Sustainability of public finances and the rising costs of long term care in the Netherlands

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Abstract

Expenditures on long term care in the Netherlands have risen substantially over the last decades. Only a part of this growth can be attributed to ageing of the population. These rising costs are one of the main concerns for sustainability of future public finances. We define long term sustainability of public finances as a situation where future generations can benefit from the same public arrangements as current generations without having to raise taxes in the future. Given this definition, growth in long term care expenditures due to changing demographics should be taken into account in determining the sustainability gap. For growth due to other factors this is less clear. When rising expenditures are related to a better quality of health services per patient in the future, it makes sense to let future generations finance this care themselves. In this paper, we evaluate different alternatives to finance additional long term care growth on top of the demographic component. We analyze these alternatives using a macro model for the long term development of the Dutch economy. We focus on the consequences of different financing schemes for the redistribution of costs and benefits between birth-cohorts. We find relatively large intragenerational redistribution of lifetime net benefits for a pay-as-you-go system or an immediate one-time increase in taxes, while a cohort-specific savings system or an "elderly tax" have relatively small intergenerational consequences. We also find that all financing options have a negative effect on labour supply and private consumption.

Key words: sustainability of LTC expenditures, funding of LTC, Baumol's disease

1 Introduction

Growing long term care (LTC) expenditures are a major concern for sustainability of public finances in most Western countries. Population ageing is an important cause of this growth, but not the only one. Changes in the relative price of care (Baumol's disease) or increases in the level or quality of care also play a significant role (De Meijer et al., 2013). The effects on sustainability of these other factors should not be assessed in the same way as the effect of population ageing, since they also affect the distribution of (in-kind) benefits between members of different generations. In this study

we address the effect of LTC spending on the sustainability of Dutch government finances. We differentiate between LTC spending growth due to population ageing and additional growth due to other factors. We evaluate policy alternatives to finance additional growth in LTC focusing on the effect of these alternatives on the distribution of costs and benefits between generations.

Sustainability of public finances is often assessed using a generational accounting framework (Auerbach et al., 1998). Sustainability can be seen a situation in which future generations can benefit from the same level of collective arrangements as current generations without having to raise the tax rate in the future. The sustainability gap is defined as the instantaneous raise in tax rates or cut in government spending needed to attain sustainability. This number is often used in policy discussions. In these kinds of analyses in-kind benefits are attributed to specific age groups when possible. For instance, use of education will be concentrated at young ages, while health spending will be concentrated at older age groups. Thus the sustainability gap also shows the sensitivity of government finances to population ageing: rising costs of LTC due to growth of the (relative) number of older people are taken into account.

Growth in LTC spending due to other factors is generally not taken into account in the calculation of the sustainability gap (e.g. European Commission (2015)), and it is doubtful whether it should be. When rising expenditures are for instance related to a better quality of health services per patient in the future, it makes little sense to present these costs in terms of an instantaneous change in government finances that should be equally borne by current and future generations. Instead, future generations could finance this additional care themselves since they are also the ones that benefit form the better quality of care. Whether the same is true for spending growth due to an increase in the relative price of care is less clear. Generally the generational accounting is about distribution of value between generations, implying that changes in relative prices should not be accounted for. However, from a policy perspective the question whether this value results in a level of services that is compatible with the future standard of living could be an important question.

The role of additional health spending on top of demographics depends on the aims of the sustainability study. Often, sustainability studies are not only seen as an answer to the question whether current arrangements can be continued into the future, but also as a forecast of future government spending. In the case of health spending these two aims diverge: it is likely that health care arrangements will improve in the future, leading to additional LTC spending. Since the effects of health spending on future public finances is a major policy concerns it is important to also address the second aim. A way to do so is by scenario analysis. The alternative scenarios should not only include the additional growth in health spending, but also policy options to finance additional costs. In the context of generational accounting the important differentiation between these policy alternatives should be the way in which they redistribute costs and benefits of care between generations.

Although spending growth in curative care is also of great importance for government finances, the effect of population ageing and other factors on LTC spending might be even more pressing. The relationship between age and health care use seems to be stronger for LTC than for cure and much less tied to time to death (de Meijer et al., 2011). Also, productivity seems to grow less in LTC than in the curative sector (Chessa, 2012), making Baumol's disease an especially important issue for LTC. The level and comprehensiveness of collective LTC arrangements differs strongly between developed countries (Francesca et al., 2011). In fact, many countries are currently in the process of setting up these arrangements. The Netherlands has a relatively long tradition of provision of collective LTC through social insurance. It also has one of the most extensive collective

LTC arrangements. This not only makes LTC spending growth an especially relevant topic for the Netherlands, but also makes the effects for the Netherlands relevant to other countries in the process of setting up similar LTC arrangements.

In this study, we perform a scenario analysis. We analyze the effect of additional growth in elderly care expenditures on top of the effect of population ageing. Our baseline scenario is based on the assumption of constant arrangements and comes from the most recent CPB ageing study for the Netherlands (Smid et al., 2014). The main conclusion of that study is that Dutch public finances are sustainable: additional future spending due to ageing can be financed without increasing taxes. The inclusion of additional spending on LTC on top of demographics would lead to a sustainability gap. We differentiate in the way this gap is closed: by an instantaneous increase in the tax rate, through a pay-as-you-go increase in the tax rate, an increase in the tax rate for pensioners, or through a cohort-specific savings system.

2 Constant arrangements and elderly care

In fiscal studies the sustainability gap is calculated under the assumption that age-specific health care arrangements are constant. In the approach taken by Smid et al. (2014), but also for instance by the European Commission (2011), this is implemented by letting age-specific health care costs (corrected for health improvements) grow in line with average gross wages. An intuitive way of interpreting this assumption is that it guarantees the same number of medical personnel per patient in the future.

During the past decades, health spending in the Netherlands has grown faster than could have been expected based on this assumption of constant arrangements. Figure 1 shows collective spending on cure and long-term care in the Netherlands between 1972 and 2010. Table 1 shows that 5.8 percentage points of the total 7.4 percent annual nominal growth in LTC spending can be attributed to factors included in the assumption of constant arrangements: nominal wage growth, population size and composition, and health improvements. An additional 1.6 percentage point annual growth cannot be explained by constant arrangements. As can be seen in the figure, growth in LTC spending was strongest before 1983 and after 2000. From the second half of the 1980s up to the year 2000 a rather stringent budgeting of both cure and LTC was in place in the Netherlands (Van de Vijsel et al., 2011).

<< Insert Figure 1 here. >>
<< Insert Table 1 here. >>

When we want to interpret constant arrangements in terms of the level and quality of health care services that are delivered, we have to consider labour productivity. Figure 2 shows the growth of labour productivity (per hours worked) between 1972 and 2010 in the cure sector, the LTC sector, and the Dutch economy as a whole. Measurement of labour productivity in health care, and especially in LTC, is very difficult. In the government controlled or regulated health care market, market prices reflecting consumer value of different health care product are not available. Objective outcome measures are seldom available. This means that the quality of health care product has to be approximated based on the tariffs set for different products by the government. There is some evidence that this way of measuring productivity might underestimate quality improvements

in Dutch LTC provision[1]. Despite these measurement issues it is clear that labour productivity growth in LTC is considerably lower than in the economy as a whole, and also in the cure sector. After the loosening of the health care budget in 2000, there has been considerable growth in labour productivity within the cure sector, while productivity within LTC has remained more or less constant.

<< Insert Figure 2 here. >>

Labour productivity for the economy as a whole grew at an annual rate of 1.8 percent between 1972 and 2010. Labour productivity in LTC only grew at a rate of 0.2 percent per year. This shows the relevance of Baumol's disease in explaining LTC expenditure growth on top of constant arrangements; if labour productivity in LTC would have grown at the same rate as the rest of the economy, expenditure growth in line with constant arrangements would have resulted in roughly the same volume of LTC in 2010 as the actual volume [2]. This finding does not invalidate constant arrangements as the proper baseline scenario to assess equal distribution of net benefits between generations. Also, the decomposition is somewhat suggestive, since it depends strongly on the chosen observation period. However, it does show the need for an additional scenario for the purpose of making accurate prediction of LTC spending growth on government finances. The assumption of constant LTC arrangements implies that, when LTC productivity would also remain constant in the future, future generations would enjoy the same (age-specific) quality and volume of care as current generation. As an accurate prediction of spending growth, this assumption seems unlikely.

3 Financing alternatives

As we have argued, a scenario analysis with additional LTC growth should be combined with different policy options to finance this growth. We restrict the financing options that we consider to alternatives that shift premium payments between age groups or generations. We do not consider changes in the comprehensiveness of the insurance package or an increase in co-payments. When additional spending growth is privately financed, the inter- and intragenerational redistribution of public costs and benefits is not affected, since each individual finances his own health care use. Thus, although its importance as a policy instrument to restrict the *amount* of publicly financed care, an increase in privately financed care is not well suited to investigate within a generational accounting framework.

We consider four financing options. The first option is a pay-as-you-go (PAYG) system. The PAYG system resembles the way in which additional LTC expenditure growth is currently financed in the Netherlands. Additional expenses in a particular year are covered through an increase in the income-dependent health care premium in the same year. There is no explicit differentiation in the

[1] See Chessa (2012) for a description of the measurement method used by Statistics Netherlands. Smid et al. (2014) provide a further discussion on the measurement of productivity in LTC and compare different productivity estimates for the Netherlands

[2] Formally, the 1.6 percentage point growth on top of constant arrangements in Table 1 cannot be interpreted as growth in volume of LTC, since this additional spending growth can also be related to price changes in non-labour inputs. However, these only form a small part of LTC spending. Indeed Van der Horst et al. (2011) directly included relative prices of LTC in a similar decomposition exercise and found that between 1972 and 2020 volume of LTC grew at an annual rate of 1.9 percentage points on top of demographics and health.

premium increase based on health care use or age. Given the concentration of LTC spending at older ages, the PAYG system implies that a growth in LTC spending increases the income redistribution from the young to the old in a particular year. The second option is a "pensioner tax". In this system, additional spending is also financed through additional health care premiums in the same year, but the additional premiums are only levied on pension income. In contrast to the PAYG system, additional LTC spending does not induce redistribution of income from the working age population to the older population.

The third option is a savings fund. All additional heath spending in the future is financed through a one-time immediate increase in the health care premium rate. After this one-time increase, the premium rate is kept constant at its new level. Since the additional health care spending increases gradually over time, the immediate increase in the premium creates a surplus in the government budget in early years. This surplus is saved, through a decrease in government debt, to finance health spending in later years. As a result, the premium rate will be higher in the short run and lower in the long run compared to the PAYG system. The fourth option is a cohort-specific savings fund. In this case, each birth-cohort saves for its own additional health care spending. In contrast to a general savings fund, a cohort-specific fund does not affect the intergenerational redistribution since each cohort finances its own additional care use. We abstract here from the institutional specifics of such a system. One could imagine something like a mandatory savings fund comparable to the way second pillar pensions are organized in the Netherlands.

4 Methods

4.1 Generational accounting framework

We base our analysis of the effect of additional LTC spending on the most recent study of the CPB Netherlands Bureau for Economic Policy Analysis (Smid et al., 2014). In this study, long term sustainability of Dutch government finances is assessed using an overlapping generations model (Gamma) [3]. Here, we limit the discussion to a general outline of the model and a more detailed description of the role of health care expenditures . The model is described more extensively by Bettendorf et al. (2011) and Draper and Armstrong (2007). The core of the model is a generational accounting (GA) framework, where the benefits and burdens of public finances are assigned to 100 age cohorts (ages 0 to 99). Each cohort is represented by a single individual with the average characteristics of that particular cohort. The model includes responses by households and firms to changes in fiscal policy based on rational expectations and optimizing behavior.

Generational accounting, developed by Auerbach et al. (1991), has become a common method to assess long-term development in government finances (e.g. Auerbach et al. (1998); Bonin et al. (2014)). In generational accounting, costs and benefits of public policies are assigned to different generations. Discounted net benefits (benefits minus costs) during remaining life are compared between different birth cohorts. Starting point of the analysis are the net benefits by age group in the base year t. For the study of Smid et al. (2014), micro data is used to assign transfer schemes, most taxes, and a large part of in-kind benefits to the representative individual for each age group in the model (Barb and Bruil, shed). In kind benefits in the form of education and health care are assigned to specific age groups. The age profile for health care is discussed in more detail

[3] See Fehr and Kotlikoff (1996) and Kotlikoff (2002) for similar approaches.

below. Public expenditures that cannot be related to specific age groups (military expenditures, infrastructure) are distributed evenly over all individuals. Details on the age profiles of benefits and expenditures can be found in (Smid et al., 2014).

Based on the age profile of costs and benefits for the base year we can make projections for future years. Just as the European Commission (2011)) we assume that age related expenditures grow at the same rate as wages. Also following the European Commission (2011) we assume an annual nominal wage growth of 3.5 %, and an annual growth of real wages of 1.5 %. In the scenario analysis we will assume an additional 1 % annual growth for in kind benefits related to LTC fort the elderly. Other expenditures are indexed to GDP. GDP growth depends on productivity growth (set at 1.5 % per year), labour supply and investment. Labour supply and investment are endogenous as they depend on responses to government policy of households and firms. Baseline projections of age-specific labour supply are taken from Euwals et al. (2014). Tax rates are held constant at their base year level. Demographic projections up to 2060 are obtained from Statistics Netherlands.

The Dutch generational accounts are embedded in the overlapping generations model Gamma. The model describes a small open economy, calibrated for the Netherlands (Bettendorf et al., 2011). Each age cohort is represented by a single household. Households determine consumption level and leisure time based on maximizing lifetime utility, subject to a budget constraint. The cohort sizes follow age-specific population projections by Statistics Netherlands. Following the approach of (Yaari, 1965), wealth of deceased cohort members is assigned to the surviving cohort members (in other words, we assume cohort specific annuities). Each cohort fully consumes its own wealth, so there are no inheritances. Consumption profiles reflecting changes in household composition over the lifecycle are based on (Alessie and De Ree, 2009). Household labour supply depends on net wages and net pension accrual. Further specifics on the model, including behaviour of firms, are given by Draper and Armstrong (2007) and Bettendorf et al. (2011).

4.2 The sustainability gap

To quantify sustainability of government finances we can use the sustainability gap. We follow Auerbach et al. (1991) and define sustainability as the case in which the discounted stream of future primary surpluses on the government budget is equal to the current government debt, or

$$D_0 = \sum_{t=1}^{\infty} \frac{PS_t}{(1+r)^t}, \tag{1}$$

with D_0 is initial government debt, PS_t the primary surplus, and r the discount rate. We can also express this relationship in shares of GDP. Let d_0 be initial debt as a percentage of initial GDP, and ps_t the primary surplus as a percentage of GDP in year t, then we have

$$d_0 = \sum_{t=1}^{\infty} ps_t \left(\frac{1+g}{1+r}\right)^t, \tag{2}$$

with g annual GDP growth[4]. Given the actual value of the initial debt ($\hat{d_0}$) and the projections of future government finances ($\hat{ps_t}$), we can define the sustainability gap as the necessary yearly

[4]For simplicity we assume here that the growth rate is constant. In the actual calculations GDP growth is not constant.

improvement in the primary surplus needed for the equality in Equation 2 to hold. In other words, h is a change in the primary surplus (expressed as a percentage of GDP) such that

$$\hat{d}_0 = \sum_{t=1}^{\infty} (\hat{ps}_t + h) \left(\frac{1+g}{1+r} \right)^t . \tag{3}$$

4.3 The age profile of health care spending

The Netherlands have a very comprehensive collective financing system for health care. Almost all health spending is financed through collective health insurance. The Netherlands has three public arrangements to finance care. Curative health care is financed through a semi-private insurance scheme (ZVW). There is a mandatory " basic" insurance package that citizens can purchase from private insurers. As of 2015, LTC is financed through two arrangements. Relatively light forms of care, such as personal assistance, are financed through the social assistance act (WMO). The provision of this type of care is a responsibility of municipalities. They get a financial contribution out of the general means of the national government, depending on the composition of their population. Intensive forms of care for patients who are in permanent need of care (often in an institutional setting) are financed through a social insurance called the Long Term Care Act (WLZ). The premium for the WLZ is collected through the income tax and is a fixed percentage of taxable income in the first and second income brackets. A small part of the costs are covered by (income and wealth dependent) out-of-pocket payments. A different age profile for each of these three arrangements is included by Smid et al. (2014). Given its strong age gradient, we focus the scenario analysis solely an additional growth in spending for LTC within the WLZ.

The age profile of LTC costs within the WLZ is shown in Figure 3. This profile is obtained from the Dutch Cost of Illness Study for 2011 (RIVM, 2013). The WLZ has been introduced in 2015. Therefore, we have constructed its age profile based on the available age profile for the old social insurance (ABWZ) that contained both the care currently financed through the WLZ and WMO. The construction of the profile is based on age-specific information on use per subsector combined with the planned budget for each of these sub sectors [5].

We correct the age profile for improvements in population health. For this purpose we use the strong connection between health spending and time to death (Zweifel et al., 1999). We follow the approach taken by the European Commission (2011) and assume that a gain of an additional year of remaining life expectancy shifts the age profile downwards by half a year. Or more formally:

$$HC_{a,t} = \alpha \Delta LE_{a,t} HC_{a-1,t-1} + (1 - \alpha \Delta LE_{a,t}) HC_{a,t-1}, \tag{4}$$ [6]

with $HC_{a,t}$ is per capita health care expenditures for age a in year t, and $LE_{a,t}$ is remaining life expectancy at age a. Figure 3 shows the age profile of LTC spending in 2015 and in the baseline projection for 2060. To enable a direct comparison between the two profiles, we have scaled the 2060 values to 2010 productivity and price levels. As can be seen in Figure 3 the projected gain in remaining life expectancy up to 2060 shifts the age profile of LTC spending downwards.

<< Insert Figure 3 here. >>

[5] A more extensive description of the construction of the age profiles is provided on page 25 of (Smid et al., 2014).

[6] Under the condition that $0 \leq \Delta LE_{a,t} \leq 1$.

4.4 Implementation of the scenario analysis

As we have discussed, in the baseline projections age-specific health care spending (corrected for health improvements) grow in line with wage growth. This approach seems justified when we would be solely interested in sustainability as an equal distribution of net benefits (in value terms) between current and future generations. However, the decomposition in Table 1 shows that the baseline scenario is not well suited as a realistic projection of future health care spending and its effects on government finances. In the scenario analysis are concerned with this second question. More precisely we want to know how additional LTC spending growth, on top of the baseline scenario, affects government finances and the distribution of net benefits between generations. For this purpose we perform a scenario analysis based on a higher growth rate of LTC spending. In this alternative projection we increase the annual growth of LTC spending for the elderly (65 and older) by one percentage point.

Baseline projections are constructed using the method described above. For the period 2015-2023 the model is calibrated to match the midterm predictions made by Gelauff et al. (2014). The scenario analysis starts in 2018. From this period up to 2060 LTC expenditures grow with an additional 1 percent per year. Financing alternatives are also introduced from 2018 onwards.

We compare the effects of this additional LTC growth on government finances to the baseline scenario. For the baseline scenario, we use exactly sustainable government finances as starting point. This enables a more clear assessment of the sole effect of additional LTC spending on sustainability. In reality, the Dutch government finances are sustainable, and in fact have a small surplus (Smid et al., 2014). This means the sustainability gap h^* (defined as in Equation 3) is slightly negative. To construct the baseline scenario, we thus decrease the primary surplus in each year by h^* through an increase in non age-specific government so that Equation 3 holds.

4.5 Implementation of the financing alternatives

The alternative scenario can be used to show how increasing LTC spending affects sustainability. A presentation of the effects of this additional growth solely in terms of the stainability gap (as defined in Equation (3)) does not suffice. The sustainability gap is based on the implicit assumption that additional government spending should be borne equally between generations. In the baseline scenario this assumption is justified since government arrangements are also kept constant across generations. In the scenario analysis this assumption is less valid, since additional health care growth also affects the distribution of in kind benefits between generations. Therefore, we implement the four different financing alternatives discussed in Section 3.

The financing alternatives differ in the way they distribute the costs of the additional LTC spending between cohorts. In the PAYG system, we increase the income dependent LTC premium rate in each year t by a single number τ_t so that the total additional premium payments in year t are equal to total additional LTC spending in that same year. The increase in τ_t is equal for all age groups. In the pensioner tax system, the same procedure is used, but now only the premium for the age cohorts older than the pension age is increased. In the savings fund system, we increase the premium rate in all years by the same number τ such that government finances are exactly sustainable.

In the cohort-specific saving fund system each birth cohort saves for its own additional LTC expenditures. To implement this alternative, we make use of the fact that in Gamma each birth cohort is represented by a single individual with rational utility-maximizing behaviour. We introduce an

age- and time-specific increase in the premium rate $\tau_{t,a}$ such that the additional premium payments by age group a in year t exactly finance additional LTC costs for the same age group in the same year. As we will show this leads to very high additional premium payments at old age. Because individuals in the model fully anticipate these payments later in life, they smooth the effect of these payments on consumption evenly over their total remaining life by additional savings early in life. We use the additional savings to determine the build up of the cohort-specific savings funds.

Increases in the income dependent premium rate decreases households labour supply and private consumption. These decreases in turn negatively affect the tax base. These second order effects are financed through an overall increase in the income dependent tax rate. The level of this additional increase is determined iteratively using a numerical optimization routine.

5 Results

5.1 The effect of additional LTC growth on sustainability

When LTC spending for the elderly grow more than based on constant arrangements this has a negative effect on sustainability of Dutch government finances. Table 2 shows the effect for the alternative scenario with a 1 % additional growth in LTC spending up to 2060. In that case LTC spending in 2060 will be 4.6 % of GDP. This is 1.4 % of GDP higher than in the baseline scenario. The expenditure growth in the alternative scenario is in line with the projection made by Van der Horst et al. (2011) based on continuation of the trend in spending between 1973 and 2010 [7]. In the baseline scenario the Dutch government has a sustainability surplus of 0.4 % of GDP. The additional LTC spending would decrease this surplus by 1 % of GDP, resulting in a sustainability *gap* of 0.6 % of GDP.

<< Include Table 2 here >>

5.2 Effects of financing schemes by age group in 2060

Figure 4 shows the additional LTC costs and additional premium payments by age group in 2060 for each of the financing alternatives. The figure is again scaled to 2010 productivity and price levels. The straight line shows the additional LTC expenditures. Age-specific LTC expenditures are about 50 % higher than in the baseline scenario. The figure allows us to compare changes in net benefits between age groups in a particular year. In the PAYG system, young age groups clearly contribute more through additional premium payments than they receive in terms of additional LTC. On the other hand, older age groups have a net benefit. The pensioner tax results in an additional premium of about 2500 euros. This is considerably higher than the premium in the PAYG system. There is still a redistribution of net benefits between age groups: the relatively younger ages beyond the pension age are net contributors, while those older than 82 have a net benefit.

<< Include Figure 4 here >>

[7] The projections of Van der Horst et al. (2011) are somewhat higher than ours, but these were made prior to the considerable recent reforms in LTC. We did take these (intended) reforms into account in creating the age profile for the base year.

The savings fund results in premiums that are lower than those in the PAYG system for 2060. This is the result of the fact that in the savings fund a part of the additional spending in 2060 is financed through collective savings (an return on these savings in earlier years). These savings are made possible by directly increasing the premium rate in 2018 to its desired long term level.

As we have discussed above, the cohort-specific savings fund is implemented through an increase in the age-specific premiums to finance age-specific LTC spending in the same year. These age-specific premiums are shown in Figure 4 for 2060. The slight difference between the age-specific premiums and the age specific LTC costs is due to second order effect, and the financing of these effects through an increase in the overall tax rate. Additional premium payments are very substantial at older age. These payments are mostly financed through additional savings earlier in life. Figure 5 shows the development of the savings fund for individuals born in the year 2010. People start saving at the age of 20. Every year, they add savings to this fund. At the age of 87 the fund has grown to 28000 euros. In the following years the fund is used to finance additional health care costs.

<< Include Figure 5 here >>

5.3 Effects of financing alternatives on economic growth

Each of the four financing schemes closes the sustainability gap of 1% of GDP caused by the additional increase in LTC spending. Here, we discuss how each of the schemes affects public finances in particular years and how it affects economic growth. Table 3 shows these effects. In the savings fund scheme, the health care tariff is immediately raised with 1.7 % of GDP in 2018. The additional income raised in other years (2040 and 2060 are shown in the table) is also 1.7 of % GDP. In the PAYG system, the premium is gradually increased each year to match the gradual additional increase in LTC spending. The additional premium is 0.1 % of GDP in 2014 and 2.4 % GDP in 2060. We again see here that the premium in later years is lower in the savings fund scheme compared to the PAYG scheme, since the savings fund scheme finances part of the costs in later years through saving out of higher premium income in earlier years. Since both financing alternatives raise the income dependent premium rate they both have a negative effect on labour participation and GDP. In case of the savings fund this effect is already substantial in 2018, while in the PAYG system these effects only appear gradually over time, but are stronger than in the savings fund scheme for the later years. Both alternatives also affect private consumption, resulting in a negative effect on government revenues out of consumption tax.

In the other two funding options, the pensioners tax and the cohort-specific savings fund, additional annual government revenues are more or less in line with additional LTC spending. Therefore, effects on GDP growth also appear gradually over time. These effects are somewhat smaller than in the PAYG system, since premiums are levied on individuals past the retirement age. Labour participation decisions are still affected through the higher tax rate on pension income, but because of discounting these effects are smaller than in case of a direct tax on labour income.

5.4 Effects on intergenerational redistribution

Figure 4 shows how the financing schemes affect the redistribution of net benefits between age groups in a particular year. Perhaps more important from a generational accounting perspective

is the way in which the financing alternatives affect redistribution of lifetime net benefits between birth cohorts. Figure 6 shows the joint effect of the additional LTC spending and the particular way of financing on net benefits by birth cohort. The figure shows the difference in net benefits compared to the baseline. Since the additional benefits in term of additional LTC spending are the same for each financing alternative, the differences in net benefits between the alternatives are solely caused by differences in the distribution of costs (premium payments).

The gradual increase in health care premiums in the PAYG system leads to additional net benefits for the cohorts born before 2000. The net benefit of younger birth cohorts is negatively affected by the PAYG system. The oldest cohorts have to pay relatively little additional premiums, while they do benefit from extra LTC. For the oldest old additional benefits are small since they will only live through the first couple of years of additional LTC growth. The younger a cohort is, the more it will enjoy the additional LTC spending growth over a longer period of time. The net benefits are highest for the cohort born in 1968. This cohort relatively benefits a lot from additional LTC spending, while they contribute relatively little in additional premiums. Cohorts born after 1968 also benefit from sustained LTC spending growth but they also contribute more decreasing the net benefits. Net benefits are negative for the youngest and not yet born cohorts due to discounting: they contribute premiums relatively early in life, while they only receive benefits at the end of life.

The pattern of the net benefits in the savings fund system has a similar shape as the PAYG system, but the redistribution between birth cohorts is smaller: old cohorts have a smaller net benefit and young cohorts have smaller net costs. This is due to the immediate increase in the premium rate in 1968: older cohorts are also confronted with this increase and thus have to contribute more. The same effect also shift the pattern to the right: the peak in net benefits is already reached for the birth cohort of 1960, while cohorts born after 1980 are already confronted with negative net benefits. Due to the lower long term premium rate (financed through savings in earlier years) the negative effects for future cohorts is smaller than in the PAYG system.

The pensioner tax scheme leads to relatively little redistribution between birth cohorts, because additional payments are more closely related to additional benefits. Additional LTC spending increases benefits at older ages, and premiums are also only levied at older ages. The remaining redistribution of net benefits is due to fact that the oldest old benefit relatively most from an increase in LTC spending (given the exponential age pattern of LTC), while they share the burden of the financing of these costs with the younger old. This causes a peak in net befits for the cohort born in 1940. Cohorts born between 1960 and 1980 benefit the least: they still have to reach the pension age, which means that they will have to pay additional premiums over their full remaining lifetime after retirement. The youngest cohorts have a small net benefit. This is due to the way we have implemented the premium increase: the premium rate is increased gradually each year by the same amount, while the actual increase in costs is not completely linear. This means that current birth cohorts pay a little more premium than necessary, while the oldest pay a little less.

The cohort-specific savings fund does not lead to redistribution in net benefits between birth cohorts, since each cohort pays for its own additional LTC use. The small redistribution of net benefits shown in the figure is due to the additional gradual increase in income tax rate that we have used to finance the negative effects on income tax (through lower labour participation) and consumption tax revenues. In the other schemes these effects are also present (as shown in Table 3) and financed in the same way. The patterns in Figure 4 are thus the net effects of the financing schemes plus the additional financing of the decrease in revenues.

6 Discussion

In this study we have addressed the effect of LTC spending growth on the sustainability on Dutch government finances. We have argued that a distinction should be made between the effect of spending growth due to the ageing of the population and growth due to other factors. It seems useful to include the effect of population ageing in the calculation for the sustainability gap and present it as a burden that should be shared equally between current and future generations. For the effect of other factors that also affect the volume and quality of care provided to different generations, this seems less sensible. Therefore, we have analyzed the effect of additional LTC spending growth in combination with four different policy options that differ in the way they distribute the burden of this addition LTC spending between generations.

Between 1973 and 2010 nominal LTC spending in the Netherlands grew at an annual rate of 7.4%. 5.8 percentage points of this growth can be attributed to ageing of the population (controlling for health improvements and nominal wage growth). The remaining 1.6 % growth was due to other factors. Labour productivity in LTC appears to have been more or less constant during this period. Therefore, it seems likely that also in the future a growth of LTC spending in line with constant arrangements (wages plus demographics) would imply no change in the volume and quality of care provided per patient. Given the developments in the past it is very likely that LTC spending will be stronger also in the future.

We have compared the effects of an additional 1% growth in LTC spending up to 2060 to a baseline scenario where LTC spending grows in line with demographics and wages. The additional growth has a negative effect of 1% of GDP on the sustainability gap. We have introduced four ways of financing this gap: a pay-as-you-go (PAYS) system, a pensioner tax, a savings fund, and a cohort-specific savings funds. The results contain two important messages for policy makers. The first is that there is no objectively best way to present or finance the effect of additional LTC growth on financial sustainability. The sustainability gap makes an implicit assumption about the way the burden of additional LTC spending is shared between generations. The four financing schemes make the financial burden borne by each generation more explicit. Each scheme leads to a different distribution of net benefits between birth cohorts.

The PAYG system and the savings fund lead to the most substantial redistribution of lifetime net benefits between generations: most current generations benefit while the younger and future generations have to contribute more. However, these two systems do lead to the most equal distribution of premium payments between age groups in a *particular year*. The pensioner tax, on the other hand, would lead to only small redistributions in net benefits, but would imply very substantial increases in the annual premium payments by the elderly. The cohort-specific savings fund and the pensioner tax lead to almost the same, relatively small, total amount of redistribution of lifetime net benefits between generations, but the way the benefits are distributed between generations differs considerably.

The second message is that economic effects, caused by behavioural responses to policy changes, should be taken into account when considering different financing alternatives. Since all alternatives we have considered raise the income dependent premium rate, they all lead to a negative effect on labour supply. However, they differ in the severity and timing of this effect. Direct substantial increases of the premium rate, such as in the savings fund, lead to more negative economic effects in the short term than a gradual increase in the premium rate, but to smaller effects in later years. The pensioner tax affects labour supply because it taxes pension income, but due to discounting the

effects are smaller than in case of a direct tax on labour income.

Policy makers should also take other aspects into account that are not included in our analysis. We have mainly been concerned with the way a given increase in LTC spending can be financed. We have not considered policy options to contain spending growth through changes in the comprehensiveness of the insurance package or increase in co-payments. We have also ignored the (ex-ante) distribution of LTC costs within cohorts. An important aspect of collective LTC arrangements is that they provide protection against very substantial financial risks. From earlier studies, we know that the distribution of lifetime LTC costs is so skewed that financing through individual savings is not a realistic policy option (Van Ewijk et al., 2013). This means that the cohort-specific savings system would need to be based on collective risk sharing between members of the same cohort. However, risk is not only an issue at the individual level, but also plays a role at the cohort level. In a cohort-based system, unforeseen changes in the costs of LTC have to be financed by each individual cohort itself. This decreases the value of the intergenerational insurance (Bovenberg and Van Ewijk, 2012).

7 Tables and Figures

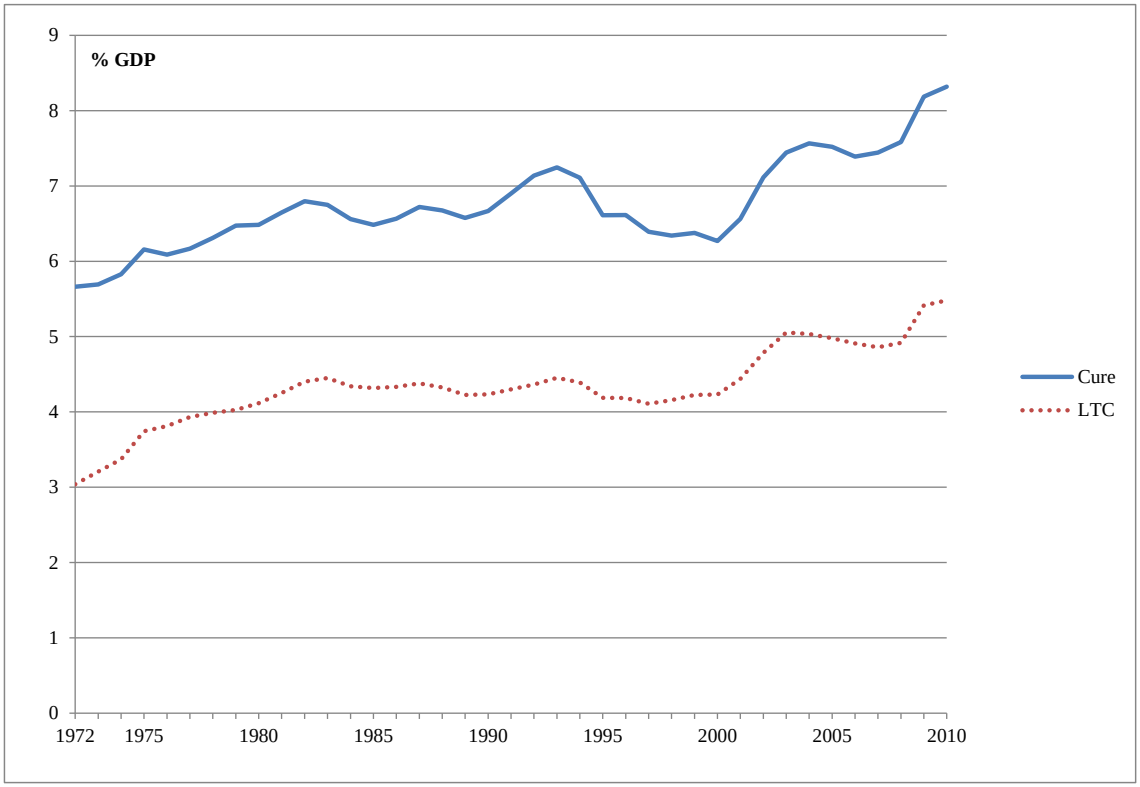

Figure 1: Health care expenditures in the Netherlands (% GDP), 1972-2010. (Source: Statistics Netherlands)

Table 1: Decomposition of the growth in health care expenditures, 1973-2010. (Source: constructed by Smid et al. (2014) based on data of Statistics Netherlands)

	Total	Care	Cure
	% per year		
Nominal growth (a)	7.1	7.4	7.0
Growth under constant arrangements (b)	5.6	5.8	5.3
nominal wage growth	4.5	4.5	4.5
population size and composition	1.3	1.9	0.9
health	-0.2	-0.6	-0.1
Growth above constant arrangements (a-b)	1.5	1.6	1.7

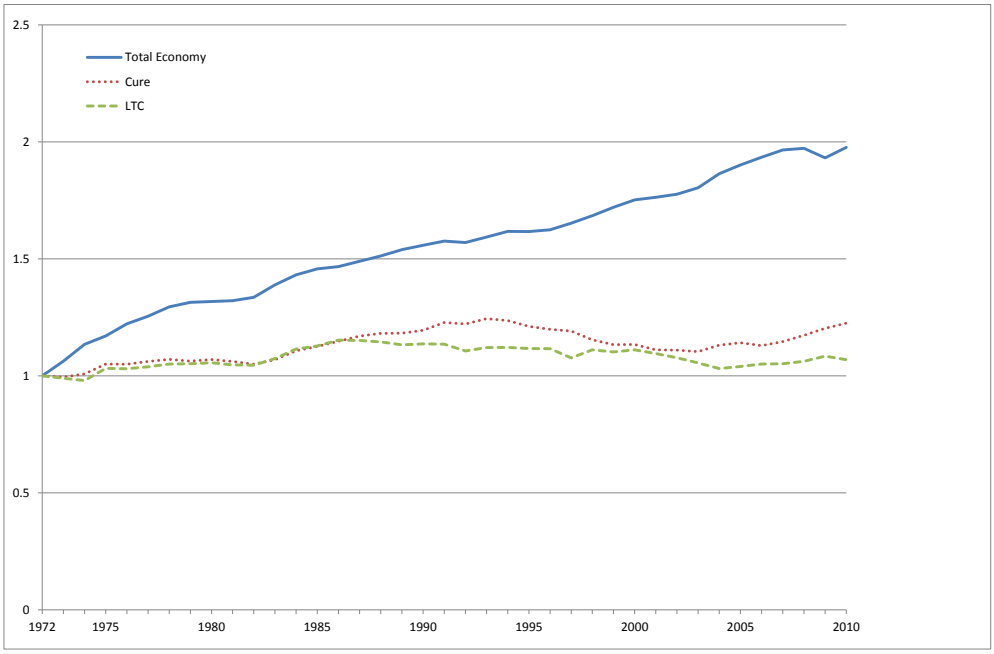

Figure 2: Index of labour productivity (in hours), 1985-2012. (Source: National Accounts, Statistics Netherlands)

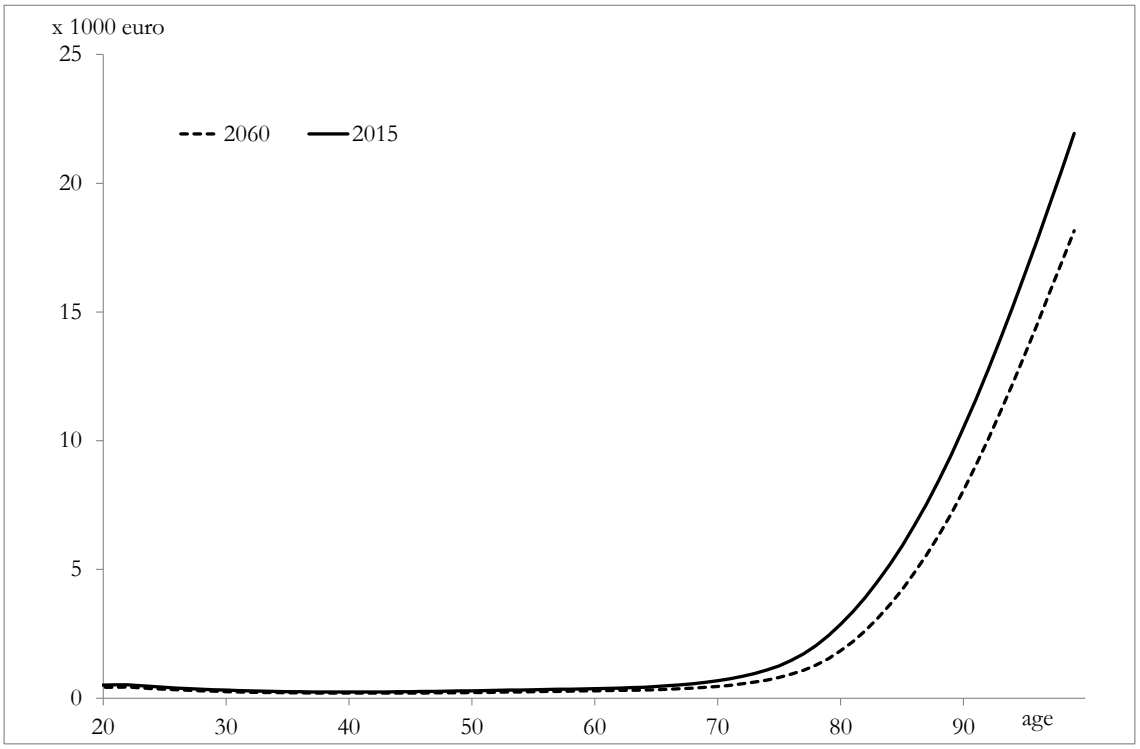

Figure 3: Age profile of long term care costs (WLZ) in 2015 and 2060 (in real terms). (Source: constructed by Smid et al. (2014) based on data from RIVM (2013))

Table 2: The effect of a 1 percentage point additional annual LTC growth

	2060 change (% GDP)
Public finance	
Government expenditures (excluding interest) (a)	1.4
old age pension	0.0
health care	1.4
Government revenues (b)	0.0
income tax	0.0
indirect tax	0.0
Primary surplus (b)-(a)	-1.4
EMU balance	-2.8
Sustainability	
Effect on sustainability gap	-1.0

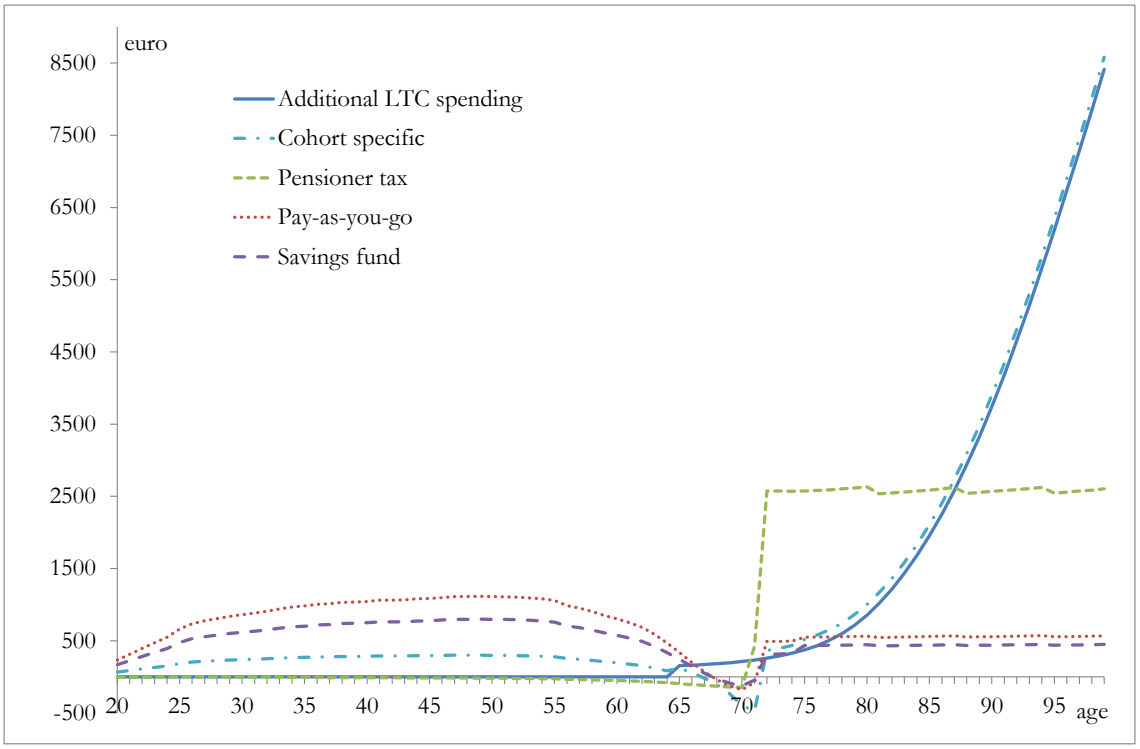

Figure 4: Additional growth of LTC spending by 1% per year. Age profile of additional expenditures and financing in 2060 (in real terms). [8]

[8]The labour participation of people older than 60 gradually decreases by age. However, they don't receive pensions until the age of 71.5 In the model we assume that individuals finance their consumption during the years in between out of their private savings. As a result these age groups pay a relative small amount of income taxes. This explains the decreasing payments between the ages 60 and 72.

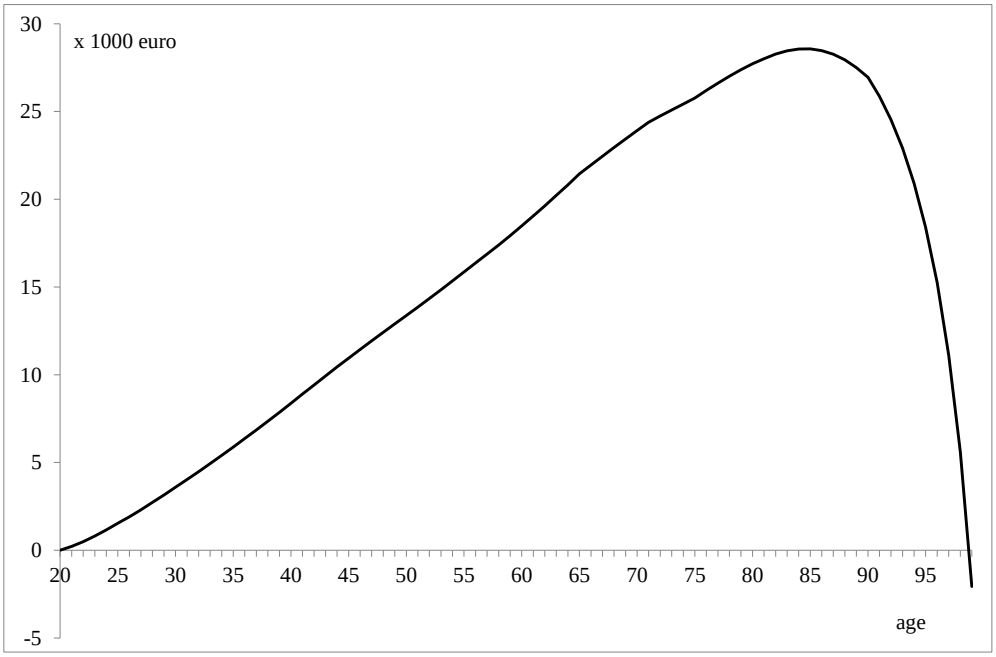

Figure 5: Build up of the cohort-specific savings fund over life for the cohort born in 2010

Table 3: Effects of financing additional LTC growth for different financing alternatives

	Savings fund			PAYG			Pensioner tax			Cohort specific		
	2018	2040	2060	2018	2040	2060	2018	2040	2060	2018	2040	2060
	Change (% GDP)											
Public finance												
Government expenditures (excluding interest) (a)	0.5	1	1.8	0.1	0.8	1.9	0.3	0.8	1.7	0.3	0.8	1.8
old age pension	0.1	0.1	0.1	0	0	0.1	0	0	0	0	0	0.1
health care	0.1	0.7	1.6	0	0.6	1.6	0.1	0.6	1.5	0.1	0.7	1.6
Government revenues (b)	1.3	1.5	1.4	-0.1	0.9	2.1	-0.3	1	1.7	-0.3	0.8	2
income tax	1.7	1.8	1.7	0.1	1.1	2.4	0.2	1.4	2	0.1	1.1	2.3
indirect tax	-0.4	-0.3	-0.3	-0.1	-0.2	-0.3	-0.4	-0.3	-0.3	-0.4	-0.3	-0.3
Primary surplus (b)-(a)	0.9	0.5	-0.4	-0.2	0.1	0.2	-0.6	0.2	0.1	-0.5	-0.1	0.2
EMU balance	0.8	1.5	1	-0.2	0	0.2	-0.6	-0.1	-0.1	-0.5	-0.5	-0.3
	Change (%)											
Economic effects												
GDP	-0.4	-0.7	-0.7	0	-0.4	-0.8	-0.1	-0.2	-0.3	-0.1	-0.3	-0.6
Employment (years)	-0.7	-0.7	-0.7	0	-0.4	-0.9	-0.2	-0.3	-0.3	-0.1	-0.3	-0.6
Private consumption	-3.8	-3.6	-3.6	-1.5	-2.4	-3.6	-4.9	-3.6	-3	-4.1	-3.3	-3.3

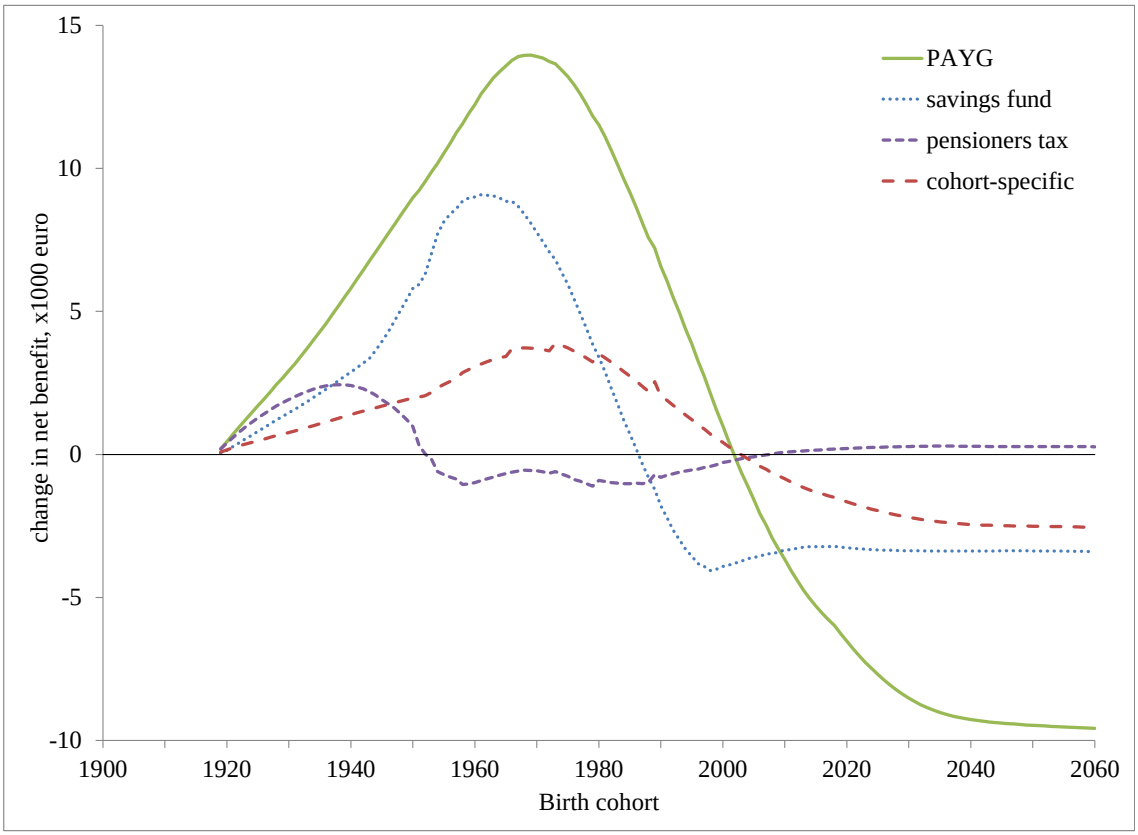

Figure 6: Change in net benefits by birth cohort as a result of an additional annual growth of elderly care spending of 1 % under different financing alternatives.

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