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Health and Long-Term Care Expenditure in Finland When Living Alone Increases

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Abstract

The share of singles has been increasing. Studies show that singles on average use more health and long-term care services than couples. How large a burden is the change in household structures likely to create for public finances in a welfare state? We decompose per capita health and long-term care costs into costs per person living alone and per person not living alone. This decomposition is done also separately for age-related costs and proximity-to-death costs. Using these two decompositions we evaluate the effects of the changing share of singles with respect to both past and projected health and long-term expenditure, and compare them to pressures coming from population ageing. We find that the increase in the share of singles has only had a modest effect on public health and long-term care expenditure during 1987 – 2006. Using household projections jointly with population forecasts we find that future increases in the share of people living alone will increase projected public expenditure on health and long-term care, but the effects are small compared to the likely effects of population ageing. This is because the share of singles is expected to diminish in the oldest age groups, where the use of public services is most frequent. It appears that changes in household structures are more important for the design of welfare systems, so that people living alone have a reasonable safety net, than they are for fiscal projections and sustainability evaluations.

Keywords: *Household structure, health and long-term care expenditure, population ageing.*

JEL codes: *H55, I11, J11*

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1. Introduction

Population ageing is likely to increase public health and long-term care expenditure. This, along with rising pension expenditure, is generally considered to be the main threat for the finances of Nordic welfare states. We bring into the analysis another demographic development, the rising share of people living alone –singles, for short. Studies show that singles on average use more health and long-term care services than couples. The most obvious explaining factor is that the care provided by a spouse is not on hand for a person living alone. This is highly significant for elderly care, but also the health care costs are lower due to e.g. dissimilar health behaviour, availability of first aid and earlier return from hospitals. This trend has not drawn much attention in the projections of future public expenditures or labour markets.

We ask how large a public burden the increasing number of people living alone is likely to create compared to that coming from the increasing number of the elderly. We apply the state-of-the-art procedure of decomposing the expenditure into two parts, one linked to proximity to death and one linked to age. Our data is from Finland, but the results have broader Nordic implications.

The share of singles has been increasing in most developed countries. Christiansen (2014) describes this in detail for the Nordic countries. Figure 1 shows the development in Finland in 1987 – 2008. The share of one-person households has risen from 17 % to 26 %. The data are from registers containing information about persons in every dwelling, including all flats in apartment blocks, provided by Statistics Finland.

The figure also shows projections for household structures for the years 2019, 2029 and 2039. They are medians of stochastic projections from the AGHON project (Ageing Households and the Nordic welfare model), see Christiansen and Keilman (2013)[1]. About one third of adults are projected to live alone in 2039. This projection assumes that the number of people in institutions is fixed to the current level.

As a brief overview of health expenditure and long-term care (in short: care) expenditure in Finland, Figure 2 shows per capita expenditures in five-year age groups in 2006, along with the number of people in each group. Total health expenditure was 11.3 billion euros and care expenditure 2.8 billion euros, representing 6.8 % and 1.7 % of GDP in 2006, respectively. Notice that age profiles for health and care costs are quite different. Health expenditure per capita varied between 1000 euros per teenager and 6000 euros per 80-year old, whereas care expenditure varied much more, from below 500 euros in ages 60 – 64 to over 25000 euros in the 95+ group. Furthermore, the largest care costs are observed in ages where the number of people is small. We will show that these differences make it more difficult to analyse what effects the increasing share of singles has on care expenditure than what they have on health expenditure.

[1] The projections are available at http://www.etla.fi/en/research-projects/aging-households-nordic-welfare-model-aghon/.

Figure 1: Adult population shares by household position in Finland

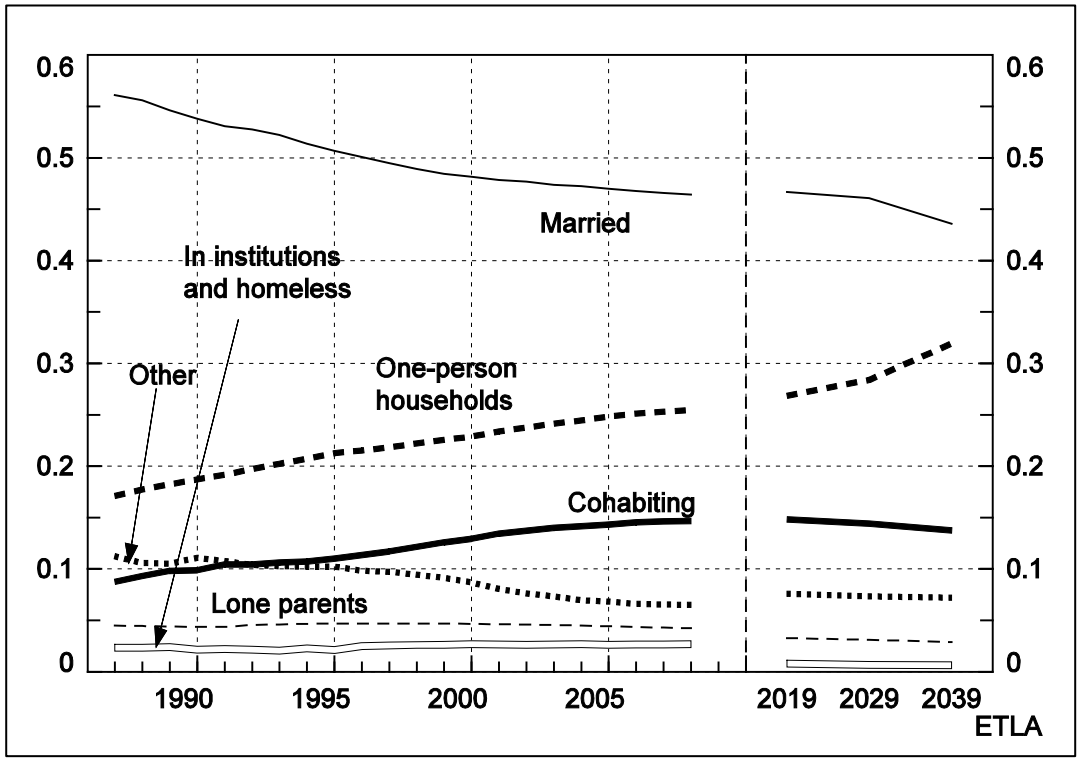
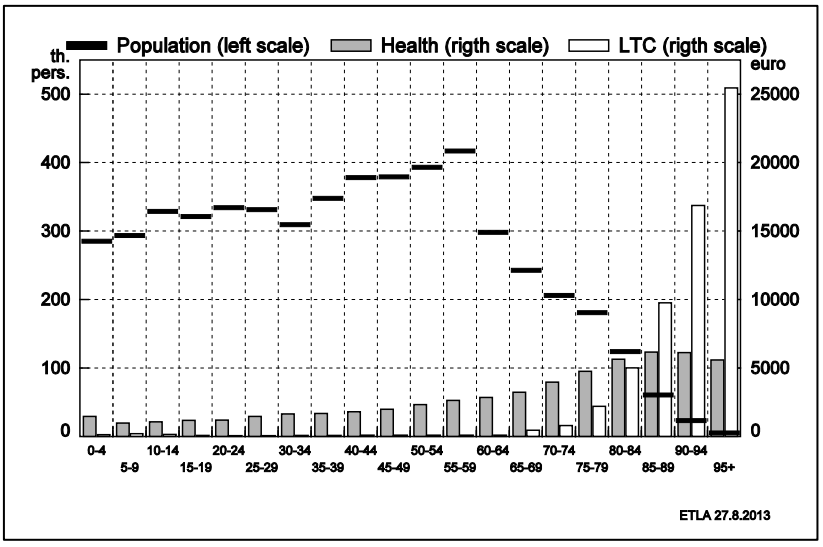


Figure 2: Health and LTC expenditure per capita and population by age in Finland in 2006



Source: The National Institute for Health and Welfare (THL)

In Section 2 we consider how the share of singles affects health expenditure, and in Section 3 we do the same for care expenditure. Section 4 combines changes in the share of singles to changes in the age structures and sizes of the Finnish population and compares their relative roles in fiscal projections. Section 5 summarises, concludes and considers future directions for research.

2. Singles and health care expenditures

Our estimates for the extra health care cost associated with living alone are obtained from Häkkinen et al. (2009). Their study used a sample from 13 municipalities in 2006 that included 298 413 persons below age 65 and 76 682 persons aged 65 and over. Individual-level data of daily use of different health and care services during 2006 were collected and priced with average national unit costs. In addition, individual-level socio-economic variables were obtained from the registers of Statistics Finland, the Population Register Center , the Hospital Discharge System, the Death Register, the Social Insurance Institution, and Finnish Hospital Benchmarking Project. Häkkinen et al. (2009) report regressions where personal use of health care was explained by several socio-economic features and sicknesses and diagnoses. In three regressions a dummy for living alone was included, the coefficient varying between 329 and 360 euros per person living alone. The estimates were highly significant.

Before assessing how changes in the share of singles affect health expenditure we must consider why health expenditure per capita is higher for singles than for those living with a partner. There are two main alternatives with potentially different implications. The first is that being married or cohabiting with a partner is good for one's health or otherwise leads to lower health costs than living alone. If this would be the sole reason, then changes in the share of singles would definitely lead to changes in health expenditure. The second alternative is that bad health causes people to live alone, or that there is some common factor that causes both bad health and living alone. If this were the sole reason for the observed difference in per capita health expenditure, then it is not clear that changes in the share of singles would affect total health expenditure. New singles could be as healthy as those living with a partner, or there need not be changes in the common background factor even if changes in the share of singles occur.

A growing number of research studies shows that both alternatives have some validity. Several studies show that marital status and living arrangements, and changes in these, have implications for an individual's health. A recent survey by Robards et al. (2012) refer to studies concluding that marriage provides protection against adverse health outcomes, through modified health behaviours and social networks arising from the union. The cost of being ill is also often lower due to support from the spouse; e.g. a person can be sent home from the hospital earlier if there is someone to help. On the second alternative, Robards et al. (2012) refer to studies showing that less healthy married persons were much more likely to become divorced than persons without health problems.

What we are estimating below is in accordance with the first alternative above, indicating that living with a partner leads to lower health costs than living alone. We in fact estimate the upper limit of cost increases from increasing shares of singles, assuming that every new single increases health expenditure by the highest estimate in Häkkinen et al. (2009), 360 euros. The total cost estimates are biased upwards because we neglect the selection issue that less healthy individuals either remain single or are more likely to become separated or widowed. Besides noting that we currently know of no way to reduce the bias, we defend our choice by stating that it in fact strengthens

our main result: even with this upward bias, the aggregate cost effects of changes in the share of singles appear to be minor.

Table 1 consists of counterfactual health expenditure calculations for Finland in 2006. The share of singles in 2006 is changed to the observed shares in 1987 and 1997 and to the projected [2] shares in 2019, 2029 and 2039. Share changes are transformed into numbers of persons, which are then multiplied by the extra cost of 360 euros.

Table 1: Health expenditure in 2006: counterfactuals with different share of singles

	2006	**Change from observed value in 2006 ***				
		1987	**1997**	**2019**	**2029**	**2039**
Share of singles	0.184	-0.0703	-0.0311	0.0230	0.0343	0.0659
Number of singles	964739	-371109	-164162	121333	180743	347574
Health expenditure, mill €	11300	-133.6	-59.1	43.7	65.1	125.1
Change in expenditure, %		-1.18	-0.52	0.39	0.57	1.10

Note: * Change from observed value in 2006 if the share of singles had been at the observed levels in 1987 and 1997 or projected levels in 2019, 2029 and 2039.

The increasing share of people living alone has indeed increased health expenditure, but the effect is not very large. If the share of singles in 2006 had been at the 1987 level, health expenditure would have been 1.18 % lower. If the share of singles increases as projected by Christiansen and Keilman (2013), but other things remain exactly as in 2006, health expenditure would be 1.10 % higher.

Had there been no singles in 2006, and assuming there is no reverse causality, a straightforward calculation reveals that health expenditure would have been 3 % lower. So living alone can add quite a lot to health care costs, but neither the past nor the projected changes in the share of singles are so large that they would cause large variation in the costs.

3. Singles and long-term care expenditure

Public provision of old age care is extensive in Nordic countries. For example, more than a fifth of the 85+ citizens live in institutions in Finland. Approximately the same share receives public services at home. The political aim is to increase the share of people living at home and to substitute sheltered housing for residential homes and care in health centres. Both goals are much easier and less expensive to achieve if informal care is available. Spouses are the main providers of informal care. Therefore the changes in the share of elderly people living alone are expected to influence strongly the demand for services and amount of public expenditure.

[2] The projection method is explained in detail in Christiansen and Keilman (2013). The projections are stochastic; we use the median values.

Our estimates for the extra care cost associated with living alone are obtained from Häkkinen et al. (2009). They concentrated on old-age care, for those aged 65 and over[3]. The problem was that in the municipal data 'living alone' excludes those in institutions, which on the other hand cause significant care costs. Whether they are living alone in the everyday sense of the word is ambiguous.
Häkkinen et al. came to the conclusion that non-married persons of age 80+ was the best available municipal-level variable reflecting 'living alone'. In the reported regressions, the point estimates for care use varied between 2955 and 3138 euros per non-married person aged 80 years or more. The estimates were highly significant. We use 3138 euros in the following calculations, as we are again estimating the upper limit, due to neglecting the selection bias by necessity.

For persons below the age 80, we have to create our own estimate for the extra per person cost for living alone. We calculate first by what percentage the average care cost of a non-married 80+ person exceeds the average cost of a married 80+ person, and use that same percentage in all younger age groups to obtain an estimate for the extra cost for a person living alone[4]. The extra costs vary between age groups.

Table 2 consists of counterfactual care expenditure calculations for Finland in 2006. The idea is basically the same as in Table 1. For those below age 80, the share of singles in 2006 is changed to the observed shares in 1987 and 1997 and to the projected shares in 2019, 2029 and 2039. For those of age 80+, we use the change in the share of not married or cohabiting person, instead of just the change in the share of non-married persons. Cohabiting is becoming more common and replaces being married, but that in itself is unlikely to increase the use of long-term care significantly. Share changes in age groups are transformed to numbers of persons, which are then multiplied by the extra cost in the respective age group.

A striking feature in this table is that the share of not married or cohabiting persons has been falling in the history and this trend is expected to continue. Therefore adjusting the care costs in 2006 for changes in 80+ non-married or cohabiting shares and for changes in the shares of singles in younger age groups shows a completely different pattern than in the case of health expenditure. The shares that prevailed in the past would have caused higher costs in 2006 than the realized amount. And according to projections the changing shares will diminish the costs in the future. Notice that the costs in ages 80+ dominate the outcome. In ages below 80 the increasing share of singles does lead to an increase in costs, but the costs per person are substantially higher in older ages, resulting in a change in sign.

[3] There were 76 682 such persons in the sample. The care includes institutional care in residential homes, long-term inpatient care in health centres, sheltered housing (ordinary and with 24-hour assistance), home-help services and home nursing.
[4] Unlike in health care in Section 2, we cannot use the same estimate for all age groups, because if we did use the 3138 euros and multiply it with the number of non-married persons or the number of persons living alone (the latter being a smaller number almost by definition) in any age group below 75, and then divide by the total number of persons in the age group, the per capita costs thus obtained would vastly exceed those in Figure 2.

Table 2: Long-term care expenditure in 2006: counterfactuals with different shares of people living alone

	2006	Change from observed value in 2006*				
		1987	1997	2019	2029	2039
Not married or cohabiting, age 80+						
Share	0.7545	0.0743	0.0495	-0.0825	-0.1257	-0.0992
Care expenditure, mill €,		49.6	33.0	-55.0	-83.8	-66.1
Change in expenditure, % of total		1.76	1.17	-1.95	-2.98	-2.35
Singles, age 15 – 79						
Share	0.2073	-0.0721	-0.0289	0.0276	0.0335	0.0603
Care expenditure, mill €		-7.2	-3.2	4.0	11.3	30.1
Change in expenditure, % of total		-0.26	0.11	0.14	0.40	1.07
Total change in expenditure, mill €		42.4	29.8	-51.0	-77.5	-54.9
Total change in expenditure, %		1.51	1.06	-1.81	-2.76	-1.95

Note: *Change from observed value in 2006 if the share of non-married or cohabiting persons aged 80 years or more and the share of singles below age 80 had been at the observed levels in 1987 and 1997 or projected levels in 2019, 2029 and 2039.

Had there been no singles in 2006, and had all persons aged 80 or more been married, the method used in Table 2 would produce 23 % lower care expenditure. Thus living alone seems to add substantially more to care costs than to health costs. Similarly to health care, the changes in the share of singles are not so large that they would cause large variation in care costs, but in addition the changes in specific age groups are important for long-term care and they seem to have gone in both directions and may well continue to do so.

4. Population Ageing, Singles and Public Expenditures

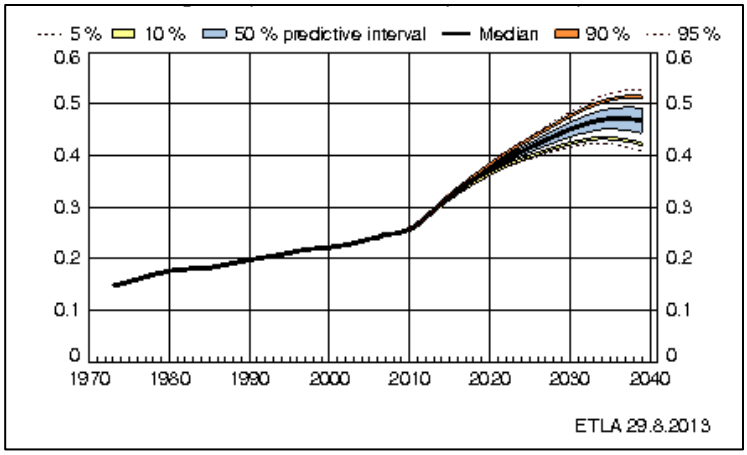
In this section we compare the effects of projected changes in the share of singles on projected changes in population age structure and size. The purpose is twofold. We wish to relate the expected cost effects of these two demographic developments on each other, and we wish to relate the uncertainty that the share of those living alone brings to fiscal projections of health and care costs to the uncertainty resulting from the magnitudes of population ageing.

Figure 3 presents one age dependency ratio, the number of persons aged 65 or more divided by the number of people in ages 15 – 64, for the period 1972 – 2008, and the predictive distribution for the ratio for the period 2009 – 2039. The distribution is from a stochastic population projection, produced by Juha Alho with a computer program *PEP*[5]. This projection was also used by Christiansen and Keilman (2013). The non-stochastic assumptions are close to those in the 2009 population projection by Statistics Finland, and the median in Figure 3 is virtually identical to the official projection. The blue area depicts the 50 per cent prediction interval for the

[5] for a description, visit http://www.joensuu.fi/statistics/juha.html

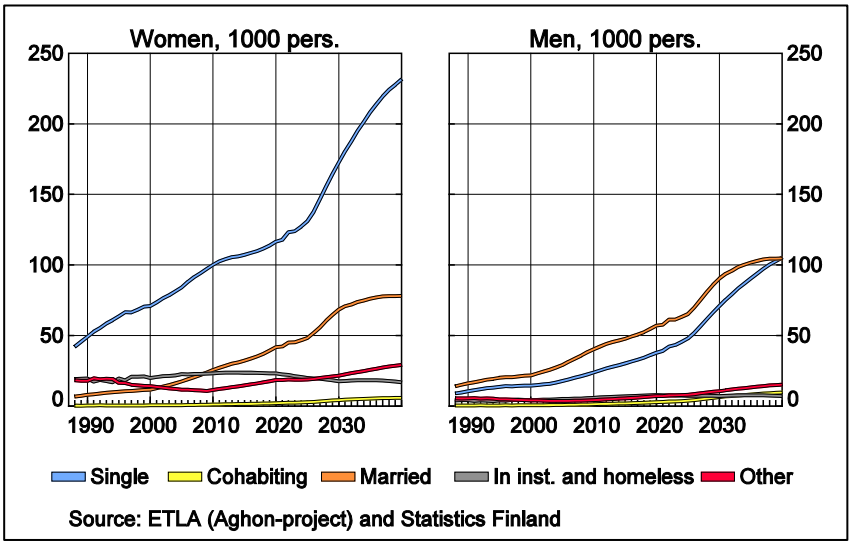
ratio in each period. For example, there is a 50 per cent probability that the age dependency ratio in Finland is between 0.44 and 0.49 in the year 2039. There is less than 5 per cent probability that the ratio is below 0.40, so even allowing for demographic uncertainty, the main message of the simulations is that we will see pronounced population ageing taking place during the next two decades.

Figure 3. Age dependency ratio (65+ / 15-65)



Each of the 3000 population paths was combined with one of the simulations from the stochastic household projection. Implicitly it is assumed that the household shares and the population numbers are independent random variables. This way we obtained 3000 sample paths for the number of people in each household position. The periodic medians of these paths for persons aged 80 or more are shown in Figure 4. We notice that the number of women living alone has grown steadily since our first observation in 1987 and will continue to grow according to the projection, but the growth accelerates in the mid-2020s when the post-war baby-boomers reach 80. A similar pattern is found in the number of single men, with lower absolute numbers. Notice especially that relatively speaking the number of married women grows more from 2006 to 2039 than the number of single women.

Figure 4. Population 80+ by household position, 1988 – 2039



We make two sets of ageing calculations. The first cost projections are based on per capita costs that stay constant in each age group in the future, plus fixed extra costs for every single person, in a way described in Sections 2 and 3. These calculations are naïve in the sense that they ignore the concentration of expenditures on the last years of life and assume that the age profile of per capita costs does not change in time. Some illnesses and injuries both hasten death and increase the health and long-term care costs significantly in the last years of life (for a recent overview, see Felder, 2013). Thus it is reasonable to include also mortality as an explanatory variable, and our second set of ageing calculations does that[6]. Since long-term population forecasts include mortality implicitly or explicitly, we still have to decide on the amount of costs allocated to the last years of life, before the cost projections can be done. It is useful to note the link between the much discussed 'healthy ageing' hypothesis and the allocation of costs. The more the proximity of death (instead of age) explains health, the more the additional years in the future are lived in good health.

Our starting point is Häkkinen et al. (2006), who used individual-level health and care expenditure for a large sample of persons of age 65+ in 1998. According to their calculations, 49 % of health expenditure and 75 % of care expenditure went to persons who died in 1998 – 2002.

From these figures one can deduce that 51 % of health and 25 % of care expenditure was not directly death-related, because they occurred to persons who were still alive five years later. Furthermore, part of the expenditure for those who died during these years obviously had no causal connection with death. A person who died because of lung cancer in 2002 may have been treated for a dislocated shoulder in 1998.

Using mortality data, we can estimate the share of expenditure occurring to those who die within five years, assuming that proximity to death has no effect on the

[6] Also the OECD separates proximity of death costs in its latest expenditure projections, see De la Maisonneuve et al. (2013).

expenditure. To do this by age group, we have to use also data for 2006, and implicitly assume that the per capita supply and unit costs of health and care services were the same as in 1998. The weighted average of this share, estimated over 5-year age groups for persons aged 65 and above, was 28 % of health expenditure and 48 % of care expenditure. These are smaller shares than Häkkinen et al. (2006) report. The difference in health expenditure share, 21 %, can be interpreted as a lower limit for the health cost that proximity to death causes. A corresponding lower limit for care is 27 %. Thus 21 – 49 % of health expenditure and 27 – 75 % of care expenditure have links to the proximity of death.

Thus the Finnish data shows that there are costs that depend on the proximity to death and costs that do not depend on it. Assuming that the latter, within each age group, are on average the same per capita for those who died and for those who did not, we can calculate the share of the former[7]. This was 29 % in health expenditure and 51 % in care expenditure. We modelled it to be the same per capita, irrespective of the person's age. Thus the total expenditure depends both on the number of people in each age group and the number of people who will die within the next five years.

Ageing calculations including the proximity to death aspect are better founded than the naïve method based entirely on age-dependent costs. The drawback is that we have to make more assumptions on how living alone affects the costs. We proceeded by dividing the health costs so that there is an extra cost for every single in both the age-related part and in the proximity-to-death part. The extra cost is in constant proportion to the age-related cost in each age group and also in the same proportion to the proximity-to-death cost. The proportion was set so that the aggregate share of the extra cost by singles match that obtained for the year 2006 using the cost of 360 euros per single and the number of singles in 2006. For long-term care we made essentially the same calculation, only in a somewhat more complicated manner since we used the number of non-married for persons of age 80+ and the number of singles for younger ages. As a result, we got the cost structures presented in Figure 5. The columns show the average expenditure, when the death costs are removed, and the lines indicate the additional costs if a person dies within 5 years.

The average additional health costs for a person that dies within 5 years are around 5000 euro. For a person who lives alone this amount is markedly bigger, around 6500 euro. Both sums are rather high compared to the average per capita health costs not related to death. Since few die during their working years, separating the death costs are important especially when evaluating the health expenditure implications of the predicted lower mortality during old age.

The average additional death-related care costs are of the same order than the health costs. Separating the singles from the others has, however, in case of long-term care a much bigger influence on the per capita costs not related to death. This result is expected, since several studies have shown that living alone is an important independent risk factor for transitions to institutional care. Its significance as a

[7]Denoting the care cost share of survivors by a, age-related cost share of those dying by b, and death-related cost share by c, we solve a, b and c from equations $(b+c) = 0.75$, $b/(a+b) = 0.48$ and $a+b+c = 1$.

predictive factor for future public expenditure depends nevertheless largely on the forthcoming changes in the shares of elderly singles.

Figure 5. Healt Care and LTC cost per capita

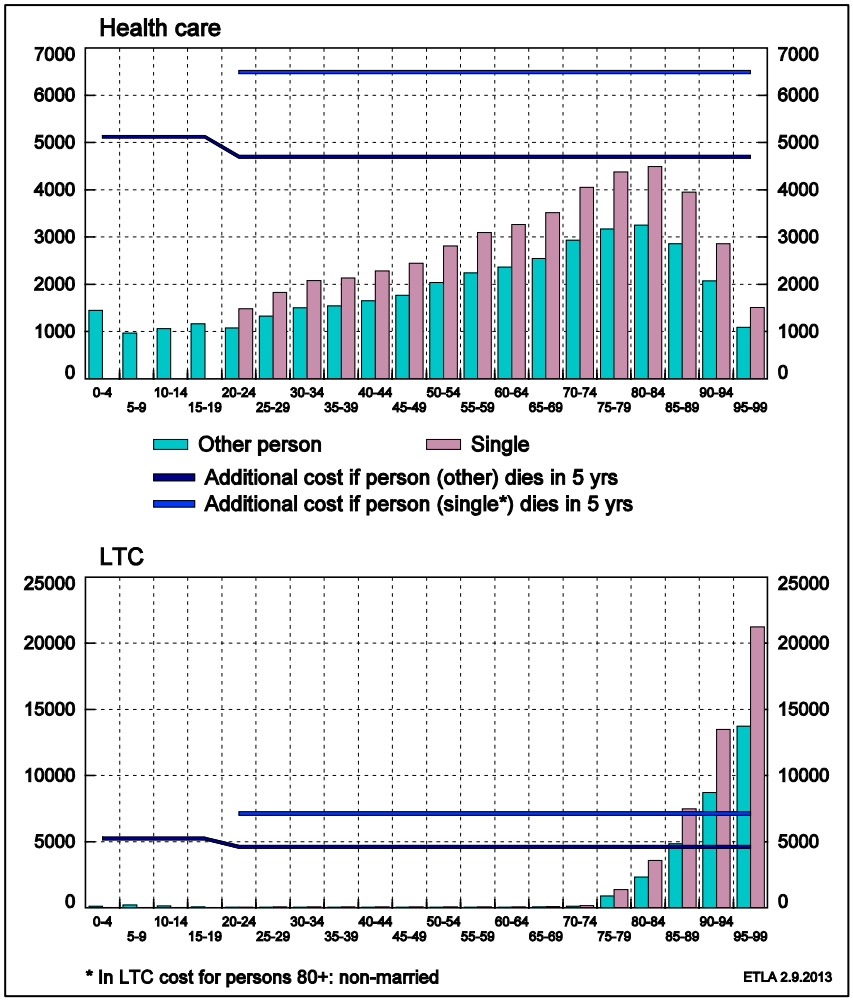


Table 3 contains the results for health and long-term care expenditures for the year 2039. We have denoted the expenditures in 2006 by 1. For health and for care, in both sets of calculations, there are three rows of results containing the median, first and third quintiles, first and ninth deciles and fifth and ninety-fifth percentiles, based on the 3000 simulations. The first row ('Singles only') describes the effects of the changes in the shares of singles (and shares of non-married 80+ for care) only, from 2006 to 2039, keeping the population as it was in 2006. The second row ('Population only') describes the effects of changes in population from 2006 to 2039, keeping the share of singles as it was in 2006. The third row ('Both') describes the effects of changes in both singles and population from 2006 to 2039.

Table 3. Predictive distributions of health and care costs in 2039 (2006 = 1)

	Fixed age-related costs only ('naïve method')						
	5 %	**10 %**	**25 %**	**Median**	**75 %**	**90 %**	**95 %**
Health costs							
Singles only	1..0081	1.0089	1.0102	1.0116	1.0131	1.0146	1.0154
Population only	1.2318	1.2517	1.2929	1.3419	1.3844	1.4236	1.4485
Both	1.2430	1.2633	1.3042	1.3530	1.3962	1.4351	1.4603
Care costs							
Singles only	0.9685	0.9731	0.9810	0.9889	0.9960	1.0024	1.0060
Population only	1.9203	2.0526	2.2847	2.5730	2.8619	3.1383	3.2836
Both	1.9075	2.0434	2.2754	2.5673	2.8518	3.1291	3.2748
Health and care costs							
Singles only	1.0017	1.0028	1.0048	1.0071	1.0093	1.0111	1.0122
Population only	1.3731	1.4200	1.4977	1.5839	1.6731	1.7567	1.8015
Both	1.3779	1.4262	1.5034	1.5911	1.6809	1.7649	1.8086

	Proximity-to-death included						
	5 %	**10 %**	**25 %**	**Median**	**75 %**	**90 %**	**95 %**
Health costs							
Singles only	1.0112	1.0125	1.0145	1.0166	1.0187	1.0207	1.0220
Population only	1.0520	1.0659	1.0954	1.1284	1.1634	1.1951	1.2134
Both	1.0677	1.0842	1.1136	1.1464	1.1828	1.2148	1.2327
Care costs							
Singles only	0.9636	0.9681	0.9760	0.9837	0.9914	0.9974	1.0006
Population only	1.4309	1.5334	1.6970	1.8914	2.1000	2.2772	2.3761
Both	1.3785	1.4723	1.6235	1.8091	2.0056	2.1822	2.2670
Health and care costs							
Singles only	1.0021	1.0039	1.0064	1.0096	1.0123	1.0150	1.0164
Population only	1.1490	1.1812	1.2340	1.2937	1.3568	1.4127	1.4455
Both	1.1476	1.1808	1.2314	1.2916	1.3519	1.4074	1.4384

Changes in household structures have very small effects on both health and long-term care costs, compared to effects coming from population growth and ageing. This holds for both the expected effects and the uncertainty of the effects that comes from the respective uncertainties of population projections and household projections. From 2006 to 2039 the median projections show that changes in population size and age structure will increase the sum of health and care costs by about 29 %, when the proximity-to-death aspect is included. The width of the 80 per cent confidence interval was about 23 percentage points. With the naïve method that assumes fixed age-related costs only the median effect is much larger, 58 %, and the confidence interval is also larger, 33 percentage points. The median effect of the change in the shares of singles is about 1 per cent and the width of the 80 per cent confidence interval is slightly over one percentage point with the proximity-to-death approach, while the naïve method yields smaller figures.

5. Conclusion and further directions

We attempted to estimate how changes in the share of those living alone – 'singles' in this article - affect public expenditure on health and long-term care in Finland. We combine results from a study based on individual-level daily use of health and long-term care services with patterns from Finnish family statistics and stochastic household and population projections for Finland.

For health expenditure we used an estimate of the extra cost that a person living alone had caused in 2006. The share of singles has increased in the past, according to family statistics, and we calculated the aggregate cost effects of those increases. Projections of household structures in the future predict further increases in the share of singles, and we calculated their cost effects. It turned out that changes in the share of those living alone are too modest both in the past and in the projections to cause large changes in health costs. If the share of singles in 2006 had been at the 1987 level, health expenditure would have been 1.18 % lower. If the share of singles increases as projected, but other things remain exactly as in 2006, health expenditure would be 1.10 % higher in 2039.

For long-term care we used a similar procedure to that for health care. There were some differences, though, that made the work more difficult. The average extra burden of those living alone is much higher in long-term care than in health care, relative to average costs. Long-term care costs are on average very high in high age groups, those over 80 years. The expensive care is often given in institutions, and the individual-level study that we use as a source sought to include those costs when assessing the role of living alone. They had to use a proxy, 'being 80+ and non-married', for being a single in an institution or elsewhere. Using a proxy makes the results and their interpretation somewhat more in doubt, and also makes it more difficult to calculate the effects of changes in the share of people living alone in the past and in the future. Our point estimates show a small decline in long-term care costs, and the results indicate clearly that the changes in the shares of singles have not contributed much to changes in care expenditure in the past and are unlikely to do so in the future. The share of non-married 80+ is already high in the age groups that use long-term care services extensively. It is actually projected to fall somewhat in the future.

Our study reveals that the use of health services and long-term care services differ quite a lot from each other in different age groups, and this affects also the contribution of living alone in the use of these services. Despite these differences the aggregate cost effects of changes in the share of singles appear to be minor in both categories. There seems to be no reason to expect that more accurate cost estimates will change the broad picture.

Compared to the effects of population growth and ageing, changes in the shares of people living alone have small effects. This holds for both the expected effects and the uncertainty of the effects that comes from the respective uncertainties of population projections and household projections. The median projections show that changes in population size and age structure will increase the sum of health and care costs from 2006 to 2039 by about 39 % when the proximity-to-death aspect is

included. The width of the 80 per cent confidence interval was about 22 percentage points. When the naïve method that assumes the costs to be related only to age was used, both the median effect and the confidence interval were larger. The median effect of the change in the shares of singles is about 1 per cent and the width of the 80 per cent confidence interval is slightly over one percentage point.

Although the cost effects are small, we do not conclude that changes in the share of people living alone is an unimportant element when considering public finances. But the point of view should be changed from worrying about public expenditure to considering the welfare of people living in different types of households. We think that for policy-making purposes a productive line of research would be to recognize that being married or cohabiting provides insurance towards many economic risks, and people living alone are in a weaker position. Thus it could be useful to study the design of welfare systems from this point of view. If population ageing results in policy decisions weakening the social security, the changes should be made so that the position of singles, who depend more on public services, remains tolerable. In doing this, attention should also be paid to the fact that partly because the welfare states have expanded their scope and scale, more people than before have been able to afford to pay the higher costs and take the economic risks that are connected to living alone.

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