

Should we differentiate the retirement age by  
socio-economic status?  
A tagging problem

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# Background information

- High differences of LE between socio-economic categories:  
10.37 years between a woman in the 1<sup>st</sup> percentile and one in the 100<sup>th</sup> in the US (Chetty et al., 2016)
- Gap is increasing overtime:  
A man in the 4<sup>th</sup> income quartile has gained on average 0.2 years of LE (at 40), each year between 2001 and 2014;  
In the 1<sup>st</sup>: only 0.08. (Chetty et al., 2016)
- Confirmed by lot of studies:
  - US: Olshansky et al. (2012); Cristia (2009); Meara et al. (2008)
  - Europe: Steingrímssdóttir et al. (2012); Huisman et al. (2004); Attanasio and Emmerson (2001)

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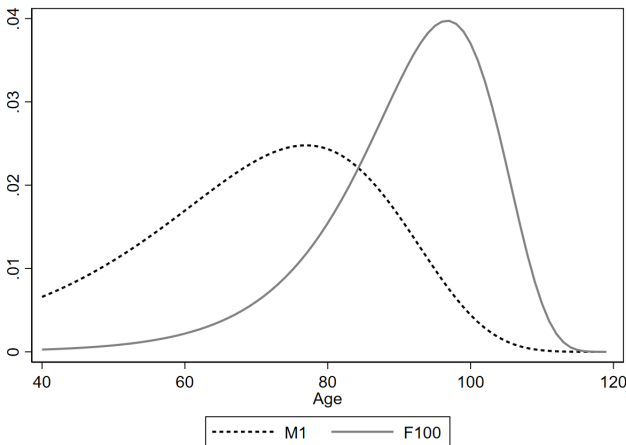
# The current policy debate

- The General Secretary of the Trades Union Congress in the UK (Brendan Barber):  
“We remain opposed to helping pay for more generous state pensions by increasing the state pension age. This means that the poor and those with stressful jobs will end up paying for better pensions of the better off with longer life expectancies.”
- Piketty (2019) criticized the recent French pension reform proposal for “taking no account of social inequalities in life expectancy”.

# The current policy debate

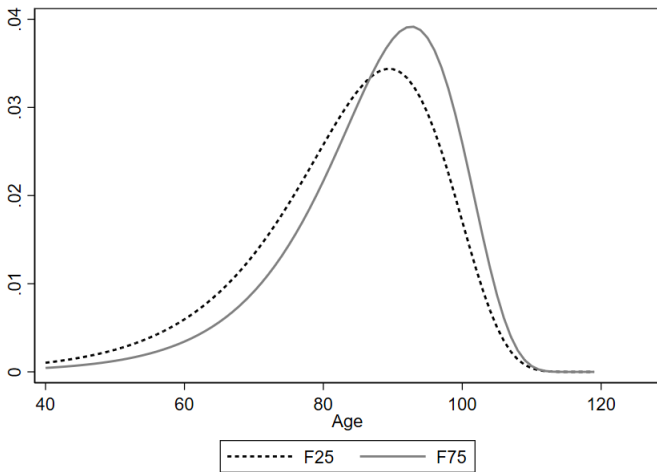
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# Empirical studies

- Studies:

- US: Liebman (2002); Coronado et al. (2000); Garrett (1995)
- France: Bommier et al. (2005)
- Germany: Haan et al. (2019)

- Policy recommendations:

- Differentiate the retirement age by socio-economic status (Ayuso et al., 2016)
- Other policy derived from this principle: linking the retirement benefit to the socioeconomic remaining LE (Breyer and Hupfeld, 2010)

- Tagging literature (Akerlof, 1978)

- Various characteristics: age (Weinzierl, 2011; Blomquist and Micheletto, 2008), gender (Alesina et al., 2011) or height (Mankiw and Weinzierl, 2010)
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# Research question

- To what extent, a different retirement age by socio-economic characteristics decrease the inadequacy of the pension system?
  - Inadequacy is defined as the deviation between the fair retirement age and the one of the system
  - The fair retirement age is defined as a given  $\alpha$  percentage of the individual's longevity

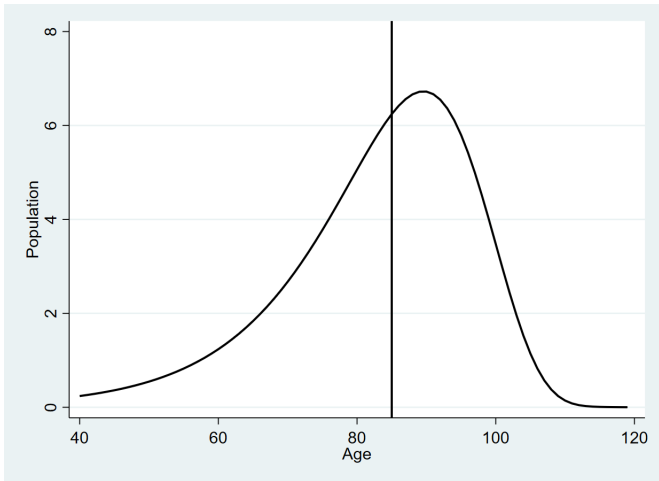
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# Research question







## Most related

- Pestieau and Racionero (2016):
  - Short- and long-lived individuals in 2 jobs: one harsh and one soft (with more short-lived in the harsh)
  - They show the importance for a pension system to be sufficiently flexible for the fairness towards the short-lived in the soft job (i.e. the group with the high life expectancy).



# Index of improvement of adequacy of the pension system

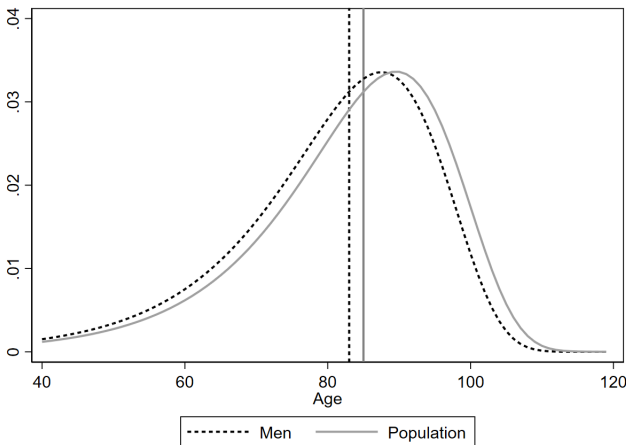
$$I(\mathbf{m}) = \frac{\sum_{j=1}^k \sum_{i=1}^{n_j} |\alpha m_{i,j} - \alpha \mu_j(\mathbf{m}_j)|^\beta}{\sum_{j=1}^k \sum_{i=1}^{n_j} |\alpha m_{i,j} - \alpha \mu(\mathbf{m})|^\beta} \quad (1)$$

$$s.t. \quad \mu(\mathbf{m}) \in \arg \min_{\mu(\mathbf{m})} \sum_{j=1}^k \sum_{i=1}^{n_j} |\alpha m_{i,j} - \alpha \mu(\mathbf{m})|^\beta \quad (2)$$

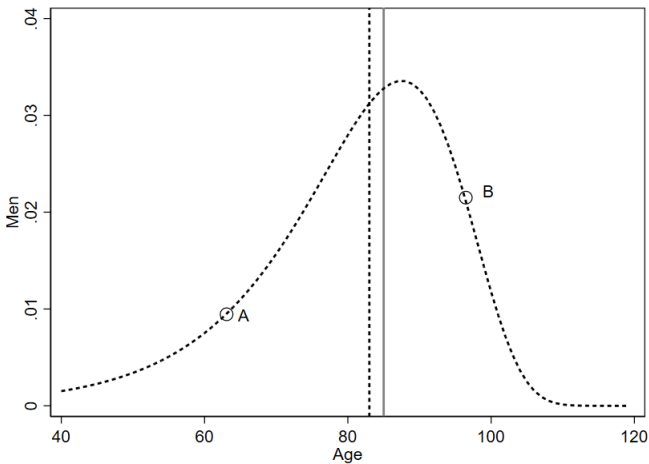
$$\mu_j(\mathbf{m}_j) \in \arg \min_{\mu_j(\mathbf{m}_j)} \sum_{i=1}^{n_j} |\alpha m_{i,j} - \alpha \mu_j(\mathbf{m}_j)|^\beta, \forall j \quad (3)$$

where  $m_{i,j}$  is the longevity of the individual  $i$  in the  $j$  group.

# Illustrations



# Illustrations



# Data

- Mortality rates taken from Chetty et al. (2016) by sex and income percentile or by state, sex and income quartile
- Construction of longevity distribution with life-table techniques (Chiang, 1984)
- Simulations start at 40



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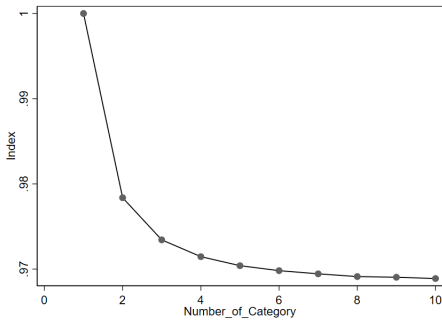




# No error aversion ( $\beta = 1$ )

Index												
$\beta$	By sex		By percentile		By sex & percentile		By state		By state & sex		By state & sex & quartile	
		98.32 %		96.80 %		95.04 %		99.59 %		97.92 %		95.08 %
Retirement age ( $\alpha = 1$ )												
Unique	Male	Female	25 <sup>th</sup>	75 <sup>th</sup>	M, 25 <sup>th</sup>	F, 75 <sup>th</sup>	Minnesota	Nevada	Min, M	Nev, F	Min, M, 1 <sup>st</sup>	Nev, F, 4 <sup>th</sup>
85	83	88	83	87	80	89	87	83	85	85	79	88

# No error aversion ( $\beta = 1$ )



Error aversion ( $\beta \rightarrow 10$ )

$\beta$	Index					
	By sex	By percentile	By sex & percentile	By state	By state & sex	By state & sex & quartile
1	98.32 %	96.80 %	95.04 %	99.59 %	97.92 %	95.08 %
2	97.64 %	94.97 %	92.35 %	99.53 %	97.15 %	92.57 %
3	96.89 %	93.38 %	90.16 %	99.38 %	96.40 %	90.54 %
4	96.72 %	92.54 %	88.83 %	99.47 %	96.03 %	89.30 %
5	95.88 %	91.68 %	87.56 %	99.41 %	95.41 %	88.18 %
10	94.39 %	90.18 %	84.30 %	99.07 %	93.17 %	85.14 %

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	Unique	Male	Female	25 <sup>th</sup>	75 <sup>th</sup>	M, 25 <sup>th</sup>	F, 75 <sup>th</sup>	Minnesota	Nevada	Min, M	Nev, F	Min, M1 <sup>st</sup>	Nev, F4 <sup>th</sup>
1	85	83	88	83	87	80	89	87	83	85	85	79	88
2	83	81	85	80	85	78	86	84	81	82	83	77	86
3	81	79	82	79	83	76	84	82	79	80	81	75	84
4	79	77	80	77	81	75	82	80	78	79	79	74	82
5	78	76	79	76	79	74	81	79	77	77	78	74	80
10	75	73	76	74	76	72	77	75	74	74	75	72	76

# Stylized facts

- A higher  $\beta$  implies a decrease in the index.
- A higher  $\beta$  decreases the retirement age.
- A higher  $\beta$  decreases the gap between the retirement age.

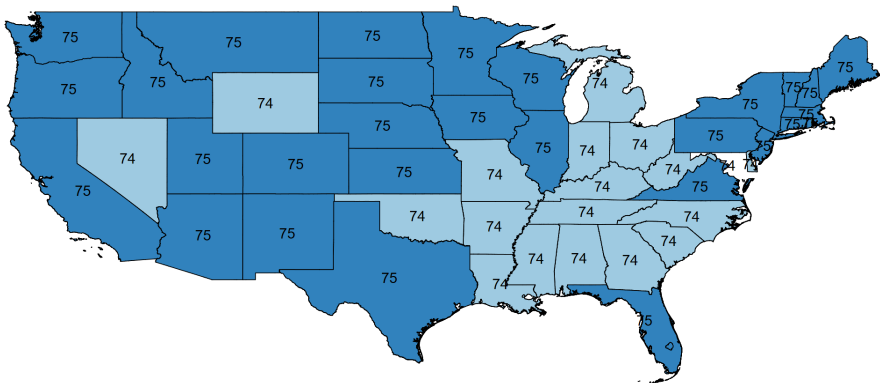
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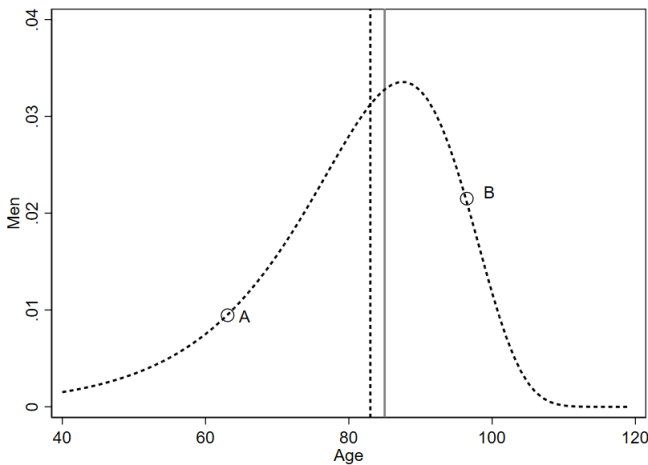
# Huge error aversion ( $\beta = 10$ )



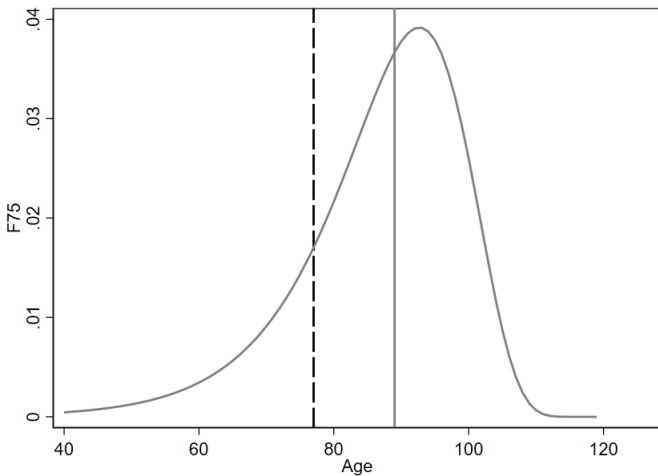
▶  $\beta = 1$



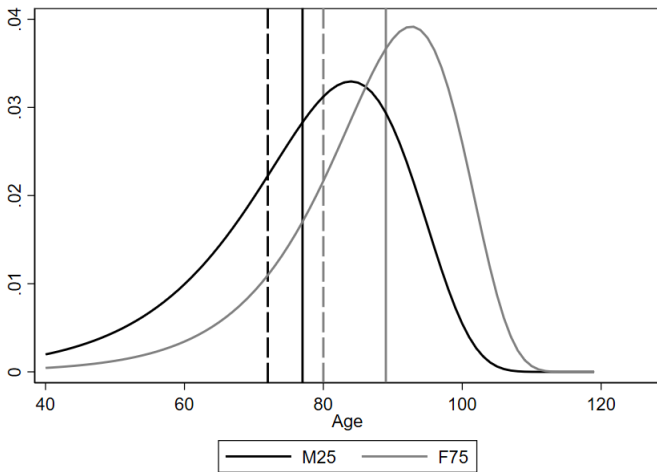
# Stylized fact n°1



# Stylized fact n°2



# Stylized fact n°3



# Different weights for positive versus negative deviations

$$I(\mathbf{m}) = \frac{\left(\sum_{j=1}^k \sum_{i=1}^{n_j} |\alpha m_{i,j} - \alpha \mu_j(\mathbf{m}_j)|^\beta |m_{i,j} \leq \mu_j(\mathbf{m}_j)\right) + \left(\sum_{j=1}^k \sum_{i=1}^{n_j} \sigma |\alpha m_{i,j} - \alpha \mu_j(\mathbf{m}_j)|^\beta |m_{i,j} \geq \mu_j(\mathbf{m}_j)\right)}{\left(\sum_{j=1}^k \sum_{i=1}^{n_j} |\alpha m_{i,j} - \alpha \mu(\mathbf{m})|^\beta |m_{i,j} \leq \mu(\mathbf{m})\right) + \left(\sum_{j=1}^k \sum_{i=1}^{n_j} \sigma |\alpha m_{i,j} - \alpha \mu(\mathbf{m})|^\beta |m_{i,j} \geq \mu(\mathbf{m})\right)} \quad (4)$$

$\sigma$	Unique	By sex		By percentile		By sex and percentile	
		Male	Female	25 <sup>th</sup>	75 <sup>th</sup>	Male, 25 <sup>th</sup>	Female, 75 <sup>th</sup>
1	85	83	88	83	87	80	89
0.75	83	81	85	80	85	77	87
0.5	80	77	82	77	82	74	84
0.25	73	71	76	70	76	68	78
0	40	40	40	40	40	40	40

# Different weights for positive versus negative deviations

$\sigma/\beta$	By sex			By percentile			By sex and percentile		
	1	2	5	1	2	5	1	2	5
1	98.32 %	97.64 %	95.88 %	96.80 %	94.97 %	91.68 %	95.04 %	92.35 %	87.56 %
0.75	98.48 %	97.65 %	96.33 %	96.70 %	94.71 %	91.73 %	95.06 %	92.18 %	87.67 %
0.5	98.55 %	97.72 %	96.22 %	96.42 %	94.41 %	91.50 %	94.96 %	92.00 %	87.54 %
0.25	98.78 %	97.86 %	96.49 %	96.09 %	93.91 %	91.29 %	94.89 %	91.74 %	87.50 %
0	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %

# Philosophical choices

- Decide which framework should be used:
  - Ex post or ex ante?
    - No empirical simple answer (Andreoni et al., 2016; Brock et al., 2013; Krawczyk and Le Lec, 2010; Falk et al., 2008)
    - Some papers strongly support ex post:
      - “Egalitarianism that focuses on inequalities in life expectancies instead of in actual longevities may miss its target. At the end of the day, what matters is what people achieve, not what they expected to achieve” (Fleurbaey et al., 2016, p. 201)
  - Between individuals or between socioeconomic groups?
    - Auerbach and Hassett (2002)

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# Possibles solutions?

- We have a strong need to find another policy to compensate short-lived people
- More papers in the style of “Compensating the dead” (Fleurbaey et al., 2014)?

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