

# Population Ageing and Health Care Expenditure: Is Long-term Care Different?

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## 1. Introduction

In the debate over ever increasing health care costs, a routine argument states that ageing of the population is a crucial driver of health care expenditure (HCE). ZWEIFEL, FELDER and MEIER (1999) argued that this claim is a red herring. Their dissent was based on the analysis of health care expenditure of deceased persons in their last years of life. The number of quarters remaining until death was significant while the age of the persons was not. In a recent paper (ZWEIFEL, FELDER and WERBLOW, 2004) we replicated our results using a larger data set, including HCE of survivors, and taking into account methodological concerns raised by SALAS and RAFTERY (2001) and DOW and NORTON (2002). In particular, we no longer focused on the time path to death of HCE, which involves a whole host of time dummies each of which is potentially endogenous since HCE may contribute to survival. Instead, we related individual HCE of a given year to remaining time to death, which was on average 21 months for the sample of decedents. Additionally, we extended the sample to include surviving individuals, since a concern has always been that the effect of age on HCE may be different for survivors.

This paper deals with yet another concern, viz. the generality of the red herring argument. Up to present, testing has been confined to total HCE, and the question arises as to whether the red herring applies equally to acute and long-term care (LTC). Chronic illnesses are prevalent in old age and often lead to permanent stays in nursing homes. Since nursing home care is expensive, it largely contributes to HCE in old age and may be responsible for the findings reported in the literature. SPILLMAN and LUBITZ (2000) did analyze HCE of the U.S. Medicare population, i.e. individuals aged 65+. They report a convex (from below) age profile for both nursing home care and (less accentuated) for home

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care. By contrast, services covered by Medicare and prescription drugs exhibit a decreasing age profile. This implies a continuing shift from acute to LTC late in the lifespan. SPILLMAN and LUBITZ conclude that population ageing will mainly drive the demand for LTC, leaving the acute sector unaffected.

The relationship between age and major components of HCE has been extensively studied in recent years, using data from different sources. O'NEILL, GROOM, AVERY, BOOT, and THORNHILL (2000) found no age effect on the cost of general practitioners when controlling for time to death. SESHAMANI and GRAY (2004a and 2004b) used longitudinal data of individuals in Oxfordshire to show that proximity to death is strongly associated with hospital costs as far back as 15 years before death, while age plays a much smaller role. STEARNS and NORTON (2004), concluded on the basis of U.S. Medicare data that it is "time to include time to death" as an explanatory variable in any analysis of individual HCE.

## 2. Differences between Acute and Long-term Care

FELDER, WERBLOW and ZWEIFEL (2005) studied five components of acute care (ambulatory care, hospital inpatient care, hospital outpatient care, drugs and other services) and two components of long-term care (nursing home care and home care). Survival status was observed at the end of 2004, which allowed for extending the time to death to 60 months (HCE observation year was 1999). The sample included 57,085 survivors and 5,075 deceased. Average age at death was 76 years, that of the survivors, 54 years. Mean time to death was 29 months for the deceased. Survivors had a maximum value of time to death of 60 months.

Health care expenditure in 1999 of those who died since January 1st, 2000 was SFR 11,567 or four times the average HCE of survivors (SFR 2,795). The composition of HCE markedly differed between the two groups, too. Among the deceased, LTC accounted for 32 percent of total HCE, while for the survivors this share was 4 percent only. Figures 1 and 2 show the age profiles of acute and LT care for deceased and survived individuals, respectively. Among the deceased aged 45+, a concave age profile with a decreasing trend beyond age 65 obtains for acute care. By contrast, LTC expenses sharply increase over the life-cycle. At an age at death of 95 years or older, LTC accounts for no less than 75 percent of total HCE. Regarding the survivors (Figure 2), expenses for acute care double between age 45 and age 75, resulting in a positive age gradient. Beyond age 75, however, expenses decrease. Again, LTC stands out, showing a sharp increase after the age of 70, and reaching almost 50 percent of total HCE at the age of 90. Under a 'red herring' perspective, this is surprising because these individuals

continued to live for at least another five years past the year of HCE observation. However, the observed figures may mask the separate influences of age, proximity to death, and other determinants of HCE and its components.

Figure 1: Observed Age Profiles of Acute (AC) and Long-term Care (LTC) for Deceased

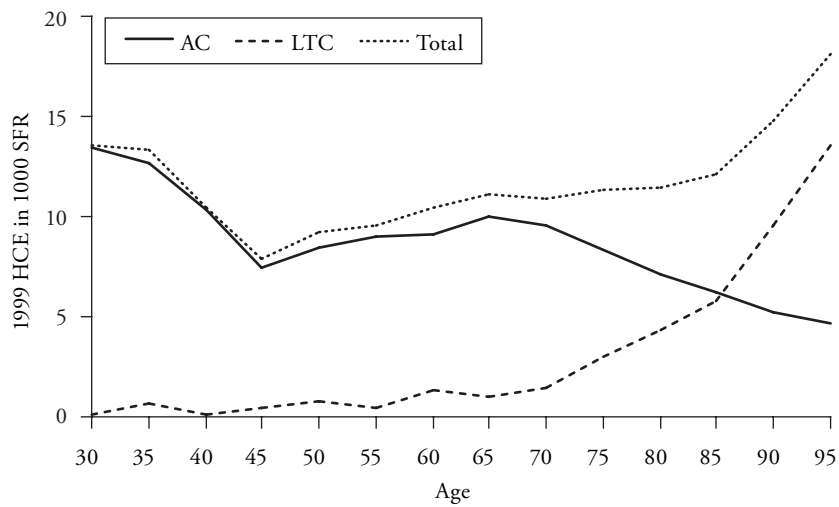
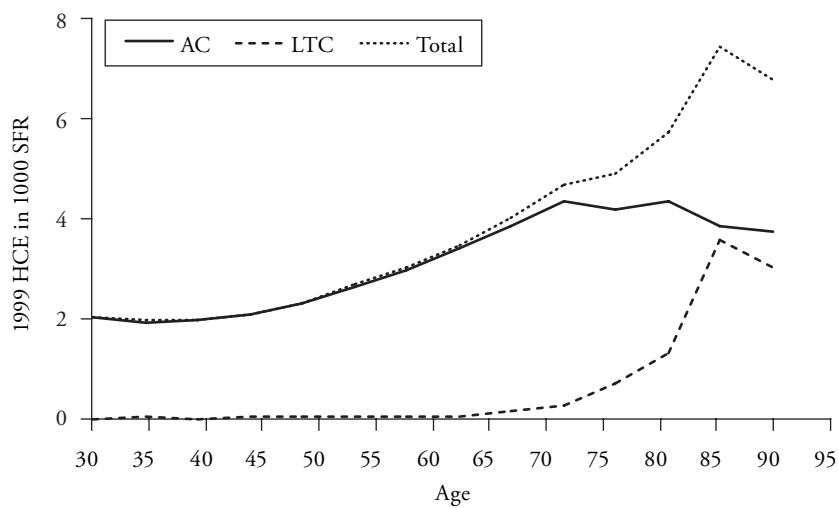


Figure 2: Observed Age Profiles of Acute (AC) and Long-term Care (LTC) for Survivors



The first step in FELDER et al.'s econometric methodology included a probit model to distinguish between LTC and non-LTC users. While age-related regressors were significant alongside those indicating death and its proximity, their impact remained small. Next, LTC status was endogenised. Age had a significantly positive and increasing effect on the probability of being an LTC user. However, regressors related to death and its proximity were clearly important as well, contributing to an increase of the overall goodness of fit. Among individuals aged 80, the LTC probability for the deceased was four times as high as for survivors.

For the individuals not in the LTC category a multivariate probit model was estimated for positive demand in each of the for acute HCE components. SURE estimation followed to study conditional demands. Age gradients were zero or even decreasing (at least beyond age 80) regardless of survivor status. This confirmed earlier results reported in the red herring debate.

Among LTC patients, we differentiated between acute health care components, LTC in a nursing home and LTC provided at home. Interestingly, the two LTC components systematically differed regarding the effects of age both with regard to the probability of positive HCE and to conditional HCE. In old age, more individuals are going to stay in a nursing home, while the share of LTC individuals receiving care at their own home decreases.

The age profile of LTC services in nursing homes was flat *ceteris paribus*. By way of contrast, in the home care component, the age coefficients were all highly significant, indicating a tendency to a progression of HCE with increasing age in old age. Proximity to death had the expected positive impact. However, the indicators associated with actual death indicated important differences between components of HCE. In the nursing home, death means less HCE, while in all other settings, it results in a big upsurge of cost.

### 3. Conclusion

Conventional wisdom suggests that a country's HCE rises with the proportion of elderly persons in the population. Predictions of future expenditure based on cross-section data tend to reaffirm this view. For instance FUCHS (1999) attributes the increase in the proportion of GDP spent on health in the U.S. to "the increase in the number of persons aged 65 and above due to the ageing of baby boomers".

At the aggregated level, however, there is no empirical evidence of a causal positive correlation between population ageing and HCE growth. Using OECD country data, GETZEN (1992) as well as BARROS (1998) found no evidence that

population ageing drives HCE. For Getzen the conventional wisdom neglects the budget constraints confronting both governments and private individuals that ultimately limit HCE. This dissent from conventional wisdom has been vindicated by recent research studying HCE of the deceased. When proximity to death is included as an explanatory variable, age tends to be statistically insignificant, suggesting that the positive relationship between age and average HCE reflects the high costs of dying and the high mortality in old age. In fact, LUBITZ and RILEY (1993) and HOGAN et al. (2001) reported that Medicare payments per decedent are about six to seven times higher than those per survivor, a figure also found in HCE data of a Swiss sickness fund (FELDER, MEIER and SCHMITT, 2000).

This paper reports on a study that decomposes HCE into seven components, includes both survivors and deceased individuals and applies a two-part model to the demand for health care services, using a large Swiss data set. It finds no age effect on HCE for almost all components of HCE when proximity to death is controlled for, and points to differences between individuals receiving LT care and non-LTC individuals. For the latter a flat or even a falling age curve for all components of HCE is observed. LTC patients are high user of health care services, their conditional HCE generally shows a decreasing age profile, while the probability of being in need of LTC markedly increases in old age. The red herring claim therefore is vindicated except for long-term care where ageing appears to matter regardless of proximity to death.

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