The purpose of this contribution is to provide an overview of the effects that changing longevity may have on a number of public policies designed for unchanged longevity.
Outline

- Introduction
- Key stylized facts about longevity increase
- Simple lifecycle model with risky lifetime
- Normative foundations
- Effects of changing longevity on public policy
Introductory remarks

- Longevity is increasing but longevity slacks remain
- Half of girls born today will live to 100 in France
- Longevity increase and aging are two different things
- Longevity in good health and standard longevity
  - France: F: 85.3 (63.5); M: 78.3 (61.8)
  - Sweden: F: 83.8 (70.2); M: 71.9 (71.1)
Longevity increase: a curse or a blessing

My concern: our concepts and our tools are not well adapted to longevity increase and variability in longevity

Focus on theory and normative concepts of justice, fairness, and equity

Countries from the OECD
Some evidence

- Rise in life expectancy at birth
- Convergence across countries
- Increasing differences across individuals: genders, income, education
- Rectangularization first increasing and then stalling
- Individual responsibility: 30%
- Underestimation of longevity
Figure 1. Life expectancy at birth (period) in several European countries, 1750-2013
(Source: Human Mortality Database)
Period versus cohort life expectancy

Figure 2. Period life expectancy at birth and cohort life expectancy at birth, Sweden, 1751-1920
(Source: Human Mortality Database)
Rectangularization

Figure 3. Survival curves (period), total population, Denmark  
(Source: Human Mortality Database)
Figure 4. Life expectancy at birth (period) for females and males, Sweden, 1751-2012
(Source: Human Mortality Database)
Figure 5. Life expectancy at age 25 by education level, males and females, United States, 1996 and 2006 (Source: U.S. Department of Health and Human Services, 2014)
Individual preferences

- Life cycle: 2 periods of length 1 and $\ell < 1$ with survival probability $\pi$
- Life expectancy: $1 + \pi \ell$
- Both $\pi$ and $\ell$ can be explained by 3 variables: genes, effort (collective or individual) and myopia (ignorance, self control)
- Importance of complementarity between genes and effort
  - Complement: efficacy of effort increases with the genetic endowment
  - Substitute: efficacy decreases
Longevity depends on $\ell$ and $\pi$. Preferences additive:

$$U = u(c) + \pi\ell u(d)$$

Neutrality towards longevity dispersion. Changes in $\pi$ or $\ell$ have identical implications. An increase in $\pi$ and in $\ell$ has the same effect on longevity $1 + \pi\ell$. It has the same effect on expected utility.
2 ways of increasing longevity: $\pi$ and $\ell$
However if one uses a concave transform of lifetime utility in case of early death and in case of survival, the effects are different. We then have risk aversion with respect to the length of life. An increase in $\pi$ has more value than an increase in $\ell$

\[
U = \pi V(u(c)) + \ell u(d) + (1 - \pi) V(u(c))
\]
Those two sources of life expectancy gains are no longer equivalent once risk-aversion with respect to the length of life is introduced. This appear clearly when looking at the effect of longevity increase on saving, education and retirement.

With risk neutrality, an increase in the survival probability $\pi$ or in life horizon $\ell$ has the same positive effect. With risk aversion the effects are different and ambiguous.
Normative foundations

Aversion for inequality

Traditional utilitarian approach: bias towards long-lived individuals

Example: two types of individuals: short ($\ell = 0$) and long-lived ($\ell = \pi = 1$)

Identical utilities: Same per period consumption implies that long-live consume twice

Not with risk aversion
Responsibility and luck

Part of longevity is our responsibility and part results from genes or environment (social responsibility). For the responsibility part: no government intervention; for the exogenous part, compensation is desirable.

Ex ante versus ex post

Ex post implies less saving and later retirement. Emphasis on those dying early.
Implications for social policy

Endogenous longevity

1. Free-riding on longevity enhancing effort

Should the government subsidize longevity? Yes for some different reasons but no if increased longevity implies a lower return of annuities or a higher cost of PAYG pensions.

\[ U = u(w - \theta - s^* - e) + \pi(e)u(s^*(1 + r)/\pi(e) + \theta(1 + n)/\pi(e)) \]

Optimal saving \( s^* \) is given by:

\[ u'(c) = u'(d)(1 + r) \]
Health expenditure is given by:

$$\pi'(e)u(d) = u'(d)(1 + r) + \pi'(e)u'(d)d$$  \hspace{1cm} (1)$$

Ignorance of $\pi'(e)u'(d)d$ calls for a corrective Pigovian tax.

Tragedy of the commons

Ex post optimum: lower $e$ and $s$. 
2. Heterogeneity in genes and productivity

Asymmetric information: Optimal policy can imply taxing health spending so as to induce the well to do to reveal their type.

Assumption: complementarity between genes and effort.
Individuals with 2 characteristics: $w_i, \varepsilon_i$

$$U_i = u(h_i w_i - s_i^* - e_i) - v(h_i) + \pi(e_i, \varepsilon_i) u(s_i^*/\pi(e_i))$$

**Utilitarian Paternalist FB**

$$\sum n_i \left[ u(c_i) - v \left( \frac{y_i}{w_i} \right) + \pi(e_i, \varepsilon_i) u(d_i) \right]$$

subject to

$$\sum n_i (c_i + e_i + \pi(e_i, \varepsilon_i) d_i - y_i) = 0$$

- $w_2 > w_1$ implies $h_2 > h_1$
- $c_i = d_i = \bar{c} \forall i$. 
- $\varepsilon_i > \varepsilon_j$ implies $e_i > e_j$ if $\pi_{\varepsilon e} > 0$, that is if both arguments are complements.

**SB optimum**

Asymmetric information on $\varepsilon$ and $w$.

Tax on labor, $\tau$, saving, $\sigma$, health, $\theta$. 
3. Preventive and curative health care

Case of sin goods or preventive effort (first period) along with myopia. Curative care in the second period. Tax sin goods; subsidize saving; free choice of curative care.
Implications for social policy

Exogenous longevity

1. Retirement policy and harsh occupations

Policy question: given that longevity is lower in some occupations, should they be granted special pension provisions.

Problem: what about the long lived in those harsh occupations and the short lived in safe occupations?

Design a pension scheme that takes those cases into consideration. Utility of the disabled higher in the harsh occupation.

Other problem: what about occupations that turn from harsh to safe?
2. Long-term care and social insurance

Dependence occurs in very old age and mainly well to do individuals reach old old age. Is there thus a case for social insurance for long-term care?
3. Poverty and longevity

Policy issue: choice between fighting poverty and increasing the longevity of poor. This depends on the objective of the State: reducing the poverty rate or increasing social welfare.
4. *Education and longevity. Ben Porath effect*

Increased longevity would foster education under certain assumptions on retirement age and human capital decay.
5. Longevity, pensions and welfare

Increased longevity leads to a lower return of unfunded pensions; this may in turn impinge growth. This negative effect depends on the prevailing setting: defined benefits or contributions, mandatory or flexible retirement. From the long run welfare viewpoint, the ideal is a defined contribution scheme and a mandatory early retirement constraint.
Concluding comments

- Caution in forecasts
- Longevity increase and acquired rights. Political economy issue
- Importance of annuitization
- Increasing demand for long term care