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# Chapter 1

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General introduction

## Population ageing and health care expenditure

National levels of health care spending are rising in many developed countries. Faced with increasing pressure on public finances, policy-makers are directing their attention towards the potential causes of this rise. Population ageing is perceived to be an important cause. For example, the Netherlands Bureau for Economic Policy Analysis estimated that population ageing caused 20% of the total rise in real health care expenditure (HCE) per capita in the Netherlands between 1972 and 2010.<sup>1</sup> Consequently, if this growth rate is extrapolated and other important factors are left aside – such as technological innovation, health policy restructuring and the Baumol effect<sup>1</sup> – population ageing will require Dutch citizens to spend 23% more on health care through taxes and premiums in 2040 than they did in 2010.

In contrast, other authors have found that population ageing only has a modest or even ignorable impact on health care costs.<sup>2-4</sup> They consistently find that technological innovations have been the major driver of growth in health care spending on the national level in recent decennia, and the demographic factors like population ageing play a minor or even insignificant role. Such contrasting results in literature on population ageing exist because population ageing itself is a complex dynamic involving many facets. Not only does a high degree of uncertainty surround these facets, many forecasts do not include all facets. In general, the term population ageing refers to three dynamics: (1) rising life expectancy; (2) a higher share of older people; and (3) increased mortality rates. These three dynamics have different implications for future health care spending, each with many different scenarios.

Rising life expectancy will only result in increased HCE if people will also live longer with health related problems. Otherwise, more life years will only postpone an increase in HCE. It is also possible that a higher life expectancy will dampen HCE (see next paragraph). Concerning the second dynamic, the share of older people is increasing and older people consume a relatively high share of health care. In 2007, Dutch citizens aged 65 years and older made up 15% of the total population, but were responsible for 37.5% of the total level of health care spending, equalling 27.75 billion of roughly

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<sup>1</sup> The Baumol effect refers to an economic law, which stipulates that economic growth is logically accompanied by decreased efficiency in the public sector. The central idea is that increased labour productivity boosts economic growth, but that this increase in productivity is most pronounced in the private sector. Efficiency in the public sector then decreases because productivity lags behind that of the private sector while wages need to increase to prevent income disparity between these sectors.

74 billion euros.<sup>5,6</sup> When taking into consideration that the share of seniors is forecasted to rise up to 26% in 2040, there is *prima facie* evidence for a considerable impact of population ageing on HCE through this second dynamic (in this case, a rise from 74 billion to 88 billion from 2007 to 2040, equalling  $\pm 424$  million euros annually). However, this simple extrapolation does not take the many counteracting dynamics into account, such as the ‘red herring’ phenomenon.<sup>2</sup>

The red herring phenomenon is related to the third dynamic: increased mortality rates. It refers to the notion that a strong rise in HCE by age on the population level conceals that there is actually not a strong rise in HCE by age on the individual level. On the individual level, in contrast, HCE increase only slightly with age, but rapidly before death. What then underlies the association between age and HCE on a population level is actually a rising mortality risk in combination with high ‘costs of dying,’ and **not** a presumed direct impact of age on HCE.<sup>7</sup> It is important to note here that the costs of dying decrease with age.<sup>11</sup> Economists therefore conclude that it is important to include predictions about age, mortality and the costs of dying in forecasts concerning HCE, rather than just age<sup>8,9</sup> – although some economic researchers do not agree with this point.<sup>10,11</sup>

### **Aim and outline of this thesis**

To gain a better understanding of how the ageing of a population affects health care spending, it is important to investigate the three separate dynamics that underlie the association between HCE and population ageing. Therefore, the aim of this thesis is *to investigate the determinants of mortality, health care expenditure and the costs of dying in the older population*. The different determinants investigated in this thesis can be separated in two categories: (1) determinants that apply to the country as a whole (macro-level) – e.g. the status of the national economy; and (2) determinants relevant for the individual (micro-level) – e.g. a person’s relationship status. Part I of this thesis (chapter 2–4) is dedicated to macro-level determinants, and part II (chapters 5–7) deals with the micro-level.

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<sup>2</sup> The term ‘red herring’ refers to an illusionary tactic to draw one’s attention away from the real problem. In economics, one creates a red herring when extrapolating a dependent variable without separately including **all** the possible determinants of the dependent variable in the forecasting model.

### Overview of the chapters

Studies have found that rates in unemployment and economic growth affect the mortality rates of a population. It is unclear if and how economic growth is associated with mortality at older age. This is investigated in **chapter 2**. Another important macro-level determinant of mortality is seasonality. It is known that mortality rates of older people are higher in cold seasons and during heat waves, but it is unknown if seasonal cycles exist in medical care expenses and the institutionalization rates of older people. **Chapter 3** deals with this issue. **Chapter 4** focuses on the national health care system. Specifically, the idea that the effective use of general practitioners (GPs) can increase the cost-effectiveness of the national health care system is investigated. When GPs act as gatekeepers utilization of more expensive specialist care is avoided through selective referral, improved coordination, and the GPs ability to perform basic treatments at lower costs. However, the cost-effectiveness of such a gatekeeping system has not been studied properly.

Part II (the micro-level) starts with a chapter on personalized medicine. The care network surrounding frail older people is usually of a bureaucratic and complex nature, which comes at the expense of their health as well as the efficiency of regional health care supply. In **chapter 5** a programme is described that aims to improve the health of hospitalized frail older people by improving their network through the individual tailoring of care. Not only the structure of the formal care network is important for the health of the elderly patient, and the efficiency of health care of older patients: the informal care network is also of crucial importance. The most important part of an older person's care network is the spouse. It is known that married older people live in better health and have a lower mortality risk. The effect on marital status on HCE needs further exploration. The effect of the loss of the spouse on HCE through time is reported in **chapter 6**. Finally, **chapter 7** concerns the costs of dying. The focus lies on four determinants on which current literature is non-existent or controversial: variation in the cost of dying, and the role of socio-demographic characteristics, different health services, and preceding HCE in the costs of dying. The key findings of this thesis are discussed in **chapter 8**, which also concerns the impact of these findings on the debate about the impact of population ageing on HCE.

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## Supplementary material

### The Dutch health care system

Health care in the Netherlands can be separated into two main sectors: medical care and long-term care. Medical care refers to consultations, medication and treatment from general practitioners, medical specialists, dentists, pharmacists, and therapists (such as physiotherapists and psychotherapists). Some forms of instrumental aid and transportation are also provided through the medical care sector. In the studied time period, health care providers bill health care insurers in the form of diagnosis related groups. Medical care is legally arranged through the Health Insurance Act (HIA).

Long-term care in the Netherlands is legally arranged through the Exceptional Medical Expenses Act (EMEA). Entitled to care through the EMEA are people who cannot satisfy their basic care needs independently due to a physical, psychogeriatric or psychiatric ailment, or a mental, physical or sensorial handicap. Before someone may receive long-term care through the EMEA, the Center for Indication Setting has to evaluate the client's health status and issue an official indication. When an indication is set for a client, the actual provision of long-term care is arranged by so-called *care offices*. After an indication is set, the care office appoints a health care provider for a client, or distributes a personal budget. The health care insurer who has the highest share of clients in a region acts as the care office for that region.

There were basically five separate long-term care services funded through the EMEA in the studied time period: (1) personal care (e.g. dressing, undressing, help with bathing or showering), (2) nursing care (e.g. wound dressing), (3) counseling (daytime activities and help with improving self-reliance, individually tailored or in groups), (4) treatment (forms of rehabilitation or therapy) and (5) residence. Indications for extra-mural care are defined in type and level (hours per week). Since July 1<sup>st</sup> 2007, intramural care is indicated in terms of Care Weight Packages (CWPs). CWPs are pre-defined bundles of residential care, consisting of housing with different types of long-term care on different levels.