities suffered have necessarily the same severity, we assigned to each of
them the maximum severity experienced.

Table 2 shows alternate care services and frequency of care for each level of
dependence according to degree of severity. Similar allocations have been employed in
other studies (Moragas Moragas, Cristòfol Allué and G.I.E, 2003) or have been suggested
as feasible (Hennessy, 1995; Jacobzone, 1998).

Table 2

By using the estimated costs in Table 1 and allocating the services needed according
to Table 2, we estimate an individual's cost of care per year by severity of dependence.
Results are displayed in Table 3. Table 3 shows the estimated cost of care for an individual
for one year in 1999 and 2003, for each of the three most common care services: formal and

informal in-home care (HC and IHC, respectively), residential homes (RH) and daily centers (DC).

Table 3

We observe that in Spain, for totally dependent individuals the most cost-effective choice are residential homes (RH, col. 4), whereas for the seriously dependent is a daily center with one hour per day of in-home care (HC with DC, col. 7). Likewise, for a moderately dependent person, the best alternative would be the services of a daily center (HC with DC, col. 7).

We now define three different scenarios for caregiving. Each one is a different combination of services according to the degree of severity. We calculate global costs of LTC by combining unit costs associated with the blend of services with estimates of duration in disability.

Model 1

In the first model we provide the least expensive care services possible to disabled individuals, according to the level of severity of the disability. For example, if the individual is only moderately dependent, he or she receives care in a daily center. A more seriously dependent person receives one hour per day of in-home care as well as care in the daily center. Finally, if the person is in a state of total dependence he or she is presumed to stay permanently in a residential home for dependent people.

Model 2

In our second model we follow closely the prescription suggested in cost-benefit studies wherein appropriate services are allocated according to the degree of dependence resulting from the degree of severity of the disability (Hennessy, 1995; Jacobzone, 1998). According to this model, moderately dependent individuals remain in their own homes and

receive in-home care. Seriously and totally dependent individuals are presumed to receive the same care services suggested in Model 1.

Model 3

The third model is an extreme case wherein the only type of care supplies is in-home care. The only variability in services supplied to moderately, seriously and totally dependent individuals is the frequency of the services offered. Thus, an individual who is moderately dependent receives 3 hours per day of in-home care (1,095 hours per year); a person who is seriously dependent receives 8 hours per day (2,920 hours per year), and totally dependent individual receive 14 hours per day (5,110 hours per year.)

Models 1 and 2 are tantamount to formal models of long-term care whereas Model 3 could be either formal, informal or a combination of these.

Morbidity and mortality projections and the impact on expected LTC costs

After we estimate individual expected long-term care costs, we analyze how these costs are affected by increments in longevity and by changes in the prevalence of dependence according to the empirical patterns recently experienced by Spain. For future mortality, we use projections prepared by the United Nations (UN, 2004). According to these projections, mortality rates will fall an average of 1.8% per year for both men and women over 64 years of age. To project disability prevalence, we estimate past trends of disability prevalence in Cataluña using information from two cross-sectional health surveys carried out in these regions in 1994 and 2002 (*Enquestes de Salut de Catalunya or ESCAs,* 1994 and 2002). Such surveys allow us to identify a reliable trend because the method of measurement used was identical in both cross-sections (the questionnaire was identical.) Furthermore, we expect the tendency in Cataluña to be representative of the national level: prevalence rates in 1999 in Spain and in Cataluña were nearly the same (DDHC, 1999).

Although there are two national cross-sectional studies (the aforementioned DDHC and a study carried out by the Spanish National Institute of Statistics in 1986) which we could have used to calculate trends, we prefer to use the rates estimated in Cataluña because the national surveys did not use identical questionnaires.

ESCA data suggests that disability at ages over 75 has increased for some groups and decreased for others. This fact could indicate that there is an important generational component driving trends in disability. That is, prevalence levels may be a function of the birth cohort and of the socio-economic, sanitary and health care conditions experienced in the past by these cohorts. Note that the bulk of the Spanish population aged 64 or over was born or grew up during three wars or post-war periods (World War I, the Spanish Civil War and World War II). Because of this potential cohort effect we chose to estimate trends in prevalence rates by linearly adjusting across cohorts rather than across age groups (people aged x in 1994 and x+8 in 2002) and projecting the resulting trend up to eight years. A contrast of the cohort-based rates in the initial (2002) and final (2010) period suggests an annual average reduction of about 1.2% for both women and men over age 64 (Monteverde, 2004).

The trend analysis referred to above did not take into account levels of seriousness, because ESCA's information does not contain this distinction. Therefore, to obtain projected prevalence by severity we assumed the same distribution by severity observed at the outset (1999).

III. Results

Expected costs under different scenarios of LTC

10

Before discussing our results it is important to remark that expected durations in disability estimated using Sullivan's method tell us nothing about the timing of individual transitions between health and disability (or mortality). Consequently, there is insufficient information to adequately assign costs corresponding to the durations of stay individuals experience in the health states distinguished here. The only way around this is to rely on the assumption of absence of recovery. Absence of recovery suffices to add the expected durations needed to calculate the age at which individuals change from one state to another (that is, the dates when individuals begin to be moderately dependent, severely dependent or totally dependent). This assumption seems plausible for the population under study. Indeed, in the DDHC survey there is a question about potential trajectory of the disability and less than one percent of the polled people over 64 replied that they expected to recover at all. Under this key assumption and using alternative price performance scenarios, we can estimate the expected increase in individual long-term care costs. As the inflationary component in Spain is not trivial (over 4% annually) and because, in general, wages there are adjusted for inflation, we have discounted the estimated inflation rate for individuals' expected costs and expressed them in terms of 1999 prices. In this way, the estimated individual costs take into account only the differential change of prices (with respect to inflation) and allow us to know the real value of expected costs expressed in terms of constant purchasing power.

Tables 4, 5 and 6 display results for women and men under different assumptions regarding increasing costs. The first price scenario (Table 4) assumes that the annual increase in costs is equal to the average of the increase observed in 1999-2003. Under this scenario, the cost of in-home care (HC) increases by 4.17% annually (equal to the inflation rate), daily centers (DC) by 5.06% annually and residential homes (RH) by 7.70% annually.

11

In the second scenario (Table 5) the annual increase is 2% less than the average increase observed during the period 1999-2003. Under this scenario, the cost of HC increases by 4.17% annually (because in Spain wages are adjusted for inflation), DC by 3.06% annually and RH by 5.70% annually. Finally, the most pessimistic price scenario is shown in Table 6. In this case, the annual increase is set to be 2% higher than the average increase observed in 1999-2003. Consequently, we assume that HC increases by 6.17% annually, DC by 7.06%, and RH by 9.70%.

Table 4

Table 5

Table 6

We find higher individual expected costs for long-term care for women than for men, a fact consistent with the higher life expectancy in disability for women. These differences are on the order of about 70% at age 65, and they decrease with age corresponding to the reduction in differences in duration of dependence between genders.

Another result displayed in Tables 4 - 6 is that the highest cost is associated with a care system based exclusively on in-home care (Model 3). This care model yields costs that are twice as high as those borne in a system which combines in-home care with care in daily centers and residential homes.

Projections: the impact of compression of morbidity and mortality

Figure 1 displays changes in individual expected costs as a result of increases in overall life expectancy and of reductions in the disability rate during the period 1999-2010 (see Section II, Data and Methods). The figure displays the results for the three care models defined previously, and distinguishes between men and women. Differences in costs by sex

12

are reflected in the y axis scale. We can observe that even when the reduction in the

disability rate is on the order of 1.2%, there would be no reductions in individual expected

costs. This is because although the Spanish population is transitioning through a

compression-of-morbidity process, the compression is only relative. In other words,

although the proportion of years lived with disability is decreasing, the durations in

disability increase in absolute terms due to higher (expected) overall life expectancy.

Figure 1

IV. Discussion

One of the fundamental quantities required to estimate expected costs for long-term

care is the dependence duration, which is usually estimated by measures reflecting life

expectancies in disability. In the absence of longitudinal information for Spain, our analysis

of durations has been made possible by using an indirect procedure (Sullivan's method).

The method produces estimates of life expectancy in disability which are approximations

and which are likely to contain some errors. Consequently, the results presented in this

paper are subject to some uncertainty. However, conditions in Spain are such that the errors

are expected to be small, so we believe that our results are not subject to a wide margin of

uncertainty.

Our procedure is also vulnerable to the criteria followed to determine the level of

severity of disability. It has the advantage of allowing us to objectively assign one level of

severity to each individual and is clearly simpler than alternative indices that do not take

into account all the restrictions we are using. But it has a weakness in that the maximum

severity level is probably not the best indicator of the overall level of dependence. This can

occur, for example, if the most severe disability is one that does not require very frequent

help (for example, a disability to move outside the home). Establishing better criteria for determining the severity of disability requires more complete knowledge about the intensity of care associated with each kind and level of disability.

Despite these weaknesses, the results obtained are quite telling. They reveal that the highest cost is associated with a model based exclusively on in-home care. If the cost per hour for formal in-home care is considered to be a good proxy for the economic cost of informal care, we can assert that the current Spanish model is somewhat inefficient. An alternative approach to measure the economic toll of disability would be to take into account the opportunity cost of informal caregivers because they leave their jobs to care for dependent individuals. Doing so is likely to increase the global costs evaluated here.

The future does not look rosy for the elderly in Spain. There will be mounting pressure on caregiver resources to finance long-term care services even if the prevalence of disability decreases. This is due to changes in family organization and because of the apparent process of relative compression of morbidity with increasing absolute duration in dependence state. Further, our analysis was carried out assuming constant prices to make possible the assessment of changes exclusively associated with alternative future morbidity and mortality scenarios. Nevertheless, if prices of basic services of long-term care continue to increase (especially in relative terms) the increases in expected individual costs will be much greater than those suggested by our analyses.

References

Akushevich I, Manton K and Kulminski A. 2005. Human Mortality and Chronic Disease Incidence at Extreme Age: New Data and Analysis. Paper presented PAA annual meetings, Philadelphia, May 2005.

Andreev K and Vaupel J. 2005. Patterns of Mortality Improvement over Age and Time in Developed Countries: Estimation, Presentation and Implications for Mortality Forecasting. Paper presented PAA annual meetings, Philadelphia, May 2005.

Casado Marín D, López i Casasnovas G. Vejez, dependencia y cuidados de larga duración, situación actual y perspectivas de futuro. 2001. Colección Estudios Sociales Nº 6, Fundación "la Caixa".

Comas-Herrera A, Costa-Font J, Gori C, Di Maio A, Patxot C, Pickard L, Pozzi A, Rothgang H and Wittenberg R. 2003. European Study of Long-Term Care Expenditure: Investigating the sensitivity of projections of future long-term care expenditure in Germany, Spain, Italy and United Kingdom to changes in assumptions about demography, dependency, informal care, formal care and unit costs. PSSRU Discussion Paper 1840. Adelina Comas-Herrera and Raphael Wittenberg editors. PSSRU, LSE Health and Social Care, London School of Economics.

Crimmins E M, Hayward, M D, Saito Y. 1994. Changing Mortality and Morbidity Rates and the Health Status and Life Expectancy of the Older Population. *Demography*, 31, 1, 159-175.

Fries JF. 1980. Aging, natural death, and the compression of morbidity. *N. Engl. J. Med.*, 303(3): 130-135.

Gruenberg E M. 1977. The failures of success. *Milbank Quarterly/Health and Society*, 1:3-24.

Hennessy P. 1995. Social protection for dependent elderly people: Perspectives from a review of OECD countries. OECD: Labour Market and Social Policy. Occasional paper 1995 nº 16.

IMSERSO. 2000. Las Personas Mayores en España. Informe 2000. Datos Estadísticos Estatales y por Comunidades Autónomas. Observatorio de Personas Mayores, Madrid: Imserso.

IMSERSO. 2004. Servicios sociales para personas mayores en España: Enero 2003. Retrieved August 3, 2004, from http://www.imsersomayores.csic.es/estadisticas/informacion/indicadoressociales/indsociales2003.html

INE. 1999. Encuesta sobre Discapacidades, Deficiencias y Estado de Salud.

INE. 2002. Tablas de Mortalidad de la Población de España 1998-1999.

Jacobzone S. 1998. Ageing and care for frail elderly persons: An overview of international perspectives. OECD: Labour Market and Social Policy. Occasional paper 1998 nº 38. Retrieved August 4, 2004, from http://www.oecd.org/LongAbstract/0,2546,en_2649_33729_1887023_1_1_1_1,00.html

Keefe, J., Legare, J., & Carriere, Y. (2005). Developing new strategies to support future caregivers of the aged in Canada: Projections of need and their policy implications. Paper presented at the XXV IUSSP annual meeting, Tours, July 2005. Retrieved August 3, 2005, from http://iussp2005.princeton.edu/download.aspx?submissionId=52430

Lièvre A, Brouard N. and Heathcote C. 2003. The estimation of health expectancies from

    cross-longitudinal surveys. *Mathematical Population Studies*, 10:211-248.

Lynch S M and Brown J S. 2005. Status-Based Estimates of Active Life Expectancy by

    Type of Initial Limitation. Paper presented PAA annual meetings, Philadelphia,

    May 2005.

Manton K G and Singer B. 1994. What's the Fuss About Compression of Mortality?

    Chance. *7*(4):21 30. Retrieved June 16, 2004, from

    http://cds.duke.edu/publications/DocLib/cds_1084.pdf

Mayhew L. 2000. Health and Elderly Care Expenditure in an Aging World. Research

    Reports RR-00-21. International Institute for Applied Systems Analysis, Laxenburg,

    Austria.

Monteverde L M 2004. Discapacidades de las Personas Mayores en España: Prevalencias,

    Duraciones e Impacto sobre los Costes de Cuidados de Larga Duración. (Doctoral

    dissertation, Universidad de Barcelona, 2004).

Moragas Moragas R, Cristòfol Allué R y G.I.E.2003. *El Coste de la Dependencia al*

    Envejecer. Ed. Herder S.L.

Palloni A, Vaupel J, Hill K and Pebley A. 2000. Projection and Forecasts of Mortality. In J.

    Bongaarts and R. Bulatao (Ed.), *Beyond Six Billion* (pp. 114-155). National

    Research Council, Washington D.C National Research Council Press.

Palloni A, White R and Monteverde M. 2005. The behavior of Sullivan's method under

    lack of stationarity and other regularity conditions. Unpublished manuscript.

Robine J M and Mathers C D 1993. Measuring the compression or expansion of morbidity

    through changes in health expectancy. In Robine J M, Mathers C D, Bone M R,

    Romieu I (Ed.), *Calculation of health expectancies: harmonization, consensus*

achieved and future perspectives (pp. 269-286). Colloque INSERM/John Libbey Eurotext Ltd.

Rogers R G, Rogers A. and Belanger A. 1989. Active life among the elderly in the United States: Multistate life-table estimates and population projections. *Milbank Quarterly*, 67(3-4): 370-411.

Rogers, A., Rogers, R. G. and Belanger, A. 1990. Longer life but worse health? Measurement and Dynamics. *The Gerontologist*, 30(5): 640-649.

Sagardui J, Guallar P, Garcia M, Banegas JR and Rodriguez F. 2005. Trends in Disability and Disability-Free Life Expectancy Among Elderly People in Spain:1986-1999. *Journal of Gerontology: Medical Sciences 60A*(8), 1028-1034.

Saito Y, Crimmins E. and Hayward M. 1991. Stability of estimates of active life expectancy using two methods of life table construction. *Cahiers Quebecois de Demographie, 20*(2), 291-327.

Servei Cátala de la Salut. 2003. Enquesta de Salut de Cataluña (ESCA) 2002.

Servei Cátala de la Salut. 1995. Enquesta de Salut de Cataluña (ESCA) 1994.

Sullivan, D. F. 1971. A single index of mortality and morbidity. *American Journal of Public Health* 86, 347-354.

UN. 2004. Life tables obtained from World Population Prospects: The 2002 Revision. United Nations Population Division, Special Tabulations, New York.

Table 1

Unit Costs of Long-Term Care Services
Weighted Average for Spain (in euros)

Long-Term Care Services	1999	2003	% Variation
In-home care (per hour)	8.34	9.73	16.73%
Telephone assistance (annual)	273.53	242.23	-11.44%
Daily centers[a] (annual)	5,510.49	6,625.20	20.23%
Public residential homes[a] (annual)	12,870.34	16,832.30	30.78%
Public assisted living (annual)	4,639.18	4,488.36	-3.25%

[a] For dependent individuals

Source: IMSERSO (2000, 2004).

Table 2

Alternate Long-Term Care Services
by Severity of Dependence

	Moderately severe dependence	Seriously severe dependence	Totally dependent
Option 1:	TA	RH: 12 months	RH: 12 months
Option 2:	HC or IHC: 3 hxd	DC: 12 months + HC or IHC: 1 hxd	DC: 12 months + HC or IHC: 3 hxd
Option 3:	DC	HC or IHC: 8 hxd	HC or IHC: 14 hxd

Notes: TA=Telephone assistance
     HC=In-home care
     IHC=Informal in-home care
     DC=Daily center
     RH=Residential home
     hxd=hours per day

Table 3

Individual Annual Cost of Long-Term Care (in euros)

1999							
	1	2	3	4	5 (5 = 3-4)	6	7
Severity Level	Hourly Cost HC	Annual hours HC	**Annual Cost HC**	**Annual Cost RH**	Annual cost HC – Annual cost RH	Annual hours HC with DC	**Annual Cost HC with DC**
Total	8.34	5,110	42,617.40	*12,870.34*	29,747.06	1,095	14,642.79
Serious	8.34	2,920	24,352.80	12,870.34	11,482.46	365	*8,554.59*
Moderate	8.34	1,095	9,132.30	12,870.34	-3,738.04	0	*5,510.49*
2003							
Total	9.73	5,110	49,720.30	*16,832.30*	32,888.00	1,095	17,279.55
Serious	9.73	2,920	28,411.60	16,832.30	11,579.30	365	*10,176.65*
Moderate	9.73	1,095	10,654.35	16,832.30	-6,177.95	0	*6,625.20*

Notes: HC=In-home care
DC=Daily center
RH=Residential home

Table 4
Individual Expected Costs for Long Term Care, Spain
Medium cost increases (in euros)

Age	Model 1		Model 2		Model 3	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
65	47,767.97	82,546.18	52,029.21	87,472.71	113,334.36	194,835.37
70	46,706.42	67,589.27	50,572.39	72,074.24	114,578.59	164,396.81
75	45,084.90	65,017.72	48,504.03	68,814.18	114,748.00	164,481.65
80	43,963.08	60,705.36	47,334.70	64,074.75	115,642.74	160,039.80
85	43,243.77	58,016.73	46,716.89	61,505.50	117,300.58	158,951.44
90	28,342.79	42,346.82	31,880.65	45,911.82	75,763.07	118,195.33
95	27,835.41	41,295.77	31,419.17	44,907.08	76,031.11	118,626.55
100	27,193.05	27,165.64	30,800.35	30,786.47	76,116.38	76,112.20

Sources: EDDES (1999); INE (2002); IMSERSO (2000).

Table 5
Individual Expected Costs for Long Term Care, Spain
Low cost increases (in euros)

| Age	Model 1		Model 2		Model 3	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
65	40,580.84	69,156.56	46,067.73	75,638.06	113,334.36	194,835.37
70	40,582.89	57,909.03	45,352.09	63,535.49	114,578.59	164,396.81
75	40,101.49	57,169.99	44,141.17	61,698.15	114,748.00	164,481.65
80	40,057.68	54,887.36	43,873.45	58,703.85	115,642.74	160,039.80
85	40,359.13	53,925.95	44,126.69	57,682.94	117,300.58	158,951.44
90	27,042.20	40,482.19	30,759.55	44,172.89	75,763.07	118,195.33
95	27,099.30	40,344.87	30,769.33	43,980.89	76,031.11	118,626.55
100	26,980.27	27,024.59	30,621.53	30,647.76	76,116.38	76,112.20

Sources: EDDES (1999); INE (2002); IMSERSO (2000).

Table 6
Individual Expected Costs for Long Term Care, Spain
High cost increases (in euros)

| Age	Model 1		Model 2		Model 3	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
65	54,955.11	95,935.79	60,021.91	101,884.34	134,316.39	235,294.45
70	52,829.94	77,269.51	57,289.56	82,504.73	132,722.83	193,506.41
75	50,068.30	72,865.46	53,895.29	77,142.84	129,730.28	188,496.59
80	47,868.49	66,523.37	51,532.03	70,186.61	127,476.97	178,126.24
85	46,128.40	62,107.52	49,795.05	65,772.58	126,110.10	171,806.92
90	29,643.38	44,211.46	33,299.22	47,859.08	79,602.39	124,028.82
95	28,571.52	42,246.67	32,211.98	45,874.22	78,242.99	121,694.22
100	27,405.83	27,306.70	31,035.46	30,929.06	76,740.31	76,569.54

Sources: EDDES (1999); INE (2002); IMSERSO (2000).
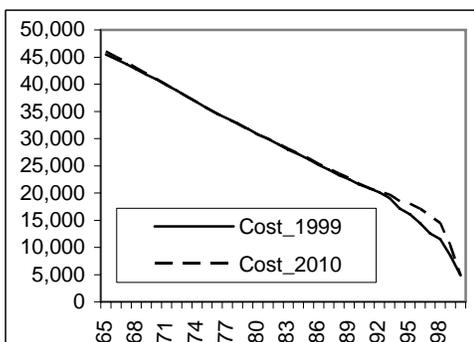
Figure 1

Individual Expected Costs for Long Term Care, 1999 – 2010
Prices as of 1999
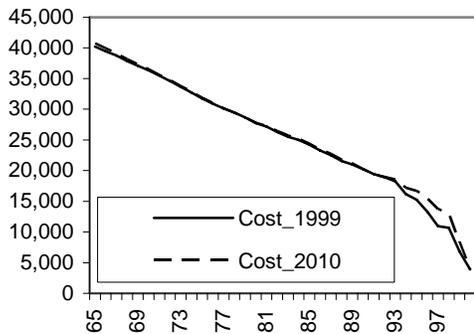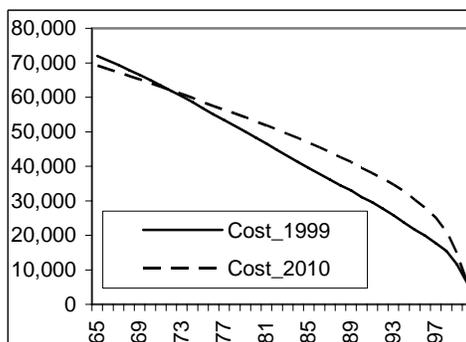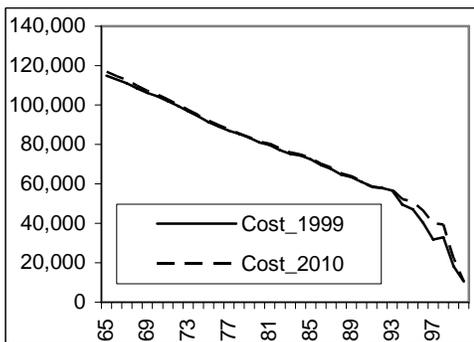

Model 1 Costs: 1999 – 2010
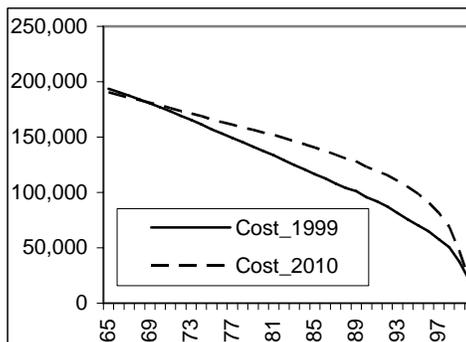
Men
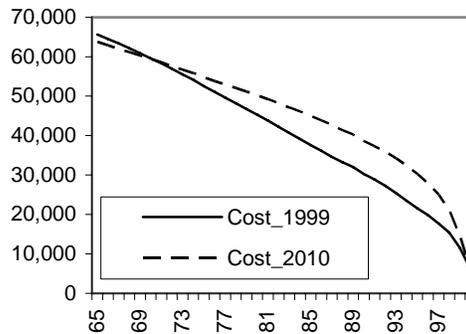
Model 1 Costs: 1999 – 2010

Women

Model 2 Costs: 1999 – 2010

Men

Model 2 Costs: 1999 – 2010

Women

Model 3 Costs: 1999 – 2010

Men

Model 3 Costs: 1999 – 2010

Women