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Determinants of long-term care spending: Age, time to death or disability?

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ABSTRACT

In view of population aging, better understanding of what drives long-term care expenditure (LTCE) is warranted. Time-to-death (TTD) has commonly been used to project LTCE because it was a better predictor than age. We reconsider the roles of age and TTD by controlling for disability and co-residence and illustrate their relevance for projecting LTCE.

We analyze spending on institutional and homecare for the entire Dutch 55+ population, conditioning on age, sex, TTD, cause-of-death and co-residence. We further examined homecare expenditures for a sample of non-institutionalized conditioning additionally on disability.

Those living alone or deceased from diabetes, mental illness, stroke, respiratory or digestive disease have higher LTCE, while a cancer death is associated with lower expenditures. TTD no longer determines homecare expenditures when disability is controlled for. This suggests that TTD largely approximates disability. Nonetheless, further standardization of disability measurement is required before disability could replace TTD in LTCE projections models.

1. Introduction

Long-term care (LTC) is provided when individuals experience disability and/or chronic disease and is often required from the onset of such conditions for the remaining lifetime. Consequently, the great majority of LTC is used by the middle-aged and elderly. In 2005, the Dutch 55+ population accounted for 88% of public LTC expenditures (LTCE) on homecare and institutional LTC. Given the rapid rise in the proportion of elderly and their high LTC use rates, population aging is expected to accelerate LTCE growth in developed countries in the next decades. Considering this increased pressure on the LTC sector, improved understanding of the factors that determine LTC use and expenditure is of utmost importance to enable more accurate projections of the need for such services, and to develop adequate policies to alleviate the pressure that population aging places on healthcare budgets.

Given that both acute and LTC expenditures rise with age, no controversy exists that the expected growth in healthcare expenditures (HCE) can to some extent be attributed to population aging (Yang et al., 2003; Pezzin et al., 1996; Comas-Herrera et al., 2007; OECD, 2006). But because the most rapid growth in elderly cohorts has still to occur, it is of interest to identify the relative contribution of population aging. The literature on this subject seems to have concluded that the proclaimed effect of age on HCE is a 'red herring' – i.e. a distraction away from the 'true driver' of HCE: time-to-death (TTD; see Payne et al., 2007 for a review). A consensus has emerged that TTD and not age determines expenditures on *acute* care, whereas both determine *LTCE* (Werblow et al., 2007; Yang et al., 2003; Comas-Herrera et al., 2007). The inclusion of TTD is therefore advocated in models used to explain and project acute and LTC expenditures.

This study reconsiders the role of TTD in LTCE models. First, while inclusion of TTD in LTCE models usually raises explanatory power, TTD models still do not adequately represent the actual causes of spending. It is not TTD itself but the degree of disability experienced in the period before death which drives the demand for LTC. This suggests that TTD itself is also a 'red herring' if it merely acts as a proxy for disability. Second, the contribution of aging to future growth in LTCE largely depends on the trend in the period

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lived with disability, i.e. whether a compression, expansion or postponement of disability prevails (Fries, 1980; Payne et al., 2007).[1] While some of the recent evidence supports a compression of disability, in the sense of a compression of the number of absolute years lived with disability (Payne et al., 2007; Manton et al., 2006), TTD models implicitly assume a postponement of the absolute years of life lived with disability. They assume that longevity gains merely shift the period lived with disability to higher ages, while its duration remains constant. Relying on TTD models to project LTCE may then lead to biased projections because the relationship between TTD and disability is dynamic, rather than constant. Third, many studies have failed to correct for the endogeneity of TTD which is partly caused by omitting disability (e.g. Felder et al., 2010; Zweifel et al., 2004). Accounting for disability therefore mitigates this endogeneity bias. Clearly, previous studies have included TTD because disability data were lacking. Given improved data availability, we are able to reconsider the roles of both TTD and age in generating LTCE.

Our main objective is to further clarify to what extent aging increases LTCE by disentangling the roles of age, TTD and disability in explaining LTCE. Our approach goes beyond earlier efforts in a number of respects. First, access to population data on public LTC enables us to examine the determinants of LTCE for the *entire* Dutch 55+ population. We separately model total LTCE, institutional and homecare expenditures. Second, next to the determinants usually included in expenditure models, our data allow us to examine the influence of cause-of-death (COD) and co-residence status on LTCE. COD information makes it possible to investigate the role of TTD by disease group which is likely to differ as the disabling impact and duration of diseases greatly varies. Considering future trends in epidemiology, this addition will allow for better projections of LTCE. Co-residence status, like TTD, is associated with age and LTCE. Its inclusion is important because it is a proxy for another important determinant: informal care availability (Sundström, 1994). Informal care potentially substitutes for homecare and generally postpones LTC admissions (Van Houtven and Norton, 2004; Bonsang, 2009). Third, for a representative sample of the non-institutionalized Dutch population, we can take the analysis of homecare expenditures one step further and condition also on morbidity and disability. Our analysis sheds new light on the consequences of population aging for LTCE through a re-examination of the relative roles of age and TTD. Although age and TTD are often found to be key predictors of LTCE, neither of them are causes of LTCE in and of themselves, but merely act as proxies for disability. They may even become redundant in explaining LTCE after appropriate control for disability. Finally, LTCE projections based on trends in demographics, co-residence and disability illustrate the usefulness of our models, in particular, by demonstrating the bias introduced when using TTD to approximate disability.

2. Demand for public LTC in the Netherlands

In this paper, LTC services include all *publicly* financed institutional LTC or formal homecare, except homecare financed by a personal care budget (PCB). With a PCB a patient receives a cash benefit to purchase LTC services directly instead of receiving these services as benefits-in-kind – i.e. when the insurer is responsible for the delivery of LTC by the provider of the patient's choice. *Institutional LTC* includes both temporary and permanent admissions to residential and nursing homes. Residential homes merely provide assistance with domestic tasks, whereas nursing homes also provide personal and nursing care. Institutional LTC accounts for 70% of total LTC spending. *Formal homecare* services include domestic care, personal care and nursing care. Consequently, the following LTC services are not considered: privately financed LTC, publicly financed homecare by a PCB and informal LTC. Informal care *availability* is approximated by co-residence status. Overall, our analysis includes the bulk of public LTC expenditure.[2]

All Dutch citizens are entitled to public LTC currently covered under the *Exceptional Medical Expenses Act* and the *Social Support Act*.[3] Public resources are allocated by an agency that regulates access to public LTC by performing objective, independent and comprehensive assessments. Guidelines – based on the International Classification of Functioning, Disability and Health (WHO, 2001) – have been developed to structure this process. Next to functioning, disability and health, the guidelines take into account the living situation and informal care availability (Peeters and Francke, 2007; Van Gameren and Woittiez, 2005). Public LTC is not entirely free of charge; an income-related copayment is charged. Note that the institutional alternatives – nursing and residential homes – are mutually exclusive while the different homecare services are not and the decision to use either one or a combination of different homecare services is determined simultaneously (Van Houtven and Norton, 2004). Once considered eligible, individuals choose whether to receive this as a benefit-in-kind or as a PCB. Recall that we are only modeling the former services.

3. Data and methods

We first analyze total LTC, institutional LTC and homecare expenditures for the entire Dutch 55+ population, conditional on age, sex, TTD, COD, and co-residence.[4] Next, we examine homecare expenditures for a random sample of the non-institutionalized 55+ population, conditioning additionally on morbidity and disability information. In the remainder of this paper we will refer to these distinct models as the 'population model' and the 'extended homecare model'.

3.1. Data

3.1.1. Population model

Three data sources linked at the individual level are used: the Registration of the Administrative Office Exceptional Medical Expenses 2004, the Death Causes Registration 2004–2007 and the Municipality Register 1998–2006. These three national registrations register (a) the use and amount of public LTC, (b) TTD and COD, and (c) several household and individual characteristics, respectively. COD is classified according to the International Classification of Diseases (ICD-10). All citizens aged 55–90 in 2004 with complete information on co-residence status are selected. This excludes less than 0.5%, mainly those who had moved into an institution before 1998.[5]

[1] This paper concentrates on trends in disability instead of morbidity because that is the main driver of LTC use (De Meijer et al., 2009), while morbidity explains especially acute care expenditures.

[2] PCB-financed LTCE account for 5–10% of public homecare expenditures (Ministry of Health Welfare and Sports, 2006). Institutional LTC is hardly ever paid out of pocket in the Netherlands, privately financed LTC therefore only constitutes a relevant alternative for homecare; 1.4% of the 30+ population and 13.5% of the LTC users consumed private homecare in 2003 (Jonker et al., 2007).

[3] The Social Support Act is implemented in 2007; coverage of domestic care and domestic help has shifted from the Exceptional Medical Expenses Act to the Social Support Act and access to these services is currently regulated by local governments.

[4] We restrict our attention to this sub-population, as these are the ones who need LTC. As noted above, in 2005, the 55+ population account for 88% of the LTCE in the Netherlands.

[5] The excluded observations were on average older, more often female and closer to death. Because this selective drop-out comprises less than 0.5% of the population, it is unlikely to have affected our results.