Extending Working Lives

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Abstract The length of retirement in the UK has risen by 12 years since 1950, but savings do not appear to have increased in line. This suggests that incomes in retirement may be less adequate than people expect. Survey evidence suggest people underestimate their life expectancy and hence save too little. The paper analyses a change in the [perception of lives on savings, and also looks at the impacts of n extension of working lives. A distinction is drawn between the impacts of these change son output (GDP) and income (GNP) in a small open economy with capital mobility. The productivity of those working longer is discussed.

[1] I would like to thank Dawn Holland and Simon Kirby for their inputs and comments as well as their help in constructing the very long baseline which underlies this paper. I would also like to thank Martin Weale, Rebecca Riley and Justin van der Ven for additional comments. The work is abstracted from or developed from work undertaken for the Department of Work and Pensions. A summary of that much more extensive study is in DWP (2006)

Introduction

There is an intimate connection between the length of working lives and the wealth of the country, with causation running in both directions. Countries with longer working lives need less wealth to finance their retirement, and wealthier countries can afford shorter working lives. In this paper we analyse these connections in the context of the UK government's plans to increase working lives. The UK is regarded as having too low a level of savings, both to maintain the capital stock and to provide an adequate level of income in retirement without an increase in taxation. Pomerantz and Weale (2005) have a discussion of the savings shortfall that focuses on capital, whilst Khosam and Weale (2006) and Turner (2006) investigate the savings shortfall in relation to pensions. Economists are careful in the use of the term 'too little' in relation to the outcomes of the decisions of optimising agents, and if we think there is a market failure, we have to describe that failure. Agents who are saving for retirement have to make decisions on the date at which they retire, the level of savings during their working lives and the level of consumption they will undertake when retired as well as whilst working. They may have inadequate savings because of misperceptions about their life expectancy or about the provision of publicly funded goods or money, such as health services and retirement pensions.

Analysing individual optimising decisions in a macro economic context is difficult, especially as the most commonly used overlapping generations models do not aggregate. In our first section we discuss the implications of the model of perpetual youth discussed in Blanchard and Fischer (1989) for the analysis of savings behaviour. This form not only allows us to aggregate across consumers to produce an equation we can use in a macro model, but also allows us to investigate analytically as well as empirically the implications of a change in expected life. This section also discusses the supply side of the model and other features that structure the outcomes of the simulations.

The core of the paper involves an analysis the implications of a change in life expectancy for savings, output and incomes, using NiGEM with fully forward looking consumers. We subsequently look at the impact of extending working lives on saving. The model simulations on these two topics are then brought together to evaluate the overall impacts of a change in the perception of longevity in the UK accompanied by an extension of working lives. We build up the final simulation by parts in order that the overall effects of the policy package can be more clearly understood. We then look at the adequacy of our assumptions that extending working lives does not affect average productivity. Survey evidence from the UK indicates that although hours and

incomes decline after the age of 45, earnings per hour do not, and hence we can assume that increasing working lives does not affect average productivity.

The modelling framework

We utilise the NiGEM model which can be used in various ways. In this note we use a version that approximates the Dynamic Stochastic General Equilibrium (DSGE) models in use by institutions such as the Bank of England[2]. Output (Y) is determined in the long run by supply factors, and the economy is small, open and has perfect capital mobility. The production function is CES, where output depends on capital (K) and on labour services (L) which is a combination of the number of person in work and the average hours of those persons. Technical progress (tech) is assumed to be labour augmenting and independent of the policy innovations considered here

$$Q = \alpha(\delta(K)^{-\rho} + (1-\delta)(Le^{\lambda_L tech})^{-\rho})^{-1/\rho}$$

We assume forward looking behaviour in production and investment depends on expected trend output and the forward looking user cost of capital. However, the capital stock does not adjust instantly, as there are costs involved in doing so. The equilibrium level of unemployment is given by the bargain in the labour market, as discussed in Barrell and Dury (2003), and the speed of adjustment depends on (rational) expectations of future inflation, and price setting behaviour is also forward looking. Financial markets follow arbitrage conditions and they are forward looking. Fiscal policy involves gradually adjusting direct taxes to maintain the deficit on target, but we assume that this has no direct effect on the labour supply decision. Monetary policy involves targeting inflation with an integral control from the price level, and inflation should settle at its target in all our simulations.

Perhaps the most important feature of the model for our discussion is that consumers react to the present discounted value of their future income streams which we may call forward looking human and non-human wealth, although they may face liquidity constraints in the short run. Barrell and Davis (2007) discuss the changing nature of liquidity constraints in a group of eight economies including the UK, and show that wealth has been becoming more important as a determinant of consumption, and that changes in current income have been becoming less important. They suggest that this is a strong indication that liquidity constraints are becoming less important, and that in the UK in particular it is possible to assume they are now largely absent. Total wealth is made up of two components, HUW is human wealth and NHW is financial and

[2] The Bank of England Quarterly model is discussed in .Bank of England (2005). It is important to distinguish between simple three or five equation log linear New Keynesian models, which are often wrongly described as DSGE models. They are reduced form representations of much more complex descriptions and miss the importance of non-linear relations present in BEQM and NiGEM mediated by the national income identity and other linear features of the world

housing asset based wealth, and permanent income can be derived by multiplying wealth by the rate of return, r(t). Although consumers know there permanent income, they may not consume it all as they are either risk averse or as we stress here face a probability of death (ρ) in each time period. They may also put a premium θ on future consumption. If life expectancy is uncertain, then consumers will have precautionary savings as discussed in Blanchard and Fisher (1989). This model of perpetual youth is a good abstraction for our purposes, but has to be used with care, and it allows us to analyse the impacts of changes in expected life on the savings decision. In this model the long run marginal and average propensity to consume (MPC) can be derived from the relationship between consumption C_t and total wealth HUW_t+NHW_t

$$C_t = (\theta + \rho)(HUW_t + NHW_t)$$

If the probability of death declines then consumers will reduce consumption now, whilst if either human or non human wealth goes up they will increase their consumption. Non-human wealth may rise when, for instance house prices rise, and this may increase consumption even though real output may not have risen. This may indeed be one reason why saving is currently so low in the UK. Consumers also have to make a decision on the consumption of goods and leisure, and hence we can see the timing of retirement to be at least in part a consumption or leisure choice. If expected life rises but the average age of retirement does not then the timing of consumption changes, which requires more saving whilst in work to finance more consumption during retirement. One might expected a change in expected life to impact on the retirement decision. In our discussion below we first analyse the impacts of a change in working life with no change in retirement age, then a change in the retirement age with no change in expected life and then we combine the two.

Changing perceptions of life expectancy

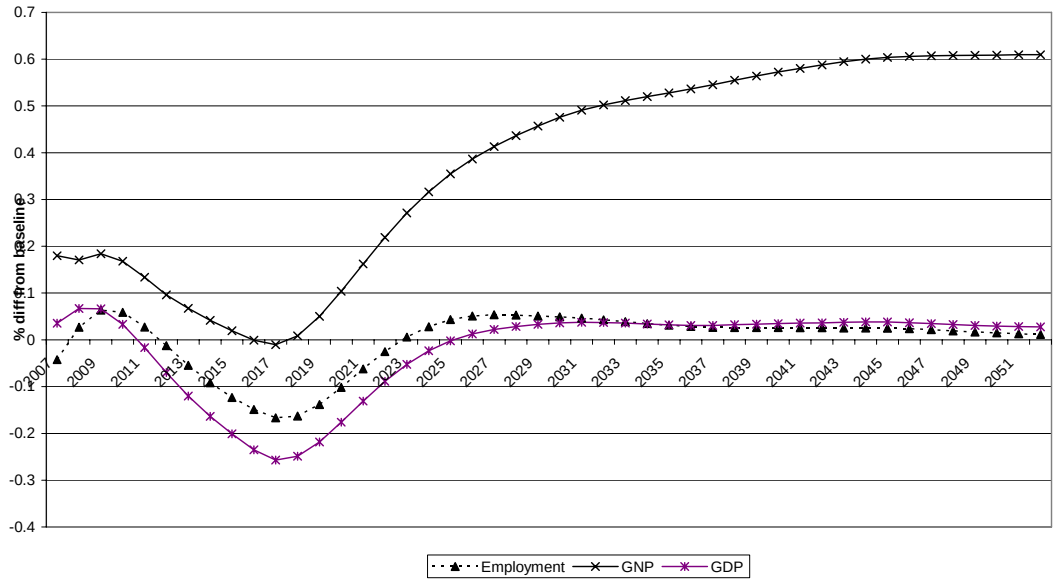
Between 1950 and 2005 the average age of retirement for men in the UK fell from 67 to 64 (it was less than 63 in 1995) and for women it fell from 64 to 62 (after being below 60 in 1995)[3]. Over the same time life expectancy at 65 has risen by 9 years, giving men 12 extra years of retirement. However, it is clear that individuals have not fully kept up with their increased life expectancy, and survey evidence suggests that people expect to die rather earlier than their statistical life expectancy would suggest. Men aged between 50 and 59 underestimate their life expectancy by almost 4 years and women underestimate theirs by around 5 years. For the 60 to 69 age group the numbers are almost 3 years for men and over 4 for women. It is therefore not

[3] These issues are discussed in Turner (2006)

surprising that actual saving is lower than individuals need, and part of the reason for having a Pensions Commission and for raising retirement ages is to help bring expected of life into line with life expectancy.

If the campaign to raise awareness is successful, and people realise they will live longer than they currently believe, savings will rise. We can use our model to analyse the impacts by raising expected life by 3 years, much in line with the survey evidence on the misperception of length of life. The impacts depend how quickly the realisation of longer expected life is absorbed in the population and we assume it takes 10 years for the full perception of longer expected lives to sink in fully. The rise in saving this would generate is accompanied by an initial decline in consumption, as it takes time for increased saving to generate higher incomes, and after 6 years or so consumption would be more than one per cent below baseline. However, in a model with forward looking behaviour the effects on output are limited, as we can see from Figure one, which plots the difference of employment and output from baseline. Initially the exchange rate would jump down, as lower demand at home would induce a fall in interest rates, and this would induce a small strengthening of growth, but slower consumption growth would outweigh this after a year or so. Output and employment settle down around baseline relatively quickly, and unemployment would be at its bargaining determined equilibrium for most of the period plotted, and would rise only marginally in the fist few years.

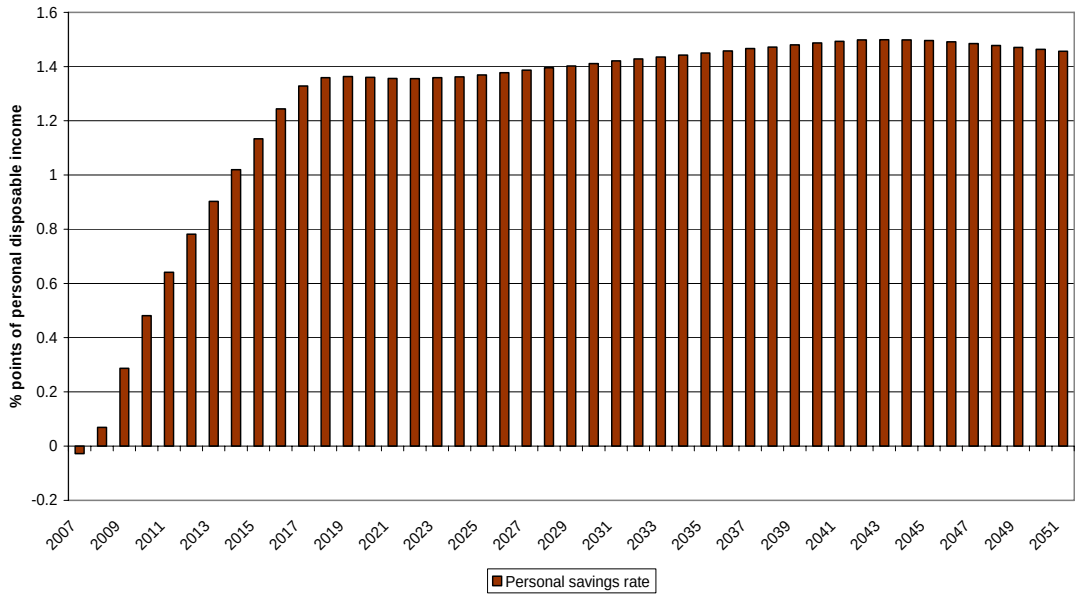
Figure 1 The effects of increasing expected life



As the UK is a small open economy, and the rate of return on capital is determined in world markets the increase in saving is accumulated in foreign assets. This requires that the UK run a balance of payments surplus, and hence the real exchange rate has

to be permanently lower. The accumulating assets earn an income stream, and as we can see Gross National Product (Gross Domestic Product or output plus net property income from abroad) rises relative to GDP.

Figure 2 The effects of increasing expected life on saving -



By the end of our simulation GNP is 0.6 per cent higher than GDP, as we can see from Figure 1. The scale of the difference depends on the scale of assets accumulated and on the rate of return they receive. Over the five years to 2005 the average rate of return on foreign assets and liabilities was 3.6 per cent, rather below that seen in the 1990s. Our forecast for these rates of return has them rising slightly over the next few years. By the 2030s the rate of return on our base is around 4.0 per cent again. If returns were higher then the increase in GNP would be more than it is in our simulation. The share of real personal disposable income in total income is forecast to decline as the share of government consumption and investment in the economy rises in line with needs. Hence the relatively constant increase in the savings ratio we see in Figure 2 is reflected in a higher share of incomes going into national savings, but that increased share declines over time. This therefore has a declining effect on the increased current account and hence on accumulation in our simulation. Again if the government sector were not to increase in real size then the impact of the increase in saving on GNP would be larger. It would not be possible to undertake this analysis with the assumption that individuals were myopic. In this situation we need an explanation of why people save, and this must be connected with their need for income in retirement and their desire to leave bequests.

Extending working lives[4]

Our analysis above assumes that increases in expected life leads only to higher saving and a change over time in the allocation of consumption. It is highly likely that as people realise that they will live longer they will also choose to work longer. They may of course be fully constrained from doing so by government regulation, but this is unlikely to be the case. Indeed part of the declared intention of raising the state pension retirement age is to raise awareness of life expectancy and persuade people to work longer voluntarily.

The government have announced plans to increase the retirement age for both men and women to 68 by 2046. The increase will come in three stages to be completed in 2036 , 2036 and 2046. We assume that individual begin reacting to the increase in the retirement age from 2016, with those above 55 changing their behaviour with fewer of them taking early retirement[5] Between 2016 and 2046 the labour force is expected to rise by about 2.2 per cent (or 900,000 persons) as a result, although those who decide to work longer are assumed to be working only 74 per cent of full time hours. Hence the labour force in effective terms is expected to increase by around 1.6 per cent[6].

In the long run output will rise (approximately) in proportion to the increase in the supply of labour, and not just in line with the initial increase in factors of production in the UK, which would be around two thirds of the final increase, in line with labour's share in output. Of course higher incomes would generate more domestic savings, and this could be invested in the UK, but it could also be invested abroad, and it would not be sufficient to create the capital required, especially at the UK's low rate of saving. The model does take account of the increase in domestic saving, but more capital is required. In an open economy with capital mobility the other factor of production will become available to work with labour at round about the existing capital labour ratio and rate of return and hence output will increase in line with the supply of productive labour. An increase in the supply of labour puts downward pressure on wages and temporarily raises the real return to capital and hence capital inflows will take place until returns are back down at world levels. Net capital inflows require a current account deficit, and this will be brought about by the increase in

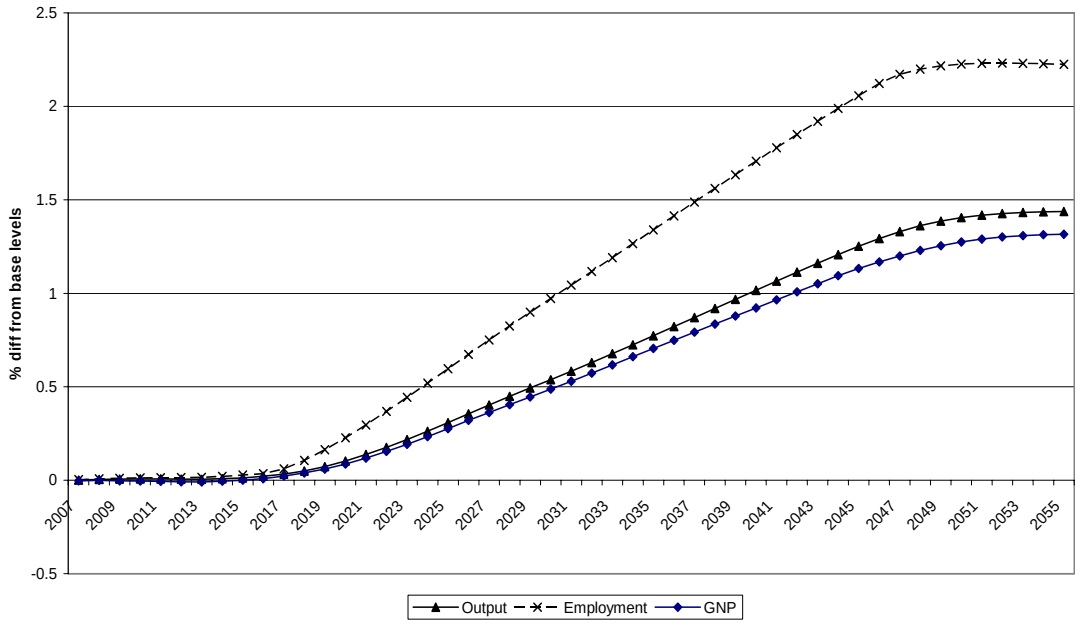
[4] The analysis in this paper is related to work undertaken for the Department of Work and Pensions in the UK, but our results differ somewhat as we make different assumptions. Although we use the same model as in DWP (2006) we have made different assumptions about the impact of policy on labour market participation. In particular we assume that the increase in labour input starts 5 years earlier than we did in the DWP simulations, and comes to an end 5 years earlier. This reflects a different interpretation of the impacts of policy, but mot a difference in substance. We assume the same overall impacts on employment and hours as in the DWP central case.

[5] This is much the same as the assumption made in the DWP discussion document. See pages …

[6] We assume that those staying in work longer have the same productivity as the rest of the population. It could of course be lower.

demand for imports and downward pressure on export prices as supply increases. If no new capital flows were needed these pressures would be absorbed by a fall in the exchange rate, but the supporting capital mean this is not needed.

Figure 3 The Impacts of Extending Working Lives

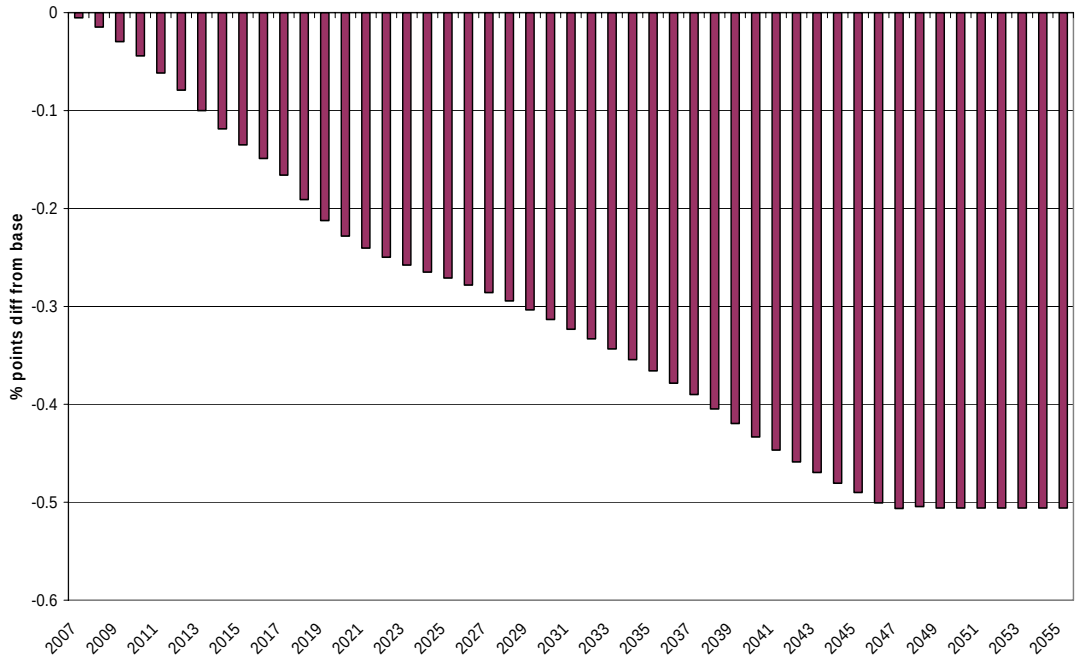


As the availability of increased labour is fully anticipated and slow to come through in this simulation, the market adjusts and in our simulation there is virtually no impact on the unemployment rate, which is determined by the wage bargain. Employers have enough time to raise investment in advance of the anticipated increase in labour supply so that the capital stock can grow approximately in line with employment. The business sector capital stock rises in line with employment given any changes in real wages relative to the user cost of capital. If all capital did the same, then output should rise in exactly in line with labour input in the long run. We assume that neither the housing capital stock nor the Government capital stock increase fully in line with GDP. Government capital is assumed to rise with population related needs, and these may be more related to the age structure and the total size of the population than to the length of working life. In particular we presume that the provision of medical and education services depends on age, not income. The housing capital stock is also assumed to rise in line with population as well as with incomes, and hence does not increase in line with the size of the workforce.

As a result of these assumptions the capital stock rises less than the workforce. Hence, as we can see form Figure 3 GDP rises marginally less than labour input (1.4 per cent in the long run) when labour input rises by 1.6 per cent (employment rises by noticeably more, but hours have fallen). The business sector capital stock rises by 1.5 per cent in the long run, but overall the capital stock only rises by 1.1 per cent. Figure

three plots the impact of an increase in working lives on output and employment as well as on GNP which rises less than GDP. The need to finance capital inflows that go with an increased labour force require current account deficits and hence a build up of foreign liabilities (or a run down in assets). This connection between lower saving, a worse current account and declining net assets is symmetrical to that discussed in the previous section, and the implications for the relationship between GDP and output are the mirror image of those discussed above. Output rises by 1.4 per cent in the long run whilst GNP rises by 1.3 per cent in the long run, and the divergence rises up until 2046 as more workers increase output until that date.

Figure 4 The Effect of Extending Working Lives on the Savings Rate



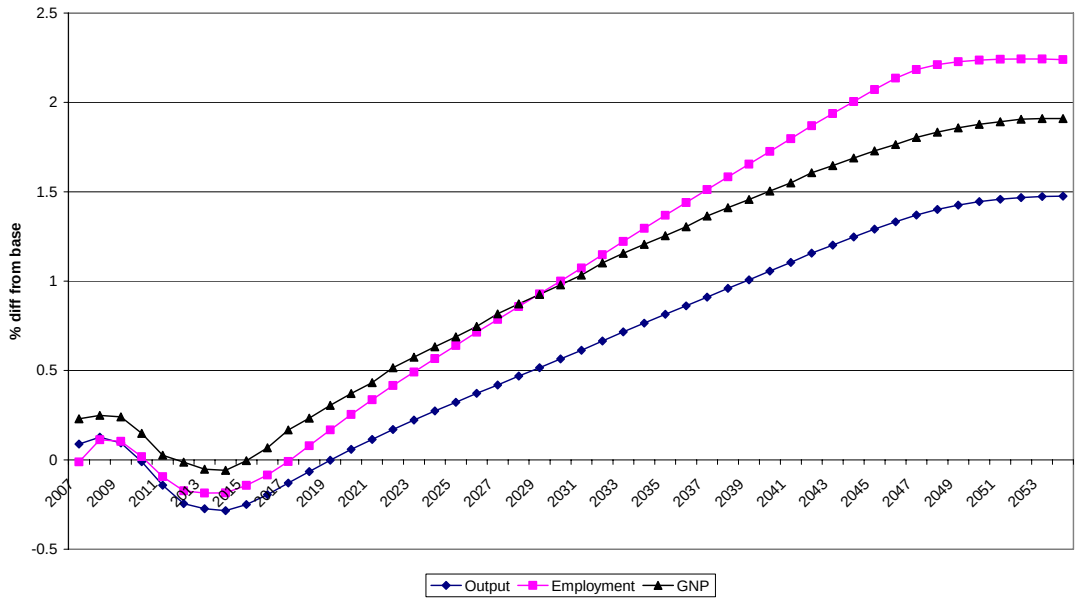
The long run results may be much as we might expect, but in the short term an expected or anticipated increase in working lives will reduce savings immediately, albeit by a small amount. Human wealth rises as people anticipate higher future incomes and the effects are brought forward by rational optimising consumers. Human wealth is the net present discounted value of future incomes, and hence current human wealth rises. In the short run consumption rises and the saving rate falls, but effects are initially small but build up, as we can see from Figure four. This result is not surprising as populations with longer working lives with a given life expectancy save less because they need less saving to spend in their retirement. As an example we know that US workers have similar life expectancy to the UK but save less because they work 7 years longer (see Sefton and Kirsanova 2006). In our simulation consumption rises ahead of the increase in activity and incomes because consumers are presumed to face only short term liquidity constraints, and even then

these do not apply to the whole population. As we can see from Figure four the saving ratio declines over the whole period, but it stabilises around the end of the increase in labour supply in 2046.

Effects of combined EWL and perception of longer life[7]

We can combine our analyses of a change in expected life and a set of policies to extend working lives in order to evaluate the effects of the set of policies and waves of persuasion that are currently being set up. This scenario would reflect the effects desired by the government, and indeed may well be the most likely outcome. We are combining two scenarios with differing effects, and the overall outcome should be approximately the sum of the two. Raising the perception of expected lives raises saving, improves the current account and increases GNP but not GDP, whilst increasing the length of working lives reduces savings, worsens the current account and increases both GDP and GNP, but the former rises more than the latter. Hence we cannot a priori say what direction the effects of the combination are on savings or the current account, but we can say that the effects on GDP and GNP will be positive.

Figure 5 The Impact of Extending Working Lives and Raising Expected Lives



As we can see from Figure five output and employment (almost imperceptibly) rise and then fall in the first few years, much as in the expected life scenario but muted somewhat by the rise in consumption that increased human wealth induces. Output and employment begin to rise after 10 years as more labour becomes available, and they continue to increase as compared to baseline (where growth is reasonably steady) for more that 30 years. By 2050 or thereabouts output has risen by 1.5 per cent as a

[7] This combined scenario differs from that in DWP (2006) as our assumptions on the change in the labour force are different, as we explain above.

result of an increase in labour input of 1.6 per cent, which is approximately the sum of the changes in the previous two simulations. Because the absolute impact on savings of increased expected life is greater than that of extended working lives the savings rate increases, as we can see from figure 6, and hence foreign assets accumulate, but not in such large amounts as in the expected life scenario on its own. Hence GNP rises by more than 1.9 per cent as compared to an almost 1.5 percent increase in GDP. This is approximately the sum of the impacts in the two scenarios we have discussed

Figure 6 The Impact of Extending Working Lives and Incresed Exopected Lives on the Savings Rate

The overall impact of the combined scenario on savings is plotted in figure six, which shows that they rise sharply in the first few years of the changes, and then fall back settling at around one per cent of GDP once the change in expected life and the increase in the length of working lives have stabilised. Savings increase because overall individuals realise that they will live three years longer, or around 3 ½ per cent if expected lives are around 85 years, but are only increasing their labour input by 1.6 per cent. Hence the need for more savings to fiancé a longer retirement, and hence the higher level of savings.

Productivity, Retirement and the Age Earning Profile

Our analysis of the impact of extending working lives on output depends upon the assumption that productivity does not decline with age. Although it is clear that earnings do peak, and then decline towards retirement, it is not absolutely clear that productivity does the same. Physical strength may decline after 45, but few occupations derive their product purely from this input. Physical dexterity may not decline in quite the same way, and its decline may be compensated for by increases in experience. In addition the majority of occupations of occupations in the UK do not

require physical or only semi skilled learning. Figures 7 and 8, abstracted from Robinson (2000) plot the earnings profiles for British men and women broken down by skill levels. These are abstracted from the NES, and represent a large sample of the population, and suggest that there is little impact of age, as indexed by years of experience, on full time earnings.

Figure 7 Male Average Earnings Profiles 1974-1996

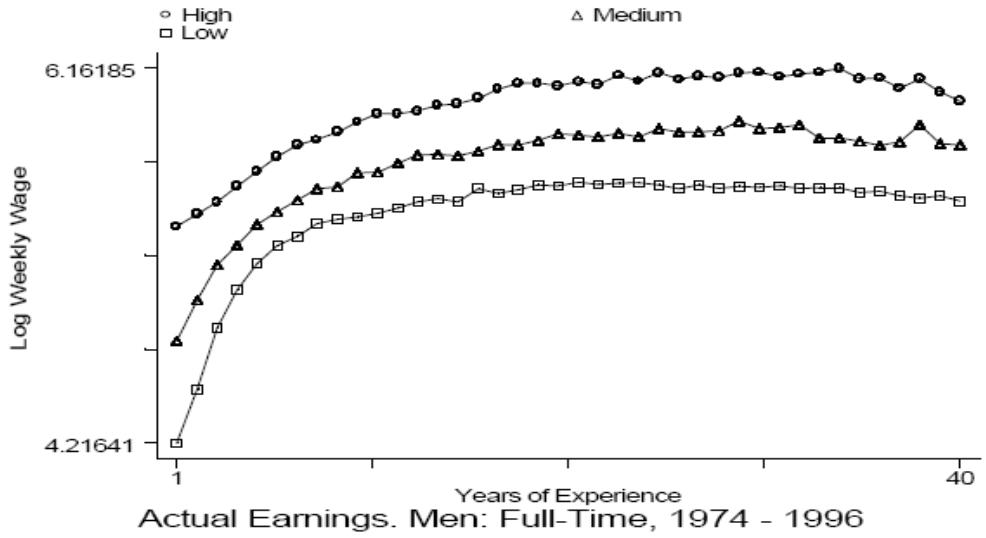


Figure 8 Female Average Earnings Profiles 1975-1996

The age earnings profile may be influenced by regulation and by institutions such as unions. Over the period from which the data are derived there was no effective minimum wage in the UK, and hour regulation was relatively lax. Although trade unions were relatively strong in the first half of the period covered that were more important in male unskilled occupations than they were in either female or skilled

groups. There is no evidence that the earnings profiles differ between these groups. In addition, over this period, the UK labour market was probably the closest in Europe to a US style open competitive structure where individuals are paid their marginal product.

There is significant evidence that hours of work do decline as people get older, and in the ten years prior to retirement average hours progressively decline and fewer individuals work full time. Hence the full time earning profile and the overall age earned income profile should differ, and the age earned income profile takes the expected shape and declines in the 10 to 20 years before retirement. Hence our assumption that average productivity does not decline can be defended, and we do allow for a decline in average hours worked in the run up to retirement.

We should treat the assumption of constant productivity with care, as it depends upon the assumption that the extension of working lives takes place in all skill groups. This would be particularly the case if the reason for the extension were purely voluntary and resulted from the campaign to persuade people that their life expectancy exceeded their own expectations of length of life. If the extension of working lives is purely the result of compulsion then our results would differ, and the output effects would be lower. As Sefton, van der Ven and Weale (2007) show, increasing the compulsory retirement age is likely to have a greater effect on the poorest, and least productive, groups of workers in the economy, as they are more dependent on state retirement pensions rather than their own assets than the average member of the population They show that retirement decisions in the UK depend upon a calculation of the adequacy of assets produce a retirement income, and wealthier groups have more assets and hence choose to retire earlier. Their decisions will not be impacted much by a change in the state retirement age, but would be influenced by a successful campaign to raise awareness of misperceptions of expected lives.

Conclusion

It is widely acknowledged that the UK has a shortfall of savings and as a result has a shortfall on the resources available to cove retirement incomes. Two sets of policies are available. Raising saving raises wealth and GNP with little effect on GDP. Extending working lives reduces saving as it reduces the need for assets to cover a shorter retirement. There are at least two other ways to increase saving. Compulsory savings and voluntary schemes based on greater returns to saving may have an impact on overall savings but they may face significant substitution out of other forms of saving (or out of working lives) unless people are persuaded of the need to save. Increasing perceptions of expected life to bring them into line with life expectancy should raise overall savings substantially. Increasing working lives can be driven

either by a statutory increase in the age at which state retirement pension is available, or by changes in the perception of expected life. It is indeed possible that increasing the state retirement age would change perceptions of expected life more effectively than any other policy. We have analysed a policy bundle that raises saving and increases working life. It is easy to do this in a fully forward looking model of the economy. It is perhaps a little harder to do it in reality, but progress is being made.

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