To defer or not defer? UK state pension and work decisions in a lifecycle model.

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Introduction and motivation

- Increasing life expectancy has significant implication for fiscal expenditures.
- Governments have been attempting to address this issue, for example introducing policies which improve retirement income (auch as auto enrollment in the UK) and/or raising default retirement age.
- State Pension Deferral: giving individuals the option to defer their state pension for some period. **Does the decision to defer effect labour supply?**
- Other reasons may include offering individual liberty, improving retirement income, freedom of choice (abolishment of default retirement age) and that individuals are heterogenous in their stock of assets when they reach state pension age (Diamond & Hausman, 1984; O'Dea & Crawford, 2014)

Preview: main findings

- Show that deferral is only taken up if it raises the present value of non-labour income including the pension stream changes.
- Current policy implies that deferral should be taken up (assuming no uncertainty and credit constraints)
- Deferral effect: reduces labour supply, although the extent of the reduction and the period in which labour supply alters depends on how close an individual is to his/her reservation wage and the marginal value of leisure in that particular period, among other factors.
- Quantify the deferral effect: raises reservation wage by around 2% in simulation exercise

Literature

- Disney and Smith (2002): Analyse effect of abolishing earnings rule in the UK (ignore deferral).
- Coleman et al. (2008): State Pension deferral: public awareness and attitudes
  - report analyses deferrer vs. non-deferrer characteristics, motives & awareness (descriptive report).
- Farrar et al. (2012): Compares state pension deferral options (assumes individual defers and doesn't consider labour supply)

This paper

- Determine the effect of pension deferral on participation **(main focus)**, consumption and saving in a two period lifecycle framework, for example ages 65 and 66 for a male.
- Specific focus on the effect deferral has on labour supply and the importance of the wage rate and marginal value of leisure
- Quantify the effect of state pension deferral with a numerical simulation
- Of the two deferral options available in the UK: (1) Incremental pension income (2) Lump sum option, which is optimal?

General utility

- Individuals maximise a time additive concave utility function depending on consumption c and leisure L, subject to their lifetime budget constrain

$$\max_{c_{T-1},c_T,L_{T-1},L_T} u(c_{T-1},L_{T-1}) + \delta u(c_T,L_T)$$

$$\text{st } c_{T-1} + \frac{c_T}{r}$$

$$= rA_{T-1} + y_{T-1} + \frac{y_T}{r} + w_{T-1}(1-L_{T-1}) + \frac{w_T(1-L_T)}{r} = x_{T-1}$$

$$0 \leq L_t \leq 1$$

Non-labour income

Non-labour income flows y_{T-1}, y_T under no deferral and deferral (where p is the flow of income from state pension) are given by:

- Without deferral:

$$Y^{ND} = y_{T-1} + p_{T-1} + \frac{(y_T + p_{T-1})}{r}$$

- With deferral:

$$Y^{D} = y_{T-1} + \frac{(y_T + r_g p_{T-1} + p_{T-1})}{r}$$

Individuals receive an interest rate r on their pension income at $T-1$ under no deferral. The individual is better off deferring iff $(1+r) < r_g$.

Consumption & labour supply

- Consumption each period must be interior:

$$\frac{\partial u_{T-1}}{\partial c_{T-1}} = r\delta \frac{\partial u_T}{\partial c_T}$$

$$rc_{T-1} + c_T = x_{T-1}$$

  For fixed values of L_{T-1}, L_T this gives a semi-indirect utility $v(L_{T-1}, L_T, x)$ which is increasing in all its arguments and also concave in the leisures of each period.

The remaining problem for the individual is to choose optimal labour supply in each period:

$$\max_{L_T, L_{T-1}, x_{T-1}} v(L_{T-1}, L_T, x_{T-1}) \text{ st } 0 \leq L_i \leq 1$$

Labour supply

We focus on just full time and zero work options for each time period (although in paper show solutions for interior cases). Define the life cycle full incomes at the start of $T-1$ corresponding to each lifetime pattern of labour participation:

$$\begin{aligned} X^s_{11} &= A_{T-1} + Y^s = Z \\ X^s_{00} &= A_{T-1} + Y^s + rw_{T-1} + w_T = Z + rw_{T-1} + w_T \\ X^s_{01} &= A_{T-1} + Y^s + rw_{T-1} = Z + rw_{T-1} \\ X^s_{10} &= A_{T-1} + Y^s + w_T = Z + w_T \end{aligned}$$

We have a ranking of the full incomes:$X_{00} \geqslant X_{01} \geqslant X_{11}$and $X_{00} \geqslant X_{10} \geqslant X_{11}$.

Value functions

So with $Z = rA_{T-1} + ry_{T-1} + y_T$, we can define:

$$\begin{aligned}
V_{11} &= v(1,1,Z) = v(1,0,Z + w_T^{11,10}) = V_{10} \\
V_{01} &= v(0,1,Z + w_{T-1}^{01,10}) = v(1,0,Z + w_T^{01,10}) = V_{10} \\
V_{11} &= v(1,1,Z) = v(0,0,Z + rw_{T-1}^{11,00} + w_T^{11,00}) = V_{00} \\
V_{11} &= v(1,1,Z) = v(0,1,Z + w_T^{11,01}) = V_{01}
\end{aligned}$$

One can then equate these expressions.[1] The pattern of how life cycle labour participation is determined is clear. For the pattern ij to be optimal (ie participation state i in period $T-1$ and j in T) to be optimal we require that $V_{ij}^s > V_{kl}^s$ for each other possible participation profile kl.

[1] In general finite positive wages exist (assuming Inada conditions hold for $\frac{\delta U}{\delta L}$).

Optimal decision: general utility and deferral

- **Assuming perfect foresight and no credit constraints, deferral is only taken up if it raises the present value of non-labour income including the pension stream changes.**
- This change in wealth changes the demand for leisure in each period.
- If leisure is a normal good $\rightarrow \uparrow$wealth $\rightarrow \uparrow$ demand for leisure in each period.
- Under deferral individuals close to their reservation wages may find it is optimal to switch from full time to zero work.

To quantify the impact of deferral policy have to choose a form for preferences.

Quasilinear utility I

Take a commonly used CRRA specification for the utility function (Gustman and Steinmeier (2010); Blau (2002), (2012)).

$$u(c_{T-1,}L_{T-1}) + \delta u(c_T, L_T) = \frac{C_{T-1}^{\alpha}}{\alpha} + h_{T-1}L_{T-1} + \delta(\frac{C_T^{\alpha}}{\alpha} + h_T L_T)$$

$$A_T = \frac{x_{T-1} - (\delta r)^{1/(\alpha-1)}\left[y_T + w_T(1 - L_T)\right]}{1 + r(\delta r)^{1/(\alpha-1)}}$$

Where

$$x_{T-1} = A_{T-1} + y_{T-1} + w_{T-1}(1 - L_{T-1})$$

Quasilinear utility II

The resulting value function is

$$\begin{aligned} v(K^s, w_{T-1}, L_{T-1}, w_T, L_T) &= D\frac{(K^s + w_{T-1}(1 - L_{T-1})) + \frac{w_T(1-L_T)}{r})^{\alpha}}{\alpha} \\ &+ h_{T-1}L_{T-1} + \delta h_T L_T \end{aligned}$$

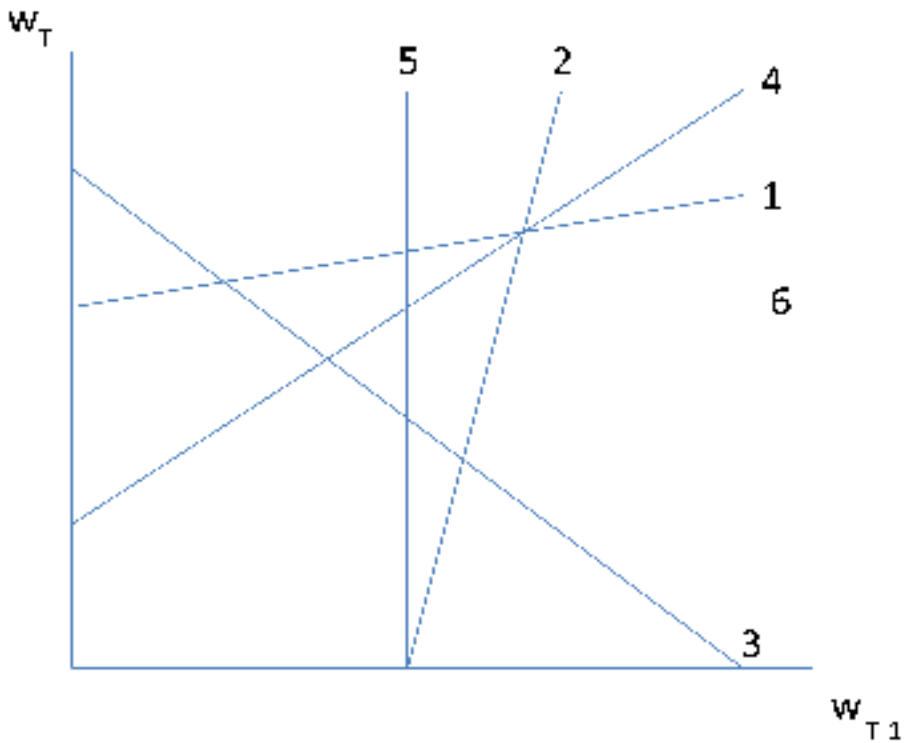
where

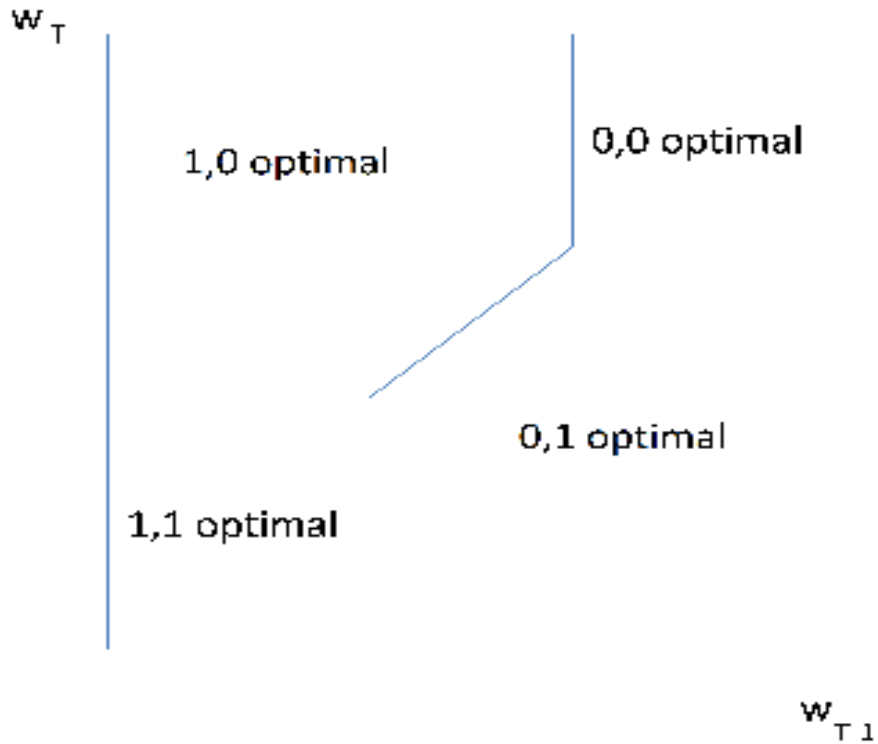
$$K^s = r(A_{T-1} + y_{T-1}) + y_T, D = ((\delta r)^{\alpha/(\alpha-1)} + \delta)$$

Quasilinearity in leisure given the wealth effect of pension deferral means that the income effects fall solely on participation.

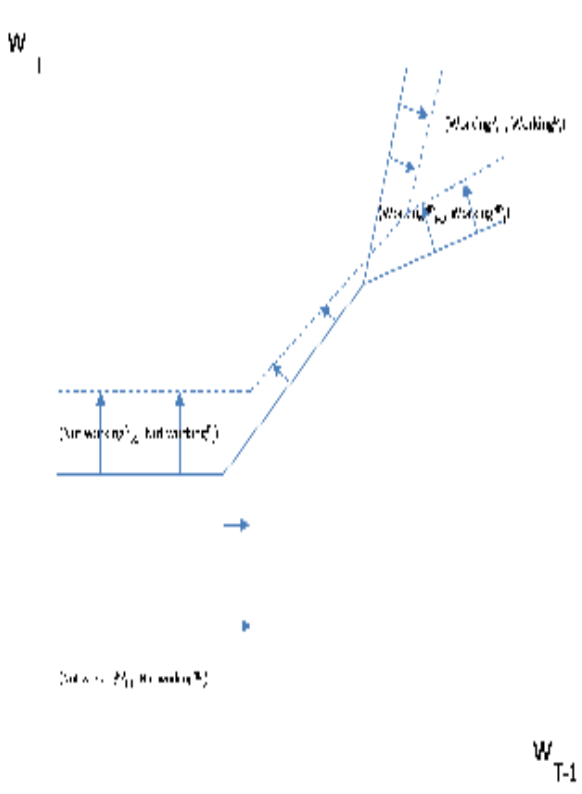
Labour supply regions

- Equating V's (there's 6 comparisons to make) for the different labour supply combinations gives:





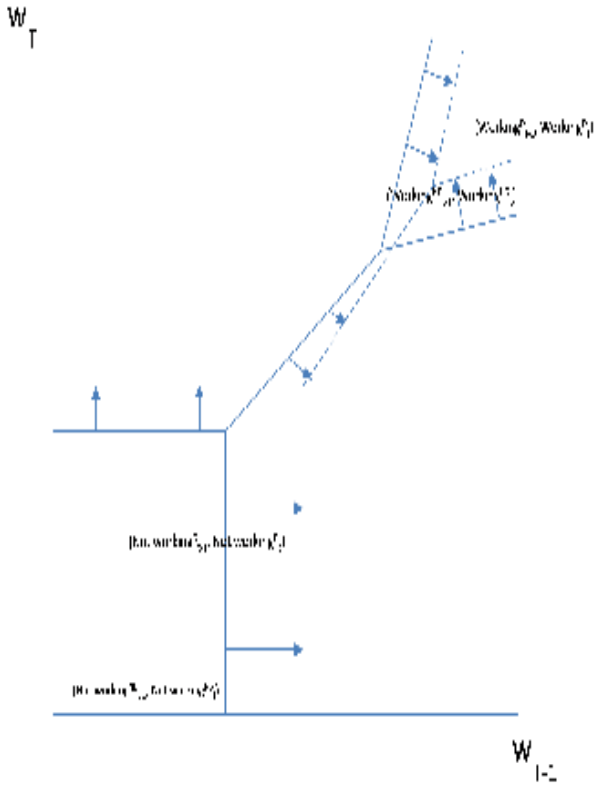
Effect of deferral on labour supply: $h_{T-1} \lessgtr h_T$



Legend

Regions defining labour supply without deferral: ——

Regions defining labour supply with deferral:



Legend

Regions defining labour supply without deferral: ——

Regions defining labour supply with deferral:

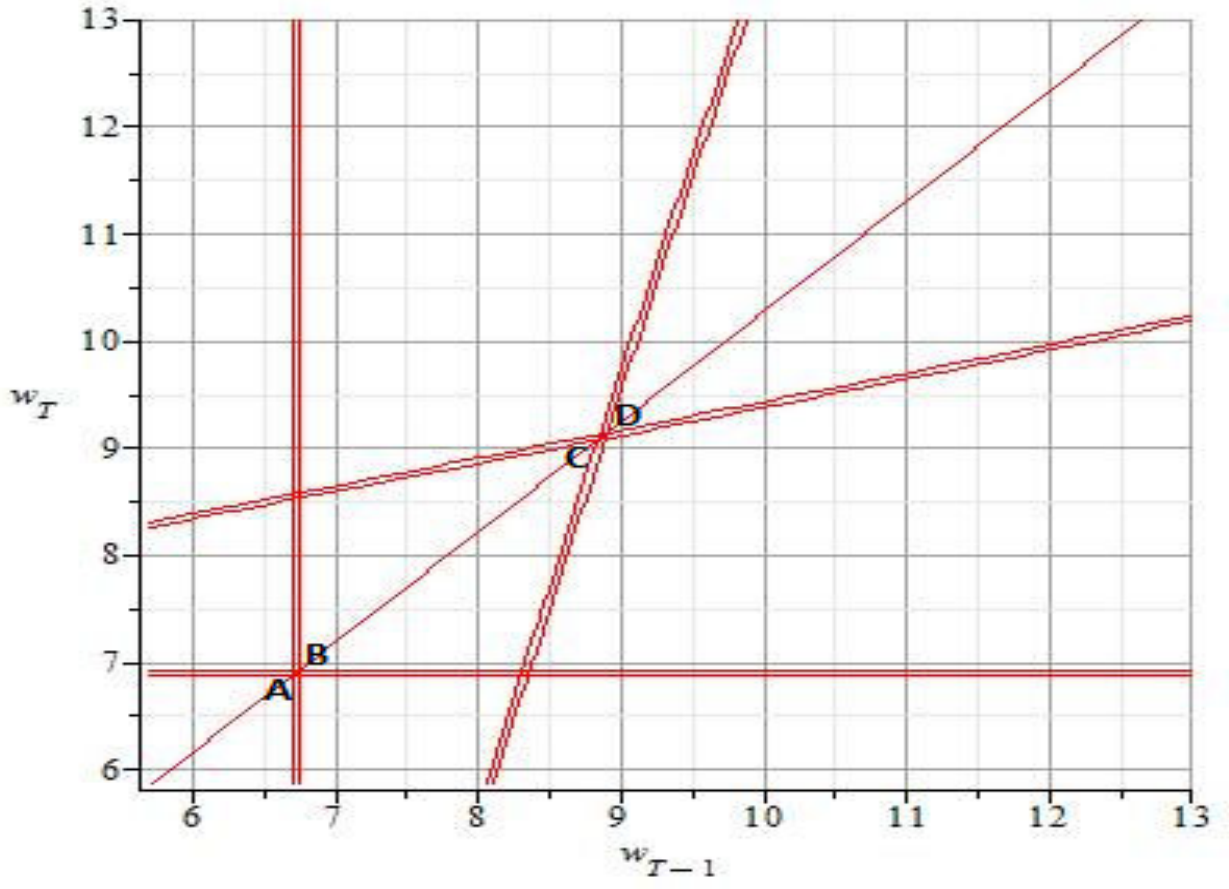
Simulation assumptions

Use literature/empirical data and apply to model:

- relative risk parameter α is -0.5 (Attanasio, Low and Sanchez-Marcos, 2008)
- marginal value of leisure h in the penultimate period and terminal period at 0:006 and 0:00630 respectively (an increase of 5% between periods and imples labour income/asset ratio of 30%)

Median per capita (non-housing) wealth of £1500, private/occupational pension income £32, weekly state pension income to be £125, individuals work 40 hours per week, annual rate of return of 3% in the free market, time preference discount rate of 0:95, earn an annual ROR of 10.4% (equivalent to a weekly rate of 0.2%), median weekly investment income (among individuals aged 65 and over) to be zero.

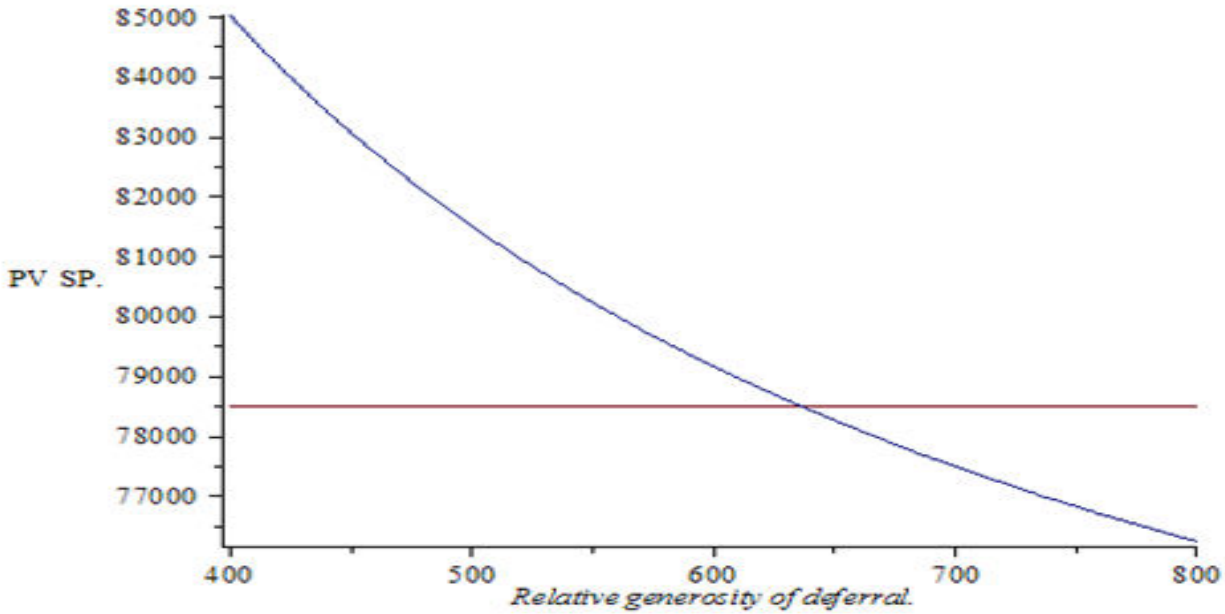
Simulation: wage co-ordinates



Raises reservation wages by around 2%, assumes deferral period is one year.
Sensitivity: in paper show how changes in α and h can affect wage co-ordinates.

Legislation: current deferral options I

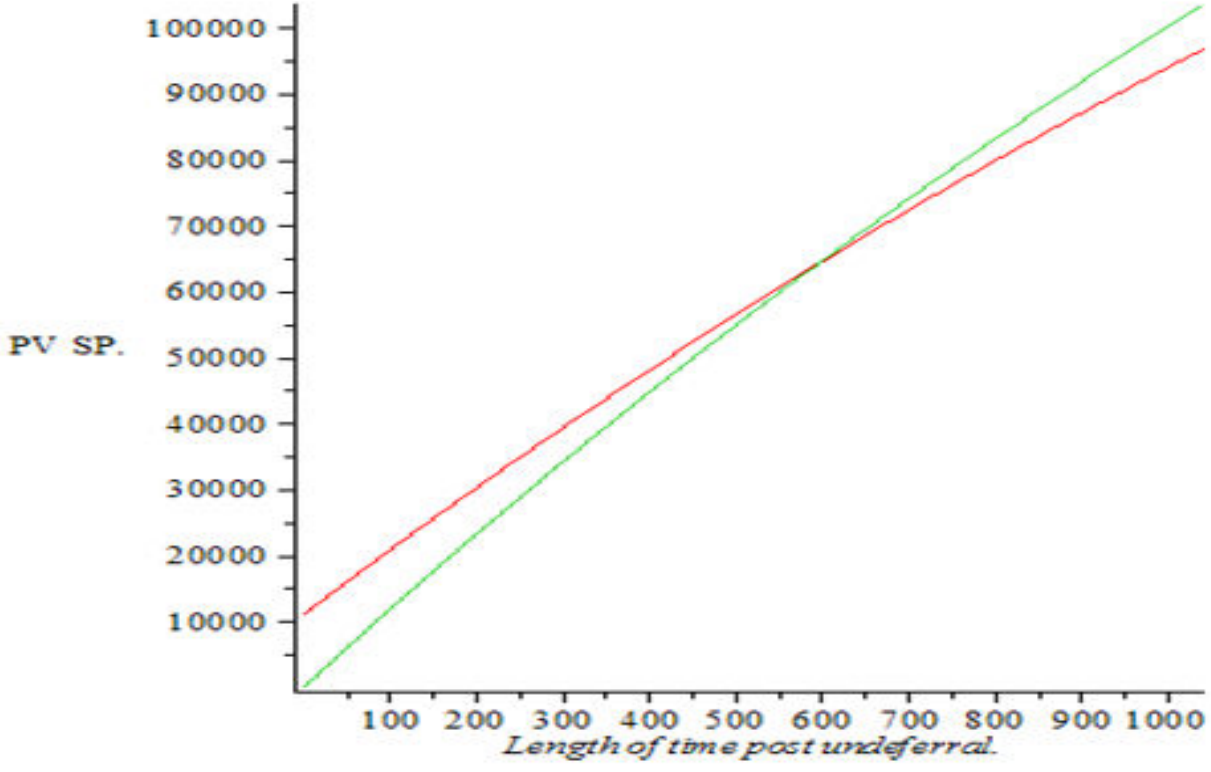
Generosity



The X-axis measures the number of weeks (multiplied by 100) required for an individual to defer their state pension in order for them to receive an additional £ 1 extra a week upon undeferral.
PV break even point is at a ROR of about 1% for every 6.25 weeks deferred.
Under current legislation the ROR is 1% for every 5 weeks deferred and therefore in this example individuals are £3000 better off if they choose the deferred income option.

Legislation: current deferral options II

Varying life span at point of pension reinstatement



Intuitively the PV for individuals who only live a short period after they undefer are much better off choosing the lump sum option. However it is clear that the deferred income option is more lucrative provided an individual lives for approximately 12 years or more after they undefer.

Prevalence of pension deferral

- Between September 2009–2010 approximately 66,300 individuals deferred their pension
- $\frac{1}{3}$took the incremental option, nearly $\frac{1}{2}$ took the lump sum option, the remainder took a mixture of the two
- Of the total number of individuals eligible to claim their state pension, roughly 1 in 10 chose to defer their pension.
- Coleman et al. (2008) using admin data surveyed individuals who were approaching or had reached SPA and found only 65% knew of the option to defer.
- This proportion only increased slightly after SPA.
- **The main reasons (for lack of knowledge) were due time constraints and it being the 'spouse's responsibility', lack of interest or confidence in financial matters.**

Extensions

- Switching cost: For the particular regime $(1, 0)$ more costly to re-enter the labour.
  - Can extend our framework to account for this; the result is that the wage loci defining full time work shifts outwards in the north-easterly direction.
- To allow for the possibility of credit constraints. Although empirical evidence suggests otherwise (Crawford and O'Dea, 2014). The wage space is then defined by particular regions where an individual is constrained or unconstrained. Results less clear.
- Time varying need for leisure: Might be of particular relevance for this age group.

Conclusion

- Theoretical framework of pension deferral and shown how deferral may effect labour force participation.
- If the policy has been designed to extend working lives then our results run counter to this. Coleman et al. (2008) suggests that in fact people who defer tend to stay on in work (joiny complementarities in leisure), because individuals feel they have enough income with SP and it offered a high ROR.
- **Financial literacy at older ages: the British DWP (2008, 2013) have highlighted they wish to promote the benefits of state pension deferral. Although its generosity has been reduced by half since April 2016 and the lump sum option scrapped all together.**