# Gender wage and longevity gaps and the design of retirement systems

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## Introduction

- The longevity gap and the wage gap are two important factors in gender inequality, particularly when it comes to the retirement period.
- **Longevity gap:** has been decreasing during the last decades, but it continues to be significant. Among OECD nations, women's life expectancy at birth is currently around four to six year larger than that of men.
- **Wage gap:** on average, women in the EU earn around 15 % less per hour than men.

- We study their implication for design of pension system represented by a **net** benefit rule as a function of retirement age
- With utilitarian SWF: redistribution from men to women.
- But redistribution according to lifespan may also be relevant: concave transformation of lifetime utility.
- Direction of redistribution then becomes ambiguous.

- We study the design of pension system in this context.
- Additional complications:
  - individuals may be singles or live in couples;
  - optimal rule is likely to be gender specific but gender neutrality (GN) is increasingly advocated.
- Simplistic interpretation of GN: require uniform system.
- We adopt more sophisticated approach:
  - menu of contracts which must be self-selecting (net pension and retirement age)
  - formally, GN is equivalent to assuming that gender is not observable.

## Model

- **Instantaneous utility** function of an individual of age $t$ :

$$V(t) = u(c(t)) - r(t)\,\ell(t),$$

where $c$ is consumption, with $u$ strictly increasing and concave, and $\ell$ is labor supply; $r(t)$ is the instantaneous intensity of labor disutility, increasing and convex function: $\rightarrow$ disutility of labor increases with age at an increasing rate.

- Simplifying assumption: $\ell \in \{0, 1\}$:

$$\begin{aligned} V(t) &= u(c(t)) - r(t) \qquad && \text{if } t \leq \tau \\ &= u(c(t)) && \text{if } t > \tau, \end{aligned}$$

where $\tau$ denotes the retirement age.

- **Lifetime utility** is therefore

$$U = \int_0^T V(t)dt = \int_0^T u(c(t))dt - \underbrace{\int_0^\tau r(t)dt}_{R(\tau)=\text{lifetime disutility from labor}}.$$

Perfect capital markets and certain lifetime $\rightarrow$ the level of *consumption is equal in all periods*. Hence,

$$U = Tu(c) - R(\tau).$$

- $w_j$ $\rightarrow$ per-period earnings $\Rightarrow$ $w_j \tau_j^i$ $\rightarrow$ lifetime labor income.
- $T_j c_j^i$ $\rightarrow$ lifetime consumption, $i = s, c$; $j = m, f$.

- Men and women populate society in equal proportions, they can be singles or live in couple.
- Gender and longevity gap:

$$w_f \leq w_m \text{ and } T_f \geq T_m.$$

- Utility when dead is normalized to zero.
- The social planner observes gender, marital status and retirement ages but not individual consumption.
- We study contracts defined by *retirement age* and *net pension benefit* $(\tau_j^i, P_j^i)$ contingent on marital status and gender $(i = s, c; j = m, f)$.
- Implementation: $P_j^i(\tau_j^i)$.

## Laissez-faire (LF)

- Singles: $c_m^{s*} > c_f^{s*}$ but $\tau_f^{s*} \lesseqgtr \tau_m^{s*}$ depending on intertemporal elasticity of substitution.
- Couples (unitary): disposable income is equally shared between partners, $c_f^{c*} = c_m^{c*} = c^{c*}$, but men retire later than their spouses $\tau_m^{c*} > \tau_f^{c*}$.

## First-best (FB)

- Social welfare function:

$$SW = \varphi(U_f) + \varphi(U_m),$$

  where $\varphi$ is increasing and concave; for example

$$\varphi = \frac{1}{1-\nu} U_j^{1-\nu}, \; j = m, f,$$

  where $\nu$ is the degree of **aversion to lifespan inequality**.

- For $\nu = 0$ (linear $\varphi$) $\Rightarrow$ utilitarian solution. Redistribution across *groups with different income*.

- For $\nu > 0$ $\Rightarrow$ introduces the concern for redistribution across *groups with different lifespan*.

- For $\nu \to \infty \Rightarrow$ Rawlsian welfare function implying $U_f = U_m$.

- **Singles only**:
  - when $\varphi$ is linear, redistribution $m \to f$ is always optimal: $P_f^{sFB}(\tau_f) > 0 > P_m^{sFB}(\tau_m)$;
  - when $\varphi$ is concave, redistribution *may be* reversed. But, in our calibrated numerical simulations, optimal redistribution remains $m \to f$.
- **Couples only:**
  - when $\varphi$ is linear, redistribution $m \to f$ is optimal together with $\tau_f^{cFB} < \tau_m^{cFB}$ and the *laissez-faire* is optimal;
  - when $\varphi$ is sufficiently concave, redistribution $f \to m$ is optimal and $\tau_f^{cFB} > \tau_m^{cFB}$ holds.

## Gender neutrality

- Menu with two (incentive compatible) pension schemes $\Rightarrow$ this limits feasible redistribution.
- Add incentive compatibility constraints.
- Bidimensional heterogeneity: no *general* single-crossing property can be established. Either one or the other of both $IC$ may be binding.
- For singles:

$$T_f u\left(\frac{w_f \tau_f^s + P_f^s}{T_f}\right) - R(\tau_f^s) \geq T_f u\left(\frac{w_f \tau_m^s + P_m^s}{T_f}\right) - R(\tau_m^s),$$
$$T_m u\left(\frac{w_m \tau_m^s + P_m^s}{T_m}\right) - R(\tau_m^s) \geq T_m u\left(\frac{w_m \tau_f^s + P_f^s}{T_m}\right) - R(\tau_f^s).$$

- Similar for couples, but recall that spouses pool their resources $\Rightarrow$ feasible redistribution reduces even more

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\begin{aligned}
&(T_f+T_m)u\left(\frac{1}{(T_m+T_f)}\left(w_m\tau_m^c+w_f\tau_f^c+P_m^c+P_f^c\right)\right)-R(\tau_f^c)-R(\tau_m^c)\geq\\
&(T_f+T_m)u\left(\frac{1}{(T_m+T_f)}(w_m+w_f)\tau_m^c+2P_m^c\right)-2R(\tau_m^c),\\
&(T_f+T_m)u\left(\frac{1}{(T_m+T_f)}\left(w_m\tau_m^c+w_f\tau_f^c+P_m^c+P_f^c\right)\right)-R(\tau_f^c)-R(\tau_m^c)\geq\\
&(T_f+T_m)u\left(\frac{1}{(T_m+T_f)}(w_m+w_f)\tau_f^c+2P_f^c\right)-2R(\tau_f^c).
\end{aligned}
$$

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- **Singles**:
  - Different cases are possible according to binding $IC$ constraint
  - In our calibrated simulations, constraint $m \rightarrow f$ is binding $\Rightarrow$ **gender neutrality impairs single women**.
- **Couples:**
  - the first best allocation is incentive compatible iff $\tau_f^{cFB} \leq \tau_m^{cFB}$,
  - if $\tau_f^{cFB} > \tau_m^{cFB}$, the second best is such that $\tau_f^{cSB} = \tau_m^{cSB}$ and $P_f^{cSB} = P_m^{cSB} = 0 \Rightarrow$ **gender neutrality impairs male spouses**.

## Concluding comments

- Our theoretical analysis is completed by numerical simulation based on a calibrated model.
- Illustrate our analytical result and show which of the cases discussed are likely to arise with empirically relevant parameter values.
- Quantify the size of the overall welfare cost imposed to society by gender neutrality, as well as its impact on the different segments of the population: male and female singles and spouses.
- In addition, we also consider the more realistic case where singles and couples coexist.

- **Gender neutrality** hurts the gender towards whom redistribution is targeted.
  - it **impairs single women and male spouses**.
  - it **largely benefit single men**.