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A PIGGY BANK FOR HEALTHCARE

Why the health system needs old-age
reserve funds

Kristian Niemietz
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Contents

About the author	06
Summary	08
Introduction	11
UK healthcare spending: the current situation	15
The demographic context	20
The effect of ageing on healthcare costs	23
Prefunding: the theory	26
Prefunded healthcare: the literature	30
Prefunded healthcare: two real-world examples	33
A transition to a prefunded health system	37
Conclusion	40
References	42

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Summary

- Healthcare spending as a proportion of GDP has almost doubled since 1990, from just over 5 per cent to almost 10 per cent now. With differences in timing and magnitude, virtually all developed countries have experienced a similar long-term trend.
- Healthcare costs rise exponentially in old age. Healthcare costs per capita are relatively stable during, roughly, the first five decades of life. But they then double over the next two decades, and double again over the following decade. The healthcare costs of people over the age of 85 are more than five times as high as the healthcare costs of young and middle-aged people. This means that most healthcare spending represents a transfer from the working-age generation to the retired generation.
- The combination of rising life expectancy and low birth rates therefore represents a demographic pincer movement for the health system. The ratio of people of retirement age to people of working age currently stands at 28 to 100. This is forecast to rise to 47 to 100 by 2064. In the same period, the share of people aged 85 and over is forecast to rise from 4 for every 100 people of working age to 13 per 100.
- The Office for Budget Responsibility (OBR) predicts only modest increases in NHS spending as a proportion of GDP, but this forecast is predicated on the heroic assumption that the NHS is going to double its long-term productivity growth rate. The OBR does not say where this sudden productivity revolution is supposed to come from, but admits that its estimate is highly sensitive to assumptions about productivity, and that the increase in costs would be vastly greater if productivity growth fails to accelerate.

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- The basic problem is that the NHS (like most healthcare systems) is financed on a pay-as-you-go basis: all current expenditure is paid out of current revenue; the system never builds up any reserves. The alternative would be a prefunded system that builds up old-age reserves (comparable to pension funds) for people of working age, and then draws upon them when people retire. In such a system, population ageing would be much less of a problem, because as the number of elderly people grows, the reserves accumulated in the old-age funds would grow alongside.
 - Prefunding has a number of theoretical advantages. Old-age funds would earn a rate of return. The rate of savings and investment would increase, which would, in turn, increase the economy's capital stock, its productivity and, indirectly, wage levels. A prefunded system would also have a more diversified funding base, which would decrease the risk of sudden, erratic changes in healthcare spending. Perhaps most importantly, it would improve the quality of decision-making. In a prefunded system, decisions about future spending would be felt today, because we would have to start building up the reserves today. This means that even a short-sighted government could be forced to act *as if* they were far-sighted.
 - The case for prefunding is well explored in the economic literature, and there are a number of interesting proposals for moving towards a fully or partially prefunded health system. These proposals have been developed in the context of very different healthcare systems (namely the Canadian, the American and the German system), which shows that virtually any type of system could be run on a prefunded basis.
 - While there is no shortage of theoretical literature, real-world examples of prefunded healthcare are rare. The two closest things are the Singaporean 'Medisave' system and the German PKV (sub-) system. The former is a system of compulsory savings for medical expenses, based on individual Medical Savings Accounts (MSAs). As Singaporeans put money into their MSAs throughout their working life, their account balance grows with age, until they start drawing them down in old age. They can bequeath the remainder to their heirs.
 - Germany, meanwhile, has two parallel health insurance systems, one of which is prefunded. Insurance companies in this branch of the system build up old-age reserves on behalf of their clients while they are of working age, and draw upon those reserves later, in order to smoothen insurance premiums over people's lifecycle. Taken together, insurers in this sub-system – which covers about 8 million people – have

accumulated old-age reserves worth nearly €190 billion, or more than €21,000 per client. Even if all revenue came to a complete standstill today, the PKV system could still keep going for another eight years by drawing upon those reserves. The PAYGO-financed branch of the system, in contrast, would immediately collapse.

- The NHS could begin to build up a similar old-age reserve fund. This would require a one-off increase in taxes, or spending cuts in the non-healthcare budget. But it would prevent steeper tax increases (or spending cuts) in the future. While the basic idea of prefunding is simple, a lot of details would need to be worked out first: this paper cannot do more than touch the surface. But at the moment, the idea of prefunding healthcare expenditure is not even part of our healthcare debate. It should be.

Introduction

Barely a month goes by without a news story about how something or other is going to 'bankrupt the NHS'. The culprits vary, depending on the political leanings of the source, and the moral panic of the day. In recent years, the blame for the NHS's impending financial collapse has been laid at a number of doorsteps, including obesity,¹ smoking,² alcohol,³ the Private Finance initiative (PFI),⁴ foreigners,⁵ a lack of foreigners,⁶ and new medicines.⁷

- 1 'Obesity could bankrupt NHS if left unchecked', *Guardian*, 17 September 2014. 'Diabetes could 'bankrupt the NHS' after 60% rise in number of cases, charity warns', *Independent*, 16 August 2015. 'Diabetes could 'bankrupt' the NHS', Channel 4 News, 17 August 2015. 'Diabetes 'threatens to bankrupt NHS': Treating obesity-linked illness already costs £10 billion a year', *Daily Mail*, 16 August 2016. 'Soaring diabetes "to bankrupt NHS"', *The Sun*, 16 August 2015. 'Diabetes is set to bankrupt the NHS with 1.2m adults affected', *Daily Mirror*, 16 August 2015. 'Huge rise in UK diabetes cases threatens to bankrupt NHS, charity warns', *Guardian*, 17 August 2015. 'Obesity has become 'a national threat' to the UK like terrorism', *Telegraph*, 11 December 2015.
- 2 'Smoking "costs the NHS billions"', BBC News, 6 October 2008. 'Smoking costs NHS £5bn a year', *Independent*, 9 June 2009. 'Smoking disease costs NHS £5bn', BBC News, 8 June 2009.
- 3 'Alcohol responsible for up to 70% of all A&E admissions as experts renew minimum unit price calls', *Daily Mirror*, 21 December 2015. 'Fewer people in hospital but alcohol harm still costs NHS £2.8bn a year', *Guardian*, 14 October 2014. 'NHS alcohol-related admissions near '10 million'', Sky News, 15 October 2014. '£3bn cost of alcohol to NHS every year', *Daily Telegraph*, 17 June 2009.
- 4 'To save the NHS, Labour must face the ugly truth of PFI debts', *New Statesman*, 10 July 2014. 'How PFI is crippling the NHS', *Guardian*, 29 June 2012. 'Hospitals 'may go bust because of botched Labour PFI deals'', *Daily Mail*, 30 October 2012.
- 5 'Health tourists cost UK taxpayers nearly £6 billion in eight years', *Daily Telegraph*, 5 April 2016. 'EU referendum: NHS short-changed to tune of £5.7bn over health tourism says Vote Leave', *International Business Times*, 5 April 2016. 'Top doctors blow whistle on EU health tourists who bleed NHS dry', *Daily Mail*, 31 January 2016. 'The great health tourist cover up: Bosses ignored whistleblowers who exposed foreigners' abuse of NHS while Ministers knew for two years but did NOTHING', *Daily Mail*, 10 August 2015.
- 6 'NHS needs EU employees to avoid collapse, says think tank', *Guardian*, 25 August 2016. 'Brexit impact fears as figures show one in 20 NHS workers are from the EU', BT News, 24 June 2016.
- 7 'Patients could suffer as drug costs threaten to bankrupt NHS', *The Scotsman*, 2 April 2016.

Sometimes, such stories contain a grain of truth. More often, they miss the point. They either focus on matters of expense that are quite trivial in the context of over £100 billion NHS budget, or they mistake gross costs for net costs,⁸ or they mistake a mere administrative problem for a structural cost driver.

A good example is the current obsession with the alleged cost of unhealthy lifestyles. Estimates of those costs implicitly assume that if people adopted healthier lifestyles, their lifetime healthcare costs would remain exactly the same, minus the treatment cost of lifestyle-related conditions. This is not true. If people lived healthier and thus longer lives, their chances of developing complex chronic conditions that require costly long-term management towards the end of their lives would increase. In aggregate terms, the costs associated with the latter more than outweigh the costs associated with unhealthy habits (Snowdon 2015). Longevity is expensive. Health improvements may have paid for themselves as long as they were associated with longer and more productive working lives, but now that they mainly extend time spent in retirement, they no longer do. Healthier lifestyles and the associated health gains may well be desirable in their own right, but they should not be presented as a way to save money.

A more recent example of a red herring is 'health tourism'. It is true that the treatment of overseas visitors costs the NHS about £367m per year, out of which it only recovers £73m (National Audit Office 2016). But contrary to the way the issue is often portrayed in the media,⁹ the typical 'health tourist' is not a poor person without health insurance. It is a visitor or temporary resident from the European Economic Area (EEA) or Switzerland,¹⁰ who enjoys comprehensive health insurance in their country of permanent residence. This means that in principle, it would be perfectly possible to recoup the cost via the European Health Insurance Card (EHIC) scheme. What stands in the way is merely an administrative failure to document, track and reclaim those costs.

8 For example, estimates of the 'cost of smoking' implicitly assume that if a smoker had never taken up the habit, their lifetime healthcare costs would have been exactly the same, minus the treatment cost of smoking-related conditions. However, by reducing life expectancy, smoking can actually decrease lifetime healthcare costs, and indeed does so in the aggregate (Snowdon 2015:21-28).

9 See, for example, 'If the NHS needs more money, why not collect from health tourists?', *Spectator*, 28 January 2017.

10 These people account for about 87 per cent of the non-recouped costs (based on National Audit Office 2016). Bearing in mind that the remaining 13 per cent will also include some insured Americans, Australians etc., this means that costs that are genuinely unrecoverable will be a very small proportion of the total.

The Private Finance Initiative (PFI) has also attracted a huge amount of negative media coverage.¹¹ PFI is a form of public–private partnership, under which private companies build and maintain new healthcare facilities, and then lease them back to the NHS for an annual fee. Criticism of these schemes is not unjustified: there is indeed evidence that many PFI schemes represent poor value for money when compared to more conventional financing methods (European Commission 2013: 32; Hurst and Williams 2012: 57). However, the NHS's building stock did experience a rapid expansion in the 2000s, and this would have cost money under *any* financing scheme. Critics seem to take issue with the fact that PFI payments usually go to private, for-profit companies. They are making a moral case, disguised as an economic case: since they consider the profit motive morally corrupt and illegitimate (at least in the health sector), they treat all PFI payments as a pure loss to the NHS. The relevant counterfactual to PFI, however, is not a scenario under which those new NHS facilities would have built themselves and maintained themselves for free. It is the financing methods that would otherwise have been chosen. These might well have been superior, but not so superior that the NHS's financial problems can be reduced to this.

The problem is that this constant exposure to warnings about the imminent bankruptcy of the NHS gives rise to a cry-wolf effect, a situation in which empirically well-founded warnings about the NHS's long-term financial sustainability are no longer given a hearing. At the same time, the various red herrings which dominate the debate distract us from the genuine cost drivers, and prevent us from discussing more effective policy responses. In particular, there is good evidence that what is really driving up healthcare costs is demographic changes, namely the combination of rising life expectancy and falling birth rates. This is neither news, nor is it a secret. We have known for a long time that these trends exist, and we know their implications for healthcare. But our healthcare debate and our healthcare policies do not reflect that. Measures such as sugar taxes and charges for foreign visitors are already well underway, but we are not even discussing ways to make the health system 'ageing-proof'.

11 'The PFI hospitals costing NHS £2bn every year', *Daily Telegraph*, 18 July 2015. 'Crippling PFI deals leave Britain £222bn in debt', *Independent*, 11 April 2015. 'Corbyn's right. PFI is an unaffordable mistake for the NHS', *Guardian*, 28 August 2015. 'To save the NHS, Labour must face the ugly truth of PFI debts', *New Statesman*, 10 July 2014. 'How PFI is crippling the NHS', *Guardian*, 29 June 2012. 'Counting the cost of PFI in the national health service', Channel Four News, 26 June 2012.

Population ageing finds it hard to compete with issues like the above-named ones for attention because it does not tap into a moral sentiment. Stories about health tourism, unhealthy lifestyles and rapacious corporations draining the NHS for a profit are ultimately stories about free-riding, about people taking advantage of the generosity and goodwill of others. Warnings about the impact of population ageing lack a moral dimension, and are therefore less gripping. It is the elephant in the room: we know that it is there, and we know that it is huge, but we nevertheless behave as if it were not there.

This paper will give an overview of the likely impact of population ageing on healthcare costs. It will also discuss a potential solution to this conundrum: prefunding, i.e. the building up of old-age reserves in the system. The increase in healthcare costs caused by population ageing is not just a possibility. It is a certainty. We know that it will happen. And we can begin to prepare for it, rather than wait for costs to spiral out of control. The NHS is currently set up as a fair-weather system. Prefunding would mean turning it into a system that saves for a rainy day. It would equip the NHS with a lock box today, so that it can cope with ageing-related cost increases tomorrow.

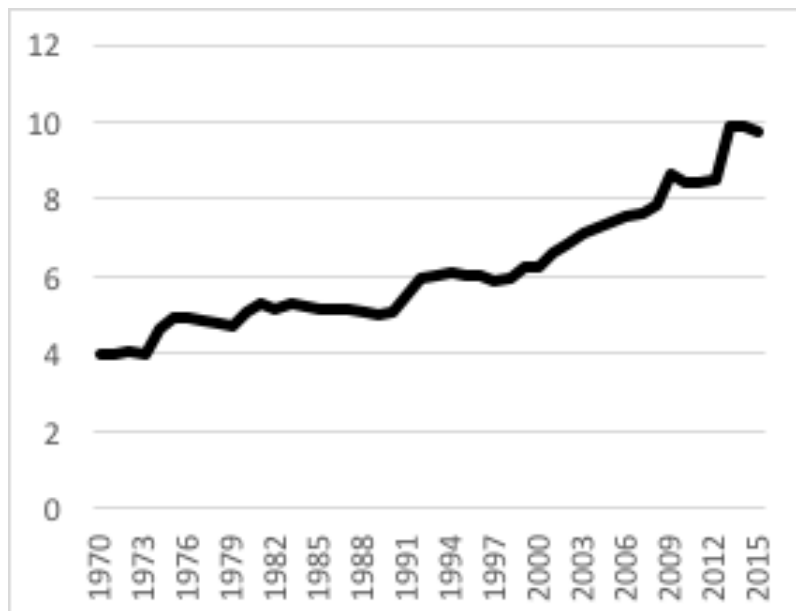
While the idea of a 'healthcare piggy bank' may sound simple enough, it does raise a number of tricky questions, not least the question of who gets to hold the key to unlock it. If it is accessible to the government of the day, one may as well not have it. As the economist Joseph Schumpeter once said, 'A dog is more likely to build up a sausage reserve than a democratic government is to build up a budget reserve'. The problem would be particularly severe in a nationalised healthcare system such as the NHS. This paper does not claim to be anywhere near exhaustive, but it will try to at least introduce the issue of prefunding into the UK healthcare debate.

UK healthcare spending: the current situation

Trend and level

UK healthcare spending has grown from about 4 per cent of GDP in the early 1970s to just under 10 per cent of GDP today (Figure 1).

Figure 1: Healthcare spending in the UK, per cent of GDP, 1970–2015

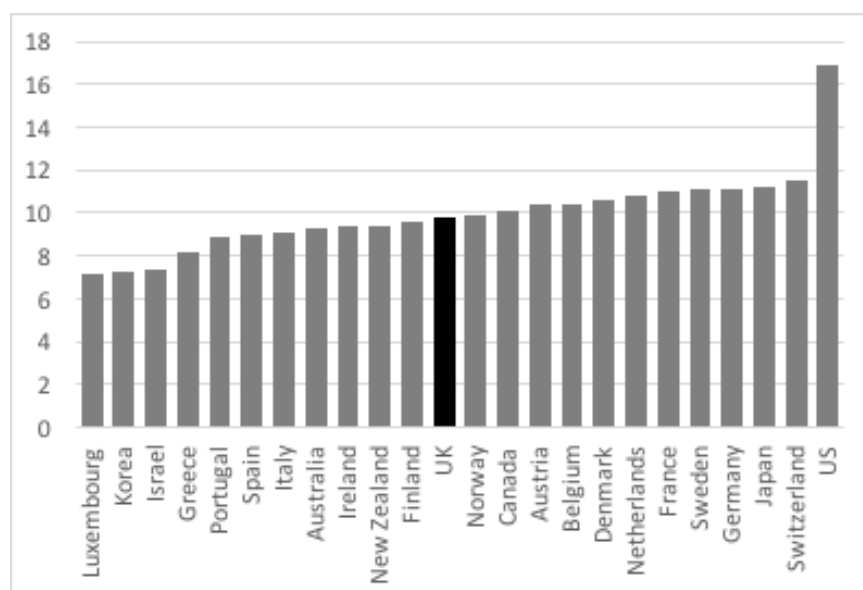


OECD.Stat (2017)

This trend is far from unusual by international standards. The proportion of GDP spent on healthcare has increased substantially over time in *all* OECD countries. As recently as in the late 1980s, there were only three countries in the world – the USA, Denmark and West Germany – which spent more than 8 per cent of GDP on healthcare. Today, hardly any developed country spends less than that.

The UK's current level of spending is not particularly high by international standards. Healthcare spending in most neighbouring countries exceeds 10 per cent of GDP, and healthcare spending in Sweden, Germany, Japan and Switzerland (not to mention the US, which is in a league of its own) exceeds 11 per cent (Figure 2).

Figure 2: Healthcare spending in OECD countries, per cent of GDP, 2015 or latest available year



OECD.Stat (2017)

But this must not be seen as an all-clear signal. In a single-payer system like the NHS, it is easier to cap healthcare spending than it is in a system of multiple insurers and autonomous providers, simply because the government directly controls the healthcare budget. In more decentralised systems, the health minister does not have such a powerful lever; they can only try to influence costs indirectly. But as we have seen in recent years, capping spending does not reduce the underlying demand for healthcare; it just means that more demand will go unsatisfied.

We are often told that something or other will ‘bankrupt the NHS’, but strictly speaking, *nothing* can bankrupt the NHS, unless the British state as a whole goes bankrupt. Demand for healthcare can grow explosively, but in theory, the government could always refuse to increase spending commensurately.

The NHS has always rationed healthcare. This could not be otherwise, and every other health system also does it in one way or another. The reason is simply that healthcare spending does not really have a saturation point. As John C. Goodman put it, ‘We could spend our entire gross domestic product on healthcare in useful ways. In fact we could probably spend the entire GDP on diagnostic tests alone – without ever treating real disease’ (quoted in Bartholomew 2015: 53). The challenge for decision-makers in any health system, then, is to work out at what point the ‘marginal pound’ would deliver greater welfare gains if it were spent on, for example, infrastructure, education, or private consumption rather than on healthcare. The rationing of healthcare is thus far from new. Demographic changes, which add to the demand for healthcare, will not literally ‘bankrupt the NHS’ – but they could lead to much more severe rationing.

In practice, this could entail a deterioration of standards, longer waiting times, greater barriers to access, and a narrower range of treatments being made available. This is one of the dangers we have in mind when we talk about the ‘financial sustainability’ of the NHS in this paper.

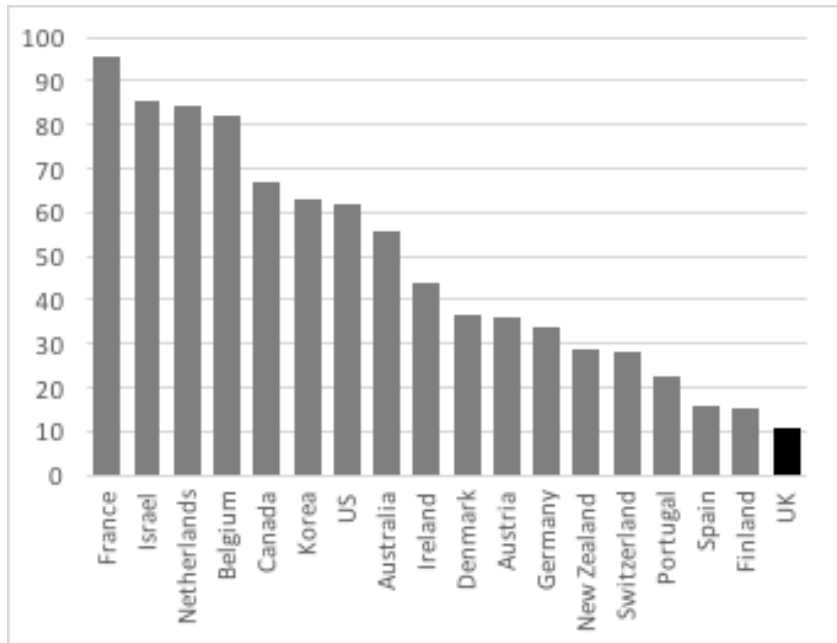
The role of private healthcare

In many health systems, the role of statutory healthcare is to define a common core package of healthcare services, and to make that core package available to everybody, regardless of ability to pay. But healthcare need not be limited to this: those who wish can go beyond, and purchase additional services privately.

In principle, this possibility exists in the UK as well, but the scope for mixing-and-matching is more limited, because the boundary between NHS care and private healthcare is more rigid (Niemietz 2016a: 48-50). In the UK, private healthcare is usually duplicative: it involves giving up an element of NHS care, and 'going private' instead. The very expression 'to go private' is already indicative of this rigid division. In the context of, for example, the Swiss or the Dutch healthcare system, it would usually not make sense to say that a patient 'goes private'. In these systems, patients often supplement or upgrade statutory healthcare privately, but they do not exit one healthcare system and enter a parallel one.

This rigid division raises the hurdle for accessing private healthcare, and as a result, the private health sector is much smaller than its counterpart in other countries. One indication of this is that only about one in ten UK citizens has private insurance, which is low even by the standards of single payer systems (see Figure 3).

Figure 3: Percentage of the population with private health insurance, 2015 or latest available year¹²



Based on OECD.Stat (2017)

Constraining the growth of the private sector in this way will lower total spending, but it will not make the system more sustainable. Private spending is not a problem as far as the sustainability of the public finances is concerned.

¹² This chart shows neither the overall size of the private health insurance (PHI) market in different countries, nor the overall size of the private healthcare sector. PHI can fulfil a range of very different functions, and this graph does not distinguish between them. In France, PHI coverage is virtually universal, but in most cases, these PHI policies only cover co-payments, not additional healthcare services. In the US, the PHI market is large because PHI provides comprehensive coverage for most working-age households. The figures for Israel, the Netherlands, Canada, South Korea, Australia, Denmark, Austria, Switzerland and Finland refer to pure supplementary insurance.

The demographic context

In the future, the healthcare costs of a relatively larger economically inactive population will have to be borne by a relatively smaller economically active population. The ratio of people of retirement age (65 and over) to people of working age (16-64) currently stands at 28 to 100. This 'old-age dependency ratio' is forecast to rise to 47 to 100 by 2064 (based on OBR 2015). In the same period, the share of people aged 85 and over is forecast to rise from 4 for every 100 people of working age to 13 per 100 (ibid).

This will make it necessary to either raise the retirement age, cut back healthcare entitlements, cut other parts of government spending, increase the system's efficiency, or raise the tax burden on the working-age population (or some combination of these). The problem with the first two options is that, ironically, the same population ageing process which makes these measures economically necessary also makes them politically less likely to happen. An increase in the old-age dependency ratio also means an increase in the political power of the 'grey vote' and thus in the ability of the retired generation to block policy changes unfavourable to them (Booth 2008).

Some increases in retirement age are already scheduled, but at least in previous decades, the retirement age has not increased at anything like the same pace as life expectancy. In the early 1970s, the average man spent around 12 years, and the average woman around 20 years, in retirement. This figure has since risen to around 17 years for men, and almost 25 years for women (OECD 2011: 28-33).

The third option is also economically possible. There are many areas of public spending that could do with a good trimming without affecting the core functions of government (see Booth 2011). The obstacle, again, is

the politics of it. The relatively modest reductions in the budget deficit since 2010 have already led to a huge political backlash, not least in the form of the ‘anti-austerity’ movement. In response, the government has already backtracked from its earlier fiscal consolidation agenda, abandoning its previous target of achieving a budget surplus by 2020.¹³ The political appetite for further spending cuts is, to say the least, limited. Given that the same ageing process which increases pressure on the healthcare system also increases pressure on the pension system and the social care sector, this appetite is unlikely to grow in the future. Fiscal retrenchment in other areas is possible, and from an economic perspective there are several fruits that are so low-hanging that they almost touch the ground.¹⁴ But it would require a profound change in the political mood.

There are certainly vast efficiency reserves in the system. In the OECD’s league tables of health system efficiency, the UK always comes out in the bottom third, despite its relatively low spending levels (Niemietz 2016a: 45–48).¹⁵ There is no one system that clearly emerges as ‘the most efficient’ from these rankings, and the systems that occupy the top places are not particularly similar to each other, which suggests that there is more than one way of organising healthcare efficiently. But it is striking that none of the top performers (e.g. Switzerland, Australia, South Korea and Japan) have systems that are similar to the NHS, and that the systems which are most similar to the NHS (e.g. Ireland and Finland) receive similarly low efficiency scores. This suggests that as long as the NHS remains as sacrosanct as it currently is, and as long as the idea of replacing it with an alternative system remains a social taboo, there is only so much that can be achieved in terms of efficiency improvements.

13 ‘George Osborne scraps 2020 budget surplus plan’, *Guardian*, 1 July 2016.

14 The most obvious example has to be Housing Benefit, as well as the cost of the Help to Buy programme, social housing subsidies and other programmes aimed at assisting people with the cost of housing. Spending on these items is largely driven by the inflated cost of housing in the UK, which is, in turn, driven by an overly restrictive land-use planning system. The cost of these programmes could therefore be slashed to a fraction of their current level by simply allowing far greater levels of housing development (see Niemietz 2016b). Another low-hanging fruit is the triple-lock of the state pension, combined with universal old-age benefits such as Winter Fuel Allowance.

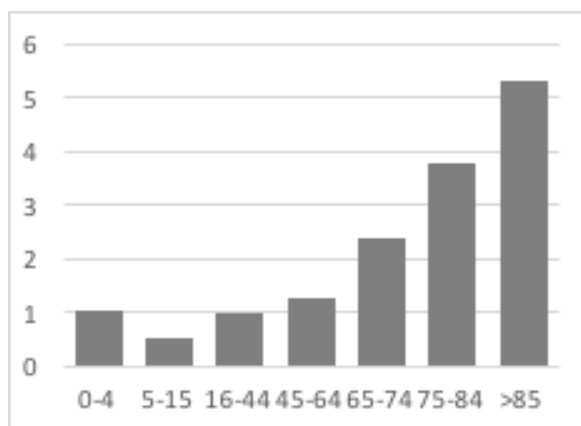
15 The Commonwealth Fund comes to a different conclusion, but that study’s methodology is problematic. ‘Efficiency’ can only sensibly be defined with respect to the relationship between inputs and outputs, but the Commonwealth Fund does not pay much attention to outputs. It is mostly a study about procedures and general system design features. It has one category which measures health outcomes (in which the UK ranks 10th out of 11), but the efficiency category does not draw upon it at all.

This leaves the possibility of raising taxes on the working-age population, which is probably the politically most feasible option. But it is an option which will eventually hit economic limits. There is evidence to suggest that the UK economy is not a million miles away from reaching its maximum taxing capacities (Smith 2007; Minford and Wang 2011; Smith 2011; Trabandt and Uhlig 2012).

The effect of ageing on healthcare costs

Healthcare costs rise systematically with age. They are relatively stable throughout, roughly, the first five decades of life, and then begin to rise at an exponential rate. Figure 4 shows a breakdown of healthcare costs by age. Per capita healthcare costs of those in the 16–44 years age bracket are taken as the baseline, and per capita healthcare costs of other age groups are then expressed as a multiple of this. It shows that healthcare costs per capita of those aged 75–84 are almost four times higher than the baseline level, and more than five times higher among those aged 85 years and above.

Figure 4: Healthcare costs per capita by age, as a multiple of those in the 16–44 age bracket



Based on Caley and Sidhu (2011)

With this in mind, it is clear that, other things equal, population ageing must drive up healthcare costs. The magnitude of the effect, however, is disputed. The relationship shown in the above graph is not stable over time, and other factors affecting healthcare spending are even less so.

A number of empirical studies have tried to disentangle the various factors behind the increase in healthcare spending in recent decades. They come to mixed results. Some suggest that ageing, in isolation, only accounts for around one tenth of the cost increase (OECD 2015: 32-33, 55-57). Others suggest that it accounts for a much larger share, up to around half.

Part of the reason for the disagreement is the existence of interaction effects and feedback loops. For example, many studies find that advances in medical technology have a bigger effect on healthcare costs than ageing – but then, advances in medical technology may not be age-neutral. If ageing increases the demand for the development and adoption of expensive medical technologies, then some of the cost increase that the models ascribe to technology could also be seen as an indirect effect of ageing. Ageing and technology are, to some extent, competing explanations, but they can also be complementary.

We are not in a position to judge which estimate is the most plausible or reliable. But it is safe to say that population ageing has been far from cost neutral, and that the magnitude of the effect has not been trivial.

These estimates refer to the recent past. What does this mean for the future? Caley and Sidhu (2011) estimate that ageing will add two thirds of a percentage point to the rate of healthcare inflation every year until 2031. This estimate refers to the *net* effect of ageing; it is already corrected for offsetting effects.¹⁶

The Office for Budget Responsibility forecasts only moderate increases in NHS spending as a proportion of GDP for the next half century. But this forecast is predicated on the problematic assumption that the NHS is about to double its long-term productivity growth rate (OBR 2015: 94-97). The OBR does not explain where this sudden productivity shock is supposed to come from. It acknowledges, however, that its forecast is highly sensitive to this assumption, and that if NHS productivity growth does not accelerate,

¹⁶ Ageing also has cost-decreasing effects. If average life expectancy in say 2030 is measurably higher than today, then a 75-year-old person in 2030 will typically be in a better state of health than a 75-year-old person today, thus requiring less healthcare.

NHS spending would rise to over 13 per cent of GDP over the next half century. Even this estimate would represent a slowdown, compared to the past cost-growth trajectory.

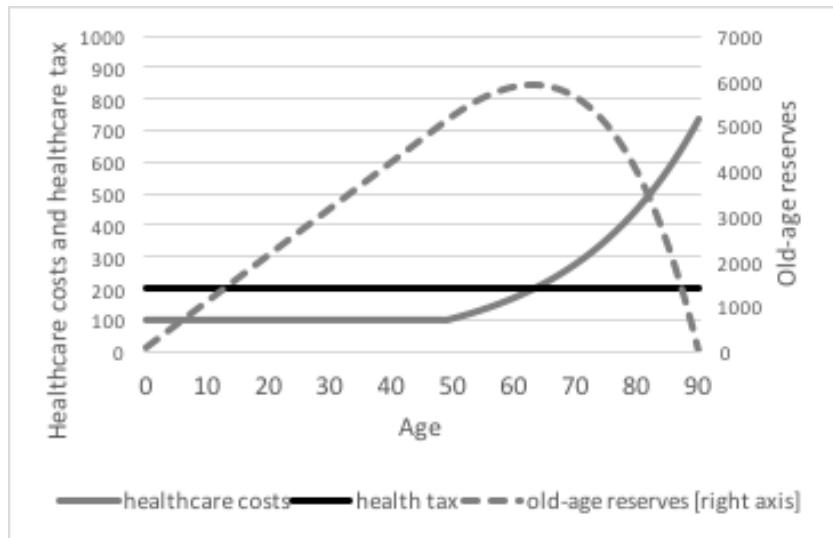
Prefunding: the theory

In the current system, most healthcare spending represents a transfer from the working-age generation to the retired generation. The health system is, in this sense, comparable to a pay-as-you-go-financed pension system. And like pensions, healthcare spending could also be prefunded. The health system could build up a capital stock (comparable to a pension fund) on behalf of people of working age and draw upon it when they reach old-age. In such a system, over the course of a lifetime, every cohort would pay for its own healthcare costs. There would be no systematic intergenerational redistribution.

This is illustrated, in highly stylised form, in Figure 5. The grey line shows the healthcare costs of a hypothetical person, who is assumed to live for 90 years, over the course of their lifetime. Costs remain constant, at 100 thalers per annum, during the first five decades of their life. From then on, they rise rapidly, exceeding 700 thalers per annum at the end of their life.

Our hypothetical health system is financed through an earmarked healthcare tax, and this person pays about 200 thalers per annum throughout their life. Until they reach age 64, they pay more into the health system than they take out. The difference is paid into an old-age reserve fund, the level of which is shown by the dotted line. From then on, their healthcare costs exceed their healthcare tax payments. The difference is taken out of the reserve fund. At the end of their life, the fund is depleted.

Figure 5: A stylised example of a prefunded healthcare system



Prefunding has several theoretical advantages. Firstly, the economic cost of taxation (the so-called 'deadweight loss') tends to rise more than linearly with the level of taxation: the economic cost of, for example, a 40 per cent tax rate is more than twice as large as the economic cost of a 20 per cent tax rate (e.g. Feldstein 1995). Prefunding can be one way to minimise the deadweight loss by smoothing tax rates over time.

Secondly, a prefunded system would improve the quality of economic decision-making, because it would lead to greater transparency about the costs and benefits of different courses of action. Suppose the government was pondering a policy change that would be modestly beneficial in the short run, but which would entail steep cost increases in the longer term.¹⁷ In the current system, there would be a strong temptation to ignore those future costs, even if perfectly predictable, and to implement that policy. In a prefunded system, incentives would be very different. If the future cost increase associated with a policy decision is predictable, then it would lead to an instant increase in taxes, because the healthcare financing agency would have to start building up the corresponding reserves now.

¹⁷ A realistic example would be the inclusion of expensive treatments that minimally extend people's lives in the standard health benefit package. The cost need not be huge initially, but in an ageing society, it can be expected to increase in the future.

The reverse would be true for a decision that would require some upfront investment, but that would eventually pay for itself.

In the current system, far-sighted decisions require far-sighted decision-makers. A prefunded system could induce even short-sighted decision-makers to act as *if* they were far-sighted, because in a prefunded system, future costs (or cost reductions) that are predictable are not *just* future costs (or cost reductions). They are already felt here and now, in the present. This could only improve the quality of the decisions made.

Thirdly, in a prefunded system, the capital accumulated to meet future healthcare needs would earn a rate of return, with interest and compound interest. PAYGO systems also generate an 'implicit' rate of return, but in developed countries with low birth rates, on average, the rate of return is almost guaranteed to be higher in a prefunded system (Booth and Niemietz 2014: 25-26).

Fourthly, other things equal, an economy with a prefunded system will be an economy with a higher rate of savings and investment, leading to a larger capital stock, higher productivity, and ultimately, higher wages (ibid.: 27-29). Prefunding is not a free lunch, of course. That additional investment would come at the expense of reduced current consumption. But it is a value-for-money lunch, which comes with drinks and side dishes included in the price.

Finally, prefunding can reduce the risk of sudden, erratic policy changes, especially with regard to healthcare funding. In recent decades, NHS spending has followed a stop-and-go pattern. In the late 1990s, healthcare spending was suddenly accelerated sharply. Between 1996/7 and 2009/10, the NHS budget increased, on average, by 5.6 per cent a year in real terms. After that, fiscal consolidation became a major policy focus, and the rate of real-term spending increases suddenly dropped to 0.5 per cent per annum (Appleby et al. 2015: 5-8). This makes financial planning difficult for NHS providers. And yet, as long as the NHS budget relies exclusively on current general taxation, such volatility is inevitable. In such a system, the healthcare budget will always depend on the political mood of the day.

A prefunded system would not, of course, provide perfectly predictable healthcare budgets either. After the 2008 financial crisis, pension funds around the world have taken at least a short-term hit. The healthcare funds of a hypothetical prefunded healthcare system would probably have been

invested more conservatively than pension funds, but they would not have been insulated from such a huge macroeconomic shock either. But at least, a prefunded system would allow international diversification, because the funds would not all have to be invested domestically. If the British economy were going through a prolonged slump, funds could be partly shifted to faster-growing parts of the world, whereas in the current system, the health system's finances are wholly dependent on the performance of the domestic economy.

Prefunding has other potential theoretical advantages, but these would depend on the exact specification of the system. The above arguments are fairly universal.

Prefunded healthcare: the literature

The economic case for prefunding healthcare is well established, and there are various proposals for moving towards a fully or partially prefunded health system. The details differ, depending on the authors' views and on the institutional characteristics of the health system they refer to. But the basics are transferable to the UK.

Feldstein (1999) proposes to prefund Medicare, the US health insurance programme for the retired. Since Medicare covers virtually all US residents above the age of 64, it is fair to say that if Medicare were prefunded, the US system as a whole could be thought of as prefunded.

The cost of Medicare is projected to rise to 7 per cent of GDP by 2070 under very optimistic assumptions. Feldstein estimates that this would require a 9 percentage point increase in payroll taxes when assuming no labour supply responses, and a 14 percentage point increase when assuming responses of a plausible magnitude. He also estimates that if a mandatory savings rate of just over 2 per cent of the payroll, equivalent to about 1 per cent of GDP, would be introduced straight away, it would be sufficient to build up an old-age reserve fund out of which the entire programme could be funded by 2070. The numbers will have changed in the meantime, and equivalent numbers for the UK would be very different anyway. But the example does show that prefunding healthcare costs pays off. A comparatively modest economic sacrifice today can obviate a large sacrifice tomorrow.

Cassel (2003) makes a similar point in the context of the German system, in which healthcare is financed through income-related health insurance contributions. Cassel draws on an especially pessimistic forecast scenario, under which health insurance contributions would increase to over 30 per cent of gross wages by 2040 (from around 14 per cent at the time the paper was written). He shows that if health insurance contributions were instead raised by 3.4 percentage points straight away and, if the extra revenue were invested in an old-age healthcare fund, no further increases would be necessary for the whole period.

This proposal would hardly be a vote-winner. It would be the single biggest hike in health insurance contributions since the system's inception in 1883, bigger than the cumulative increase that has taken place over the preceding quarter of a century (see, for example, Oberender et al. 2002). But the point of this exercise is to show that even within a worst-case scenario, quick steps towards prefunding can make a bad situation tolerable.

Cassell's model, unlike Feldstein's, is a model of *partial* prefunding: he accepts continued PAYGO financing for the baseline level of health expenditure. In his model, the purpose of prefunding is to cover *future* increments in healthcare spending above this level, including increments that are not caused by ageing.

Also in the context of the German system, Eekhoff et al. (2005) present a more radical proposal, which would move the whole system to a prefunded basis. In their model, all health insurers would be required to build up old-age reserves on behalf of their policyholders, in such a way that they can fully fund the higher healthcare costs associated with old-age by running down those reserves. However, for most current contributors, there is not enough time left to build up sufficient old-age reserves. Eekhoff et al. therefore suggest that the government should fill up insurers' old-age funds with government bonds in order to make up for the missing reserves. This would lead to a gigantic one-off increase in government debt, between €700 billion and €800 billion in the authors' estimate. But they also emphasise that this debt is not really new. The current system contains an implicit promise that today's young generation will one day enjoy at least the same standard of healthcare in old age that the retired generation currently enjoys. This promise represents an unfunded liability. The proposal of Eekhoff et al. would merely formalise it and put a number on it. It would convert implicit debt into explicit debt.

In Eekhoff et al.'s model, the responsibility to build up old-age reserves would fall to individual health insurers. Felder (2003) presents a competing proposal, under which this function would be centralised. In the German system, there is an institution called the *Risikostrukturausgleich* ('risk structure compensation scheme'), which redistributes premium revenue from insurers that cover a disproportionate share of 'good risks' to insurers which cover a disproportionate share of 'bad risks'.¹⁸ It does this on the basis of a number of variables, but the most important of these is age. RSA redistribution is, in large parts, intergenerational redistribution. Under Felder's model, the RSA would build up old-age reserves for the whole population. It would then disburse those funds to individual insurers, to help them with the healthcare costs of their older policyholders.

Stabile and Greenblatt (2010) propose a partial prefunding of the Canadian health system. They are not as convinced of the case for prefunding as Feldstein or Eekhoff et al., but they believe that *pharmaceutical* expenditure is particularly amenable to prefunding. Spending on prescription drugs, they argue, shows an especially steep age gradient and follows a more predictable trajectory than other components of healthcare spending. In Canada, several provinces run insurance programmes that cover the costs of prescription drugs for the elderly population. The authors propose to prefund these programmes via a (presumably one-off) hike in payroll taxes, with the proceeds earmarked to build up an old-age fund.

Also in the context of the Canadian system, Robson (2002) proposes to prefund a federal level programme which assists regional governments with the healthcare costs of their elderly populations.

These proposals differ in important respects. Some suggest full, others partial prefunding. Some suggest a single, national old-age healthcare fund, others advocate more decentralised solutions. In some proposals, old-age reserves are allocated to identifiable individuals, in others they are group reserves built up for an insurance pool. 'Prefunding' can mean many different things in practice. But even relatively simple model calculations show that prefunding is both feasible and sensible.

18 This is to prevent adverse selection ('cherry picking').

Prefunded healthcare: two real-world examples

Despite a strong theoretical case, real-world examples of prefunded healthcare are extremely rare. But two examples stand out: Singapore's 'Medisave' programme and Germany's PKV (sub-)system.

In Singapore, most routine healthcare costs are financed via a system of individual medical savings accounts (MSAs) (MoH 2017; Haseltine 2013). Under the Medisave programme, employees and self-employed people are required to pay between 8 per cent and 10.5 per cent of their incomes into a MSA, until they have accumulated a sum of S\$52,000 (≈£30,000). MSA savings can be drawn upon for specific, approved uses, subject to withdrawal limits. Medisave is coupled with an insurance programme (MediShield Life) which covers expensive treatments such as chemotherapy, and a means-tested safety net (Medifund). There are also various programmes to top up the Medisave accounts of low-earners, and 'object subsidies' for healthcare providers.

Medisave was not set up with the intention of creating a prefunded healthcare system, and MSAs are not specifically old-age reserve funds. But in practice, the vast majority of people will keep accumulating MSA savings over the course of their working lives (which is aided by strict drawdown rules), and gradually run them down in old age. Thus, MSAs will act *a lot like* old-age reserve funds, whether or not that is what they are meant to be. One could think of them as two separate funds in one, namely a short-term savings fund for recurrent expenses, and a long-term savings fund for old age. Singapore's health system is therefore partly prefunded. As the share of elderly people in Singapore's population increases, MSA funds are going to grow alongside.

In the Singaporean context, prefunding goes hand in hand with a 'de-pooling' of risks. The system does contain insurance protection and safety net mechanisms, but patients are expected to draw upon their own savings first. This involves a degree of personal responsibility for one's own healthcare costs which is currently unthinkable in a UK context. Patient surveys show that there is virtually unanimous support for the principle that healthcare should be completely free at the point of use, and opposition to even modest co-payments (Patients Association 2013).

In this respect, the German PKV system is probably a more relevant example, because it combines prefunding with a much greater degree of risk pooling. As a result of historical idiosyncrasies,¹⁹ Germany has two parallel health insurance systems. About 90 per cent of the population are covered by a social insurance system – called the GKV system – in which insurance premiums depend on income, not individual health risk. This is made possible by the aforementioned *Risikostrukturausgleich* (RSA) or 'risk structure compensation scheme'. Insurers can afford to accept high-risk groups without charging risk mark-ups, because transfers from the RSA compensate them for the additional costs associated with insuring high-risk groups. This is also the reason why insurers have no incentive to build up old-age reserves: as the average age of their insurance pool increases, transfers from the RSA increase commensurately.

Some insurers, however, operate outside of the RSA. They form a parallel insurance system, known as the PKV system,²⁰ which covers about 8.8 million people. PKV insurers are required to build up old-age reserves on behalf of their policyholders, and use them to smoothen premiums over people's lifecycle, in the way illustrated in Figure 5. Taken together, they have built up old-age reserves of €189 billion (PKV Verband 2016), or about €21,500 per capita. For comparison, their total expenditure is about

19 This split goes back all the way to the system's creation in 1883 (Oberender et al. 2002: 21-27). Health insurance, commercial and mutual, existed well before 1883, so the Bismarckian reforms did not create anything from scratch. They created a new, standardised set of rules (which became known as 'social insurance'), and subsumed most of the existing mutual insurance societies under it. In principle, private commercial insurers could also have been allowed to operate under this set of rules and, indeed, this is what happened later in countries that introduced similar systems. In Switzerland and the Netherlands, the German split into 'private insurance' and 'social insurance' does not exist. But due to Chancellor Otto von Bismarck's ideological aversion to private insurance, a strict separation between the two was maintained. The coverage of social insurance soon began to expand rapidly, until it eventually became almost synonymous with 'the healthcare system', but the residual system never went away.

20 PKV stands for *Private Krankenversicherung* (private health insurance).

€24.9 billion per year, or €2,800 per person. This means that even if all contributions suddenly came to a halt, the PKV system could still keep going for nearly another eight years, by using up its reserves. The GKV system, in contrast, would immediately collapse.

A comparison of these two systems shows, again, that ‘prefunding’ is a broad term, which can mean very different things in practice. In the Singaporean system, people’s (de facto) old-age reserves are their personal property, even if they cannot spend them entirely as they see fit. Singaporeans can directly access their MSA savings, they can transfer them to family members, and they can bequeath them to surviving dependents. The status of old-age reserves in the German PKV system is more complex. Although they are *allocated* to individuals, they are not, in a meaningful sense, individual property. Policyholders cannot directly access their old-age reserves; they could not, for example, tap into them in order to fund a treatment that is not covered by insurance. They could not bequeath them either, and until recently, reserves were not even portable between insurers: switching insurers would entail the loss of one’s old-age reserves. (A limited degree of portability has since been introduced.) They are probably best thought of as the collective property of the insurance pool (with the insurer acting as the custodian), although even as a group, the insured can only use them to smoothen premiums.

Both systems have their problems. Elderly Singaporeans often have to tap into their children’s MSAs, because their own funds are insufficient (Haseltine 2013: 47-48). Such transfers account for as much as one third of (MSA-mediated) spending of people above the age of 55. This may be partly a result of the system’s relative novelty (it takes decades to build up sufficient old-age funds), but whatever the reason, it does raise questions about the accessibility of care. It is also fair to say that as long as such a large proportion of the elderly’s spending represents intergenerational transfers, the system is not really prefunded.

The German PKV system does not have these problems. PKV insurers started building up old-age reserves in the 1930s (Schönfelder and Wild 2013: 7) and the system offers extensive risk-pooling and comprehensive protection. But it has other problems. Lifetime premium-smoothing does not always work: it is not uncommon for elderly PKV policyholders to experience sharp increases in premiums.

In both cases, though, the problems lie not with prefunding but with the way health risks are shared. In the Singaporean MSA system, risk-pooling only takes place within families. The German PKV system uses large risk pools, but premiums reflect individual health profiles, so unexpected changes in a person's health profile will lead to unexpected changes in their insurance premium. Problems arising from this cannot be attributed to prefunding. They must be attributed to the way these systems are financed more generally. Abandoning prefunding would not make them go away.²¹

21 A system of medical savings accounts is not *by definition* prefunded. We could imagine a variation of the Singaporean model in which MSA savings are only meant to cover current medical expenses, i.e. for the next few years. The savings rate would then have to increase with age. Whatever problems the Singaporean system may have, they would be worse if it were financed in that way. The same can be said about the German PKV system. Premiums would be even more volatile if the PKV did not build up old-age reserves.

A transition to a prefunded health system

The German PKV system has accumulated old-age reserves equivalent to more than seven times its total annual expenditure. If the NHS were to build up a comparable demographic cushion, it would require a fund of more than £700 billion. This would take several generations, and it would be uncharted territory: a transition from a PAYGO-financed healthcare system to a prefunded one has never been done anywhere. But countries have managed the more challenging transition from PAYGO-financed to prefunded pension systems (see, for example, Niemietz 2007), so there is no reason why this should not also be possible in healthcare.

While this is not absolutely essential, it would help if, first of all, the NHS were financed in a more direct and transparent way. An earmarked 'NHS tax', the revenue from which would go directly to the NHS, would be one way to do this. The NHS tax could be carved out of the existing income tax, which means that it would not be necessary to create an additional revenue collection bureaucracy, or indeed any additional paperwork.

The rate of the NHS tax could be set by the NHS itself, but it would have to be subject to parliamentary approval. The aim should be to keep this rate stable over time. This means setting it at a higher level than what is necessary to finance current health expenditure, which would entail either a tax increase or a cut in non-health government spending.

The surplus would be used to start building up an old-age reserve fund. Old-age funds would be pooled, but allocated to individuals. Around retirement age, each individual should have a fund allocated to them which is sufficient to cover all the additional expected healthcare costs associated with old age for the remainder of their lives. This is, of course, a long-term

goal. For the majority of today's working-age generation, it would be too late to build up sufficient reserves even if the transition started today. To bridge the gap, the government would have to fill up the old-age funds with government bonds, in order to compensate for the assets that we should have built up long ago but failed to build up.

Technically, this would lead to a one-off explosion in recorded government debt. But it is important to point out that this is not new debt. It is mainly a formalisation of debt-like promises that have already been made. Under the current implicit intergenerational contract, today's working age generation pay for the healthcare costs of the retired, under the expectation that tomorrow's working-age generation will provide them with (at least) the same standard of healthcare. This is a promise, not an enforceable right, but reneging on that promise would be extremely politically unpopular. This promise is government debt in all but name, and under the proposal made here it would become government debt including in name. Over time, the share of government debt in the NHS's old-age reserve fund would decrease, and the share of 'real' assets would increase.

While people would not be able to directly access their old-age funds, they would nonetheless be defined as private property. The NHS would act as the custodian, but it would *not* own the reserves. It would have to inform people regularly about the amount accumulated in their old-age funds, explain how those funds are invested, etc.

To the government, the funds would have to be untouchable. There would have to be the strictest constitutional safeguards possible, but ultimately, as long as we have a single-payer system (and thus, under pre-funding, a single-custodian system), no protection would be completely watertight. In a single-payer system, the healthcare financing agency cannot be completely separate from and completely independent of the government. The government will always see the assets accumulated in the old-age fund as, in some sense, 'theirs', and there will always be a temptation to access them in some way, and spend some of that money now.

There would be a similar danger of the government tinkering with the actuarial calculations. As explained above, a prefunded system would curtail a government's ability to make costly political promises today and let future governments pick up the tab. In a prefunded system, if the government makes promises today, the healthcare financing agency has to start building up the corresponding reserves today. But this would only be

true if the government cannot interfere with the way the required reserves are calculated and the savings rates are set. There will always be a temptation for the government of the day to manipulate such variables, in order to shift costs into the future.

Such risks would be far more acute in the UK than in the real-world examples described above. Singaporean MSA funds are private property. The Singaporean government cannot access them. German PKV insurers are private companies like any other. The government cannot access the reserves they hold, nor can it dictate their premiums or other business decisions.

It would be possible to prefund the NHS, but otherwise leave the current system as it is. A more promising solution, however, would be to move to a multi-payer system, in which the role of building up old-age reserves would be devolved to various competing health insurers and other healthcare financing agencies (Niemietz 2016a: 119-136). There are many good reasons for such a move, especially the fact that multi-payer systems tend to outperform the NHS and its closest relatives on a wide range of health outcome measures (ibid.: 26-48).

But such a change would require a fundamental shift in the political mood. It is not currently on the cards. However, in principle, prefunding can be achieved within any system, including the NHS as it is currently constituted.

Conclusion

This paper has presented the case for a prefunded healthcare system. Admittedly, it has raised more questions than it has provided answers. It is beyond its scope to provide estimates of the required NHS tax rate, of the required savings rate, of the rate of return that could be expected, of how long the transition would take, of how the funds would be invested, etc. A number of tricky questions have remained unaddressed, such as: how exactly would the funds be protected, both from government interference and from financial market risks? How exactly, and by whom exactly, would the NHS tax rate be set? How exactly, and by whom exactly, would the old-age savings rate be set? How would this system deal with an influx of elderly immigrants, who have not been here for long enough for the system to build up reserves on their behalf?

The point of the paper was to show that just because the NHS has always been financed on a pay-as-you-go basis, this does not mean that this is the only way of financing it. In principle, prefunding healthcare is both feasible and desirable. Moving to a prefunded system would diffuse the demographic time bomb. It would put the health system on a much more solid and sustainable footing. In a prefunded system, as the number of older people grows, the old-age fund would automatically grow alongside.

Moving to a prefunded system would not be a free lunch. It would require a tax hike, or reductions in public spending elsewhere. But it would prevent the need for even larger tax hikes (or spending cuts) in the future. The funds would be productively invested, increasing the economy's capital stock, and indirectly, wage levels. They would earn a rate of interest, and in time, compound interest. A prefunded system would also enable more sensible economic choices, because it would force even myopic governments to act as if they were far-sighted. This is because a prefunded

system would blur the distinction between 'future costs' and 'current costs'. The impact of policy choices that would raise future costs, even if that future is still far away, would be felt today. In a prefunded system, promises always have to be backed by reserves, and those reserves have to be built up well in advance.

The transition to a prefunded system would also force the government to formalise, and put a number on, the value of promises already made. Implicit debt would be converted into explicit debt. This would, most likely, lead to a shock, because it would reveal how indebted the UK government really is and how trivial the savings achieved under so-called 'austerity' policies really were. This could fundamentally alter the debate about the state of the public finances. This transparency shock alone would make the transition towards a prefunded system worthwhile.

References

- Appleby, J., Baird, B., Thompson, J. and Jabbal, J. (2015) *The NHS under the Coalition Government, Part 2: NHS Performance*. London: The King's Fund.
- Bartholomew, J. (2015) *The Welfare of Nations*. London: Biteback Publishing.
- Booth, P. (ed.) (2011) *Sharper Axes, Lower Taxes. Big Steps to a Smaller State*. London: Institute of Economic Affairs.
- Booth, P. (2008) The young held to ransom - a public choice analysis of the UK state pension system. *Economic Affairs* 28(1): 4-10.
- Booth, P. and Niemietz, K. (2014) Growing the UK Pension Pot: The case for privatisation. Discussion Paper 56. London: Institute of Economic Affairs.
- Caley, M. and Sidhu, K. (2011) Estimating the future healthcare costs of an aging population in the UK: expansion of morbidity and the need for preventative care. *Journal of Public Health* 33(1): 117-122.
- Cassel, D. (2003) Die Notwendigkeit ergänzender Altersreserven und höherer Rentner-Beiträge in der GKV. *Wirtschaftsdienst* 83(2): 75-80.
- Eekhoff, J., Raddatz, G. and Zimmermann, A. (2005) Privatversicherung für alle - Zukunftsmodell für das deutsche Gesundheitswesen. Argumente zur Marktwirtschaft und Politik No. 092. Berlin: Stiftung Marktwirtschaft.

European Commission (2013) Health and economics analysis for an evaluation of the public private partnerships in health care delivery across EU.

Felder, S. (2003) Kapitaldeckung in der gesetzlichen Krankenversicherung über den Risikostrukturausgleich. *Jahrbuch für Wirtschaftswissenschaften* 54(1): 60-72.

Felder, S. and Werblow, A. (2003) Swiss social health insurance: co-payments work. CESifo DICE Report 3/200343. Munich: CESifo Group.

Feldstein, M. (1999) Prefunding Medicare. Working Paper 6917. Cambridge MA: National Bureau of Economic Research.

Feldstein, M. (1995) Tax avoidance and the deadweight loss of the income tax. NBER Working Paper No. 5055. National Bureau of Economic Research.

Haseltine, W. (2013) Affordable excellence. The Singapore healthcare story. Washington DC: Brookings Institution Press.

Hurst, J. and Williams, S. (2012) Can NHS hospitals do more with less? Research report. London: Nuffield Trust.

Jourmard, I., André, C. and Nicq, C. (2010) Health care systems: Efficiency and institutions. OECD Economics Department Working Papers, No. 769. Paris: OECD.

Minford, P. and Wang, J. (2011) Public spending, taxation and economic growth – the evidence. In Booth, P. (ed.) *Sharper Axes, Lower Taxes: Big Steps to a Smaller State*. London: Institute of Economic Affairs.

MoH (2017) Schemes and subsidies. Ministry of Health Singapore. Available at: https://www.moh.gov.sg/content/moh_web/home/costs_and_financing/schemes_subsidies.html

National Audit Office (2016) Recovering the cost of NHS treatment for overseas visitors. Report by the Comptroller and Auditor General. London: Department of Health.

Niemietz, K. (2007) From Bismarck to Friedman. *Economic Affairs* 27(2): 83–87.

Niemietz, K. (2016a) Universal Healthcare without the NHS. Towards a patient-centred health system. London: Institute of Economic Affairs.

Niemietz, K. (2016b) The Housing Crisis: A Briefing. London: Institute of Economic Affairs.

OBR (2015) Fiscal Sustainability Report. Supporting documents: Graphs and tables. Available at: <http://budgetresponsibility.org.uk/fsr/fiscal-sustainability-report-june-2015/>

OECD (2011) *Pensions at a glance 2011: Retirement income systems in OECD and G20 countries*. Paris: OECD Publishing.

OECD (2015) Fiscal sustainability of health systems. Bridging health and finance perspectives. Paris: OECD Publishing.

OECD.Stat (2017) Social Protection: Private health insurance.

Oberender, P., Hebborn, A. and Zerth, J. (2002) *Wachstumsmarkt Gesundheit*. Stuttgart: Lucius und Lucius.

PKV Verband (2016) *Zahlenbericht der Privaten Krankenversicherung 2015*. Cologne: Verband der Privaten Krankenversicherung.

Robson, W. (2002) Saving for health: Prefunding health care for an older Canada. Health Papers No. 170. Toronto: C. D. Howe Institute.

Schönfelder, B. and Wild, F. (2013) Volkswirtschaftliche Wirkungen der Alterungsrückstellungen in der Privaten Kranken- und Pflegeversicherung. Ein Beitrag zur aktuellen Reformdiskussion. Cologne: Wissenschaftliches Institut der PKV.

Smith, D. (2007) *Living with Leviathan: Public Spending, Taxes and Economic Performance*. London: Institute of Economic Affairs.

Smith, D. (2011) The changing economic role of government: past, present and prospective. In Booth, P. (ed.) *Sharper Axes, Lower Taxes. Big Steps to a Smaller State*. London: Institute of Economic Affairs.

Snowdon, C. (2015) Death and Taxes. Why longer lives cost money. IEA Discussion Paper No. 67. London: Institute of Economic Affairs.

Stabile, M. and Greenblatt, J. (2010) Providing Pharmacare for an aging population: Is prefunding the solution? IRPP Study No. 2. Montreal: Institute for Research on Public Policy.

Trabandt, M. and Uhlig, H. (2012) How do Laffer curves differ across countries? International Finance Discussion Papers No. 1048. Board of Governors of the Federal Reserve System.

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