

Séminaire annuel du Syndicat des Actuaire Conseil (SACEI)

DEAUVILLE, 24 septembre 2015

La révolution de la longévité des adultes

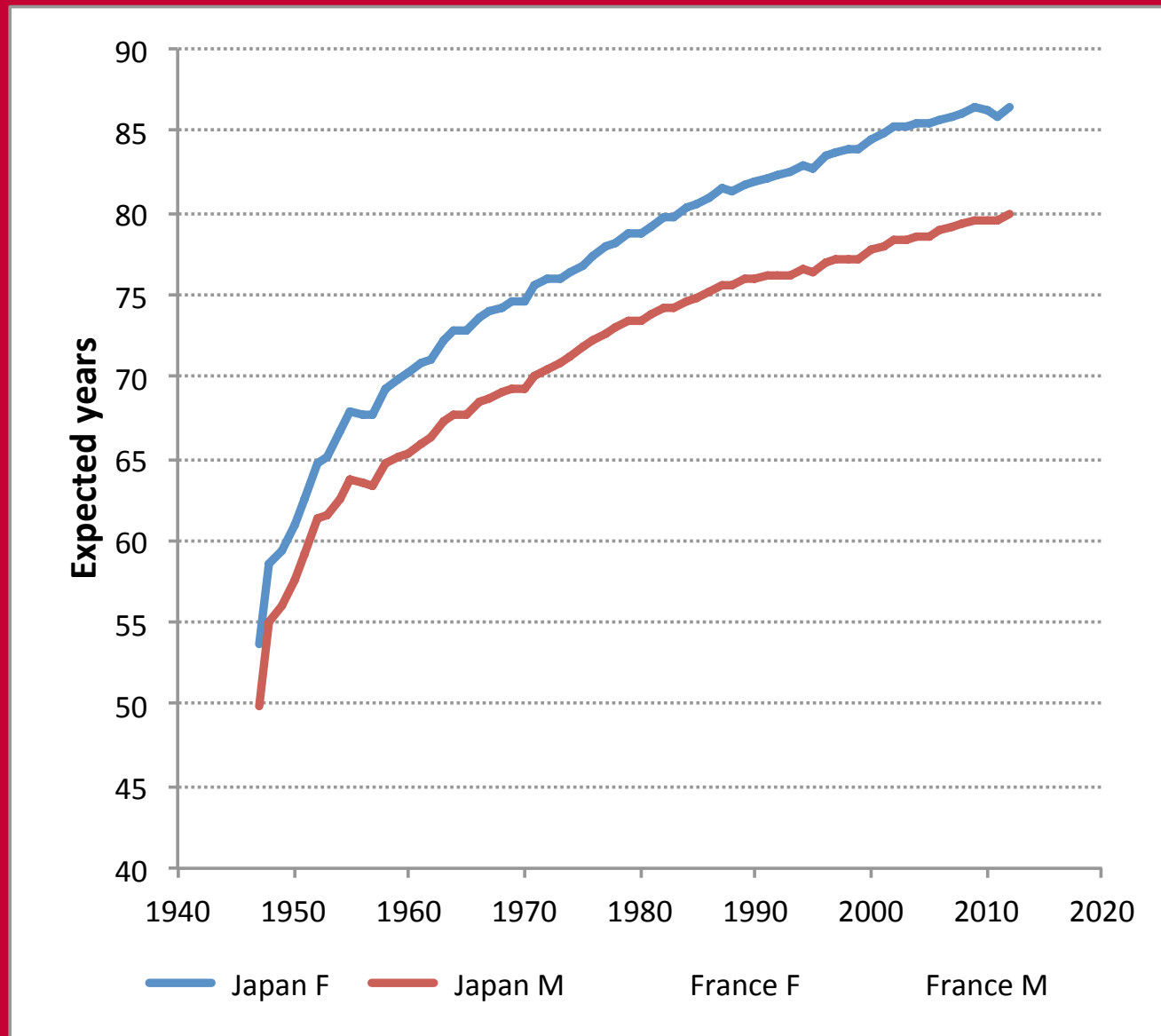
Jean-Marie Robine

INSERM – EPHE, Paris and Montpellier, France

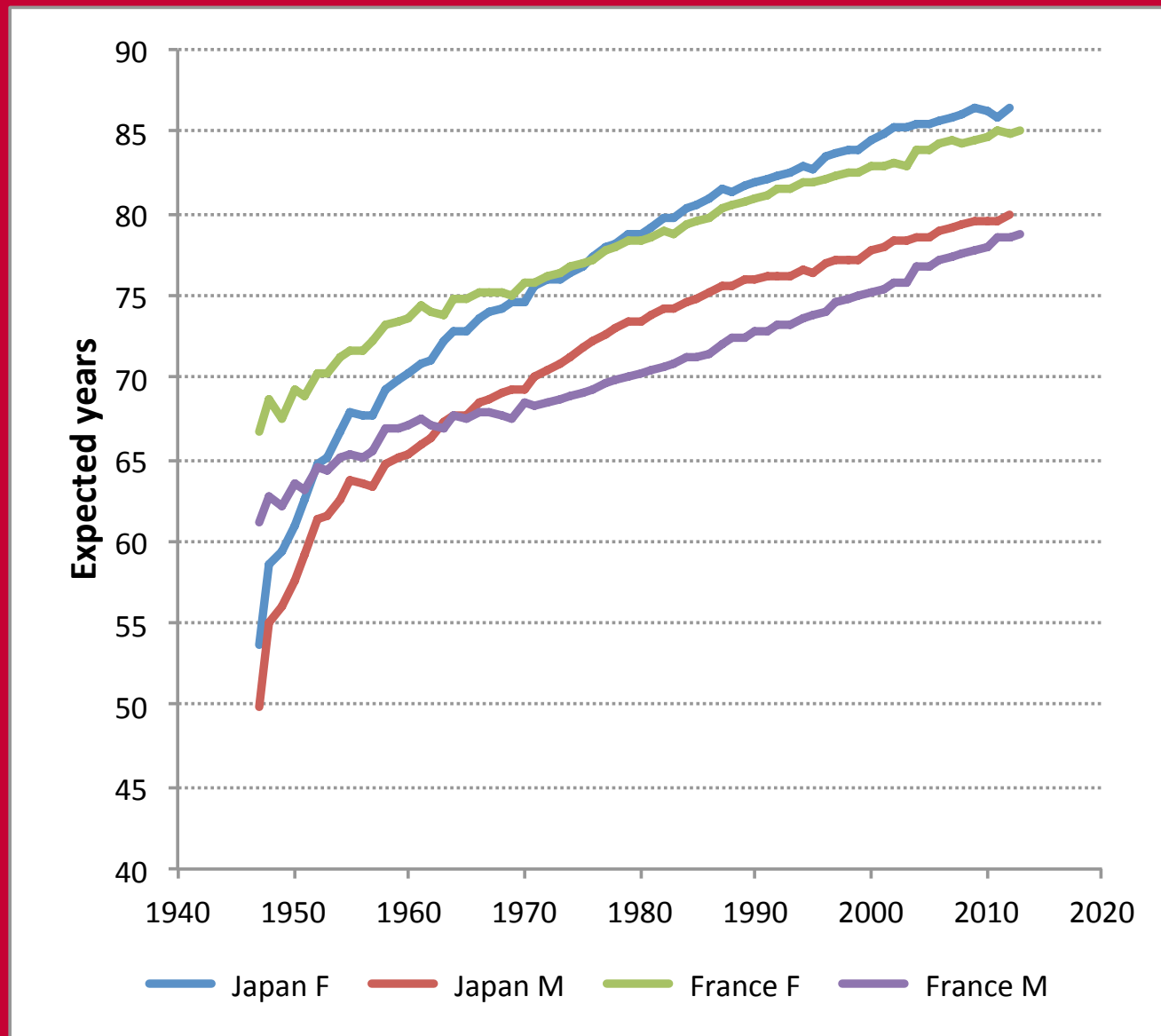


La longévité? Quels gains?

Plus d'années de vie ?



Plus d'années de vie ?

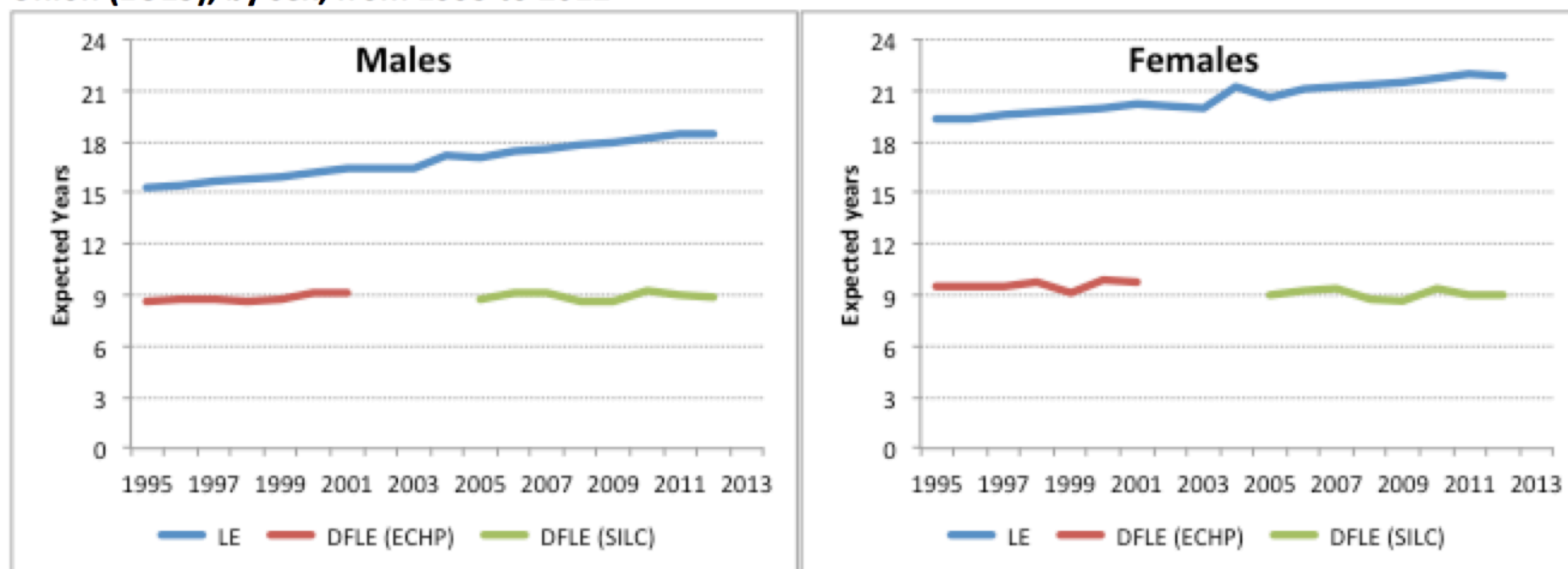


Plus d'années de vie en bonne santé?

Tendances de l'espérance de vie sans incapacité à 65 ans en Europe

EV et EVSI à 65 ans, UE15, 1995-2012

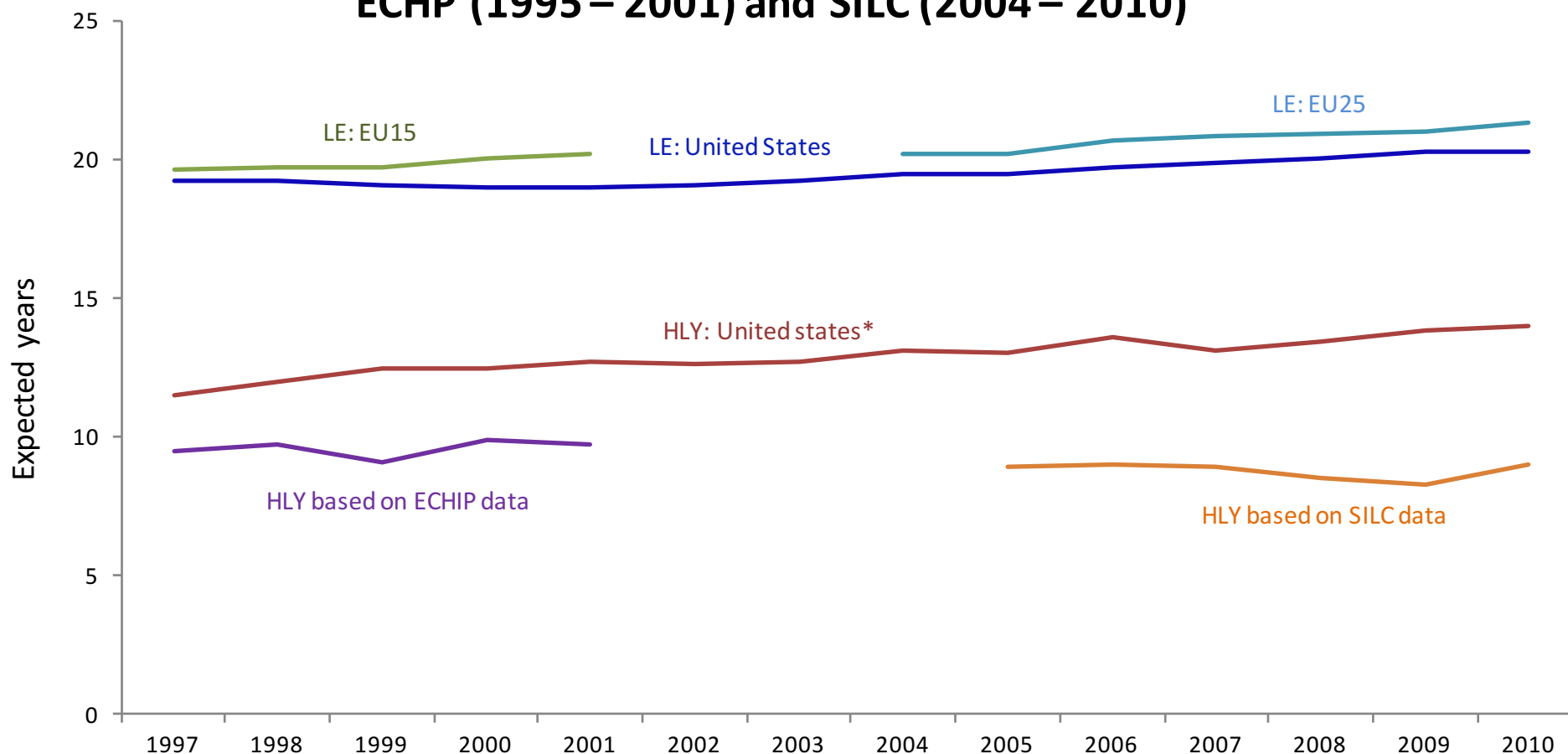
Life expectancy (LE) and disability-free life expectancy (DFLE) at age 65 in 15 members of the European Union (EU15), by sex, from 1995 to 2012



Note: Data on disability come from the European Community Household Panel (EHP) from 1995 to 2001 and from the European Statistics on Income and Living Conditions (EU-SILC) since 2005. No data are available for 2002-2004; Calculation: www.eurohex.eu

Tendances aux Etats-Unis

Figure 1. Female Life Expectancy (LE) and Healthy Life Years (HLY) at age 65 for the U.S. NHIS (1997-2010)* and European Union (EU15 and EU25) based on ECHP (1995 – 2001) and SILC (2004 – 2010)



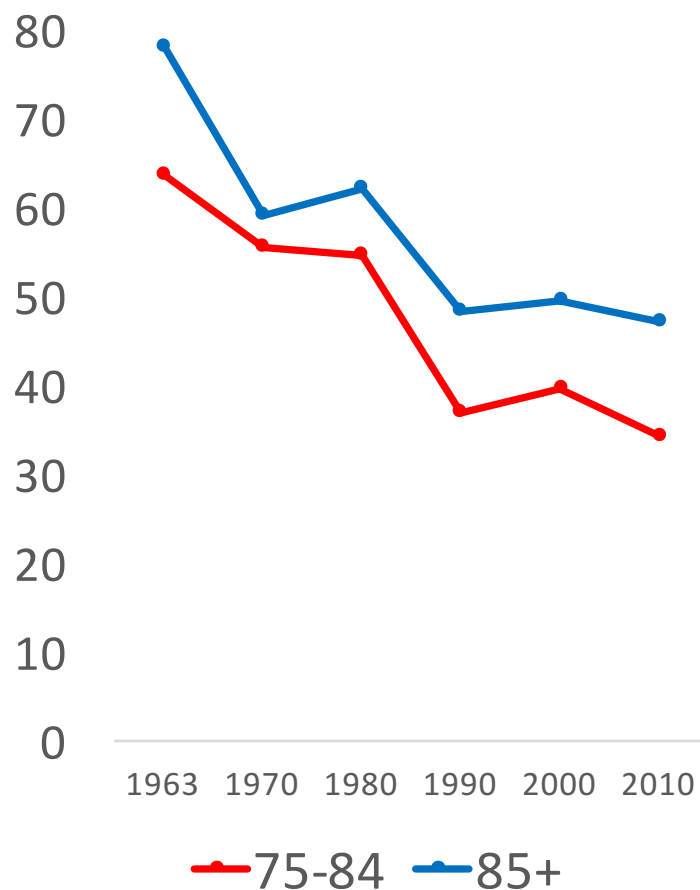
U. S.	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
LE	19.2	19.2	19.1	19.0	19.0	19.1	19.2	19.5	19.5	19.7	19.9	20.0	20.3	20.3
HLY	11.5	12.0	12.5	12.5	12.7	12.6	12.7	13.1	13.0	13.6	13.1	13.4	13.8	14.0
% HLY/LE	60.1	62.4	65.3	66.0	66.5	66.1	66.3	67.3	66.6	68.9	65.8	67.2	67.9	68.8

* Based on responses to five activity limitation questions.

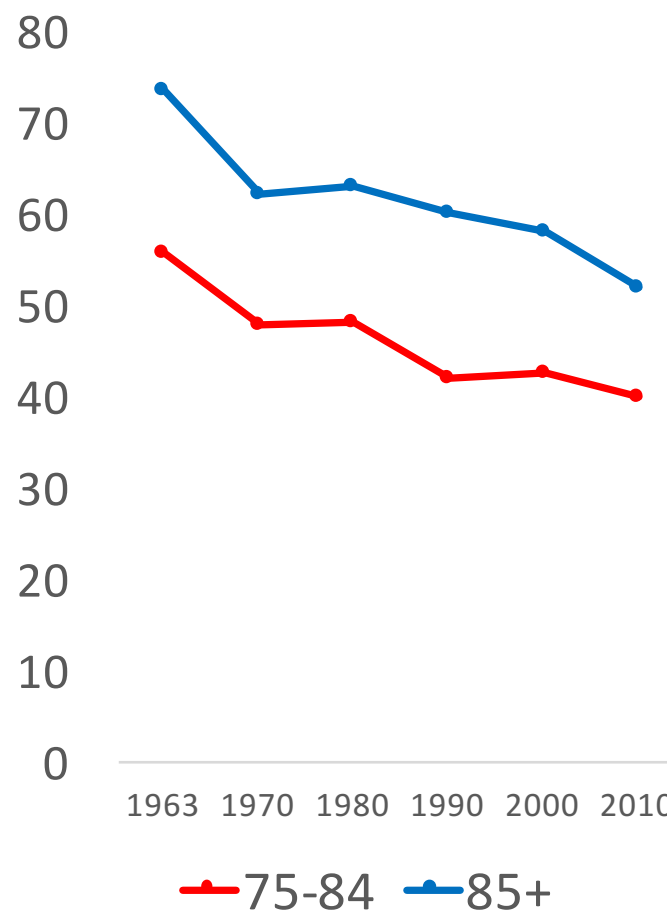
SOURCE: Madans JA-EHLEIS, 2014

Long Term Improvement in Less Severe Disability: Percent With Any Activity Limitation (USA, 1963 -2010)

Males



Females



SOURCE: Crimmins, GSA, 2014

Tendances de la prevalence des démences

Decline in the prevalence of dementia

PERSPECTIVE

NEW INSIGHTS INTO THE DEMENTIA EPIDEMIC

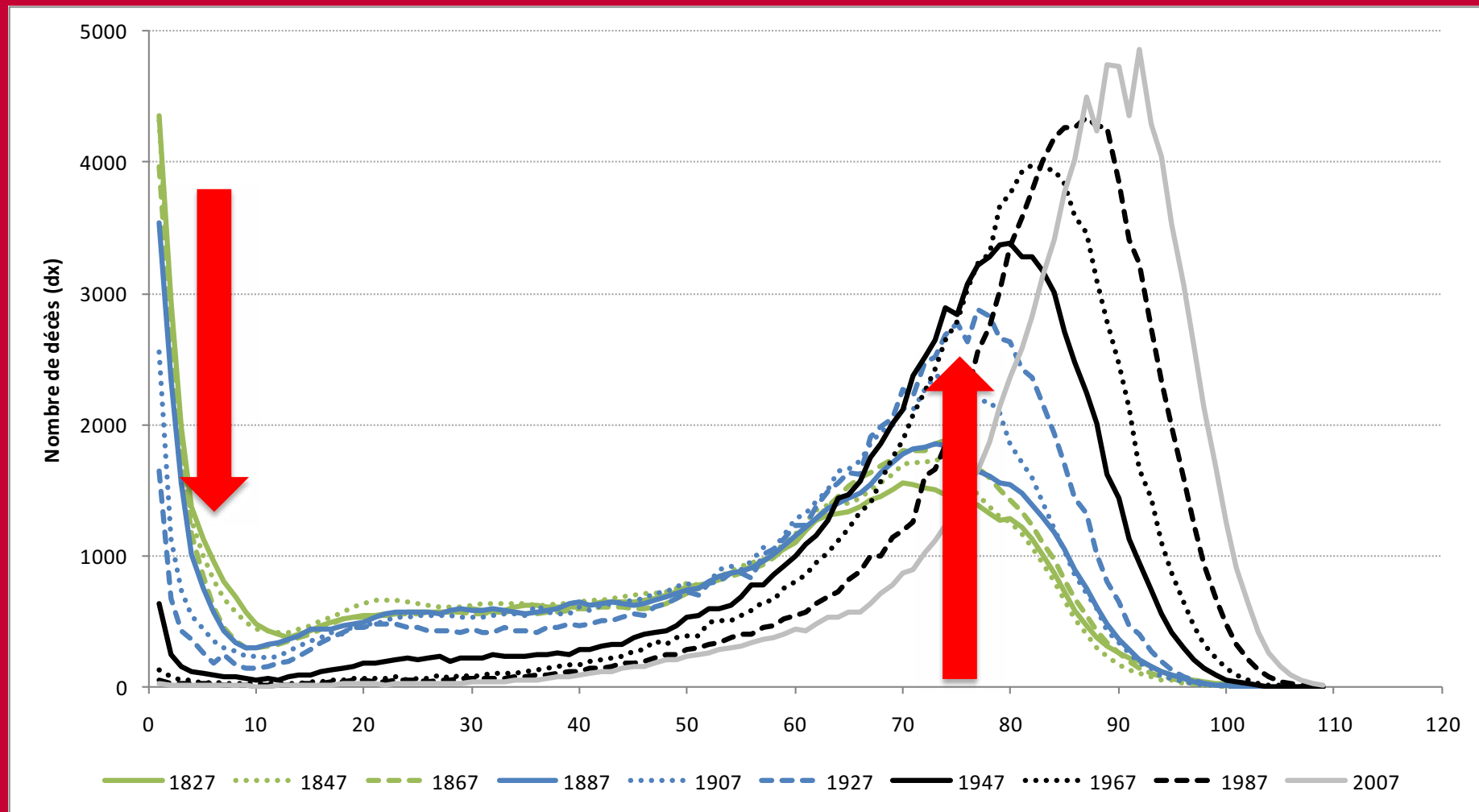
Selected Recent Studies of the Dementia Epidemic.				
Study	Outcome	Data Source	Key Findings	Factors
Manton et al. (United States) ¹	Prevalence of severe cognitive impairment	National long-term care survey interviews, 1982–1999	Decline in dementia prevalence among people ≥65 yr of age (5.7% to 2.9%)	Higher educational level, decline in stroke incidence
Langa et al. (United States) ²	Prevalence of cognitive impairment	Ongoing population-based survey of people ≥51 yr of age	Prevalence of cognitive impairment among people ≥70 yr of age (12.2% in 1993 vs. 8.7% in 2002)	Higher educational level; combination of medical, lifestyle, demographic, and social factors
Schrijvers et al. (Rotterdam) ³	Incidence of dementia	Population-based cohort ≥55 yr of age in 1990, extended in 2000	Incidence rate ratios (6.56 per 1000 person-yr in 1990 vs. 4.92 per 1000 person-yr in 2000)	Higher educational level, reduction in vascular risk, decline in stroke incidence
Qiu et al. (Stockholm) ⁴	Prevalence of DSM-III-R dementia*	Cross-sectional survey of people ≥75 yr of age, 1987–1989 and 2001–2004	Age- and sex-standardized dementia prevalence (17.5% in 1987–1989 vs. 17.9% in 2001–2004); lower hazard ratio for death in later cohort suggests decreased dementia incidence	Favorable changes in risk factors, especially vascular risk; healthier lifestyles
Matthews et al. (England) ^{5,†}	Prevalence of dementia in 3 regions	Survey interviews of people ≥65 yr of age, 1989–1994 (in CFAS I) and 2008–2011 (in CFAS II)	Dementia prevalence (8.3% in CFAS I vs. 6.5% in CFAS II)	Higher educational level, better prevention of vascular disease

* In the study by Qiu et al., dementia was diagnosed according to the criteria provided in the *Diagnostic and Statistical Manual of Mental Disorders*, third edition, revised (DSM-III-R).

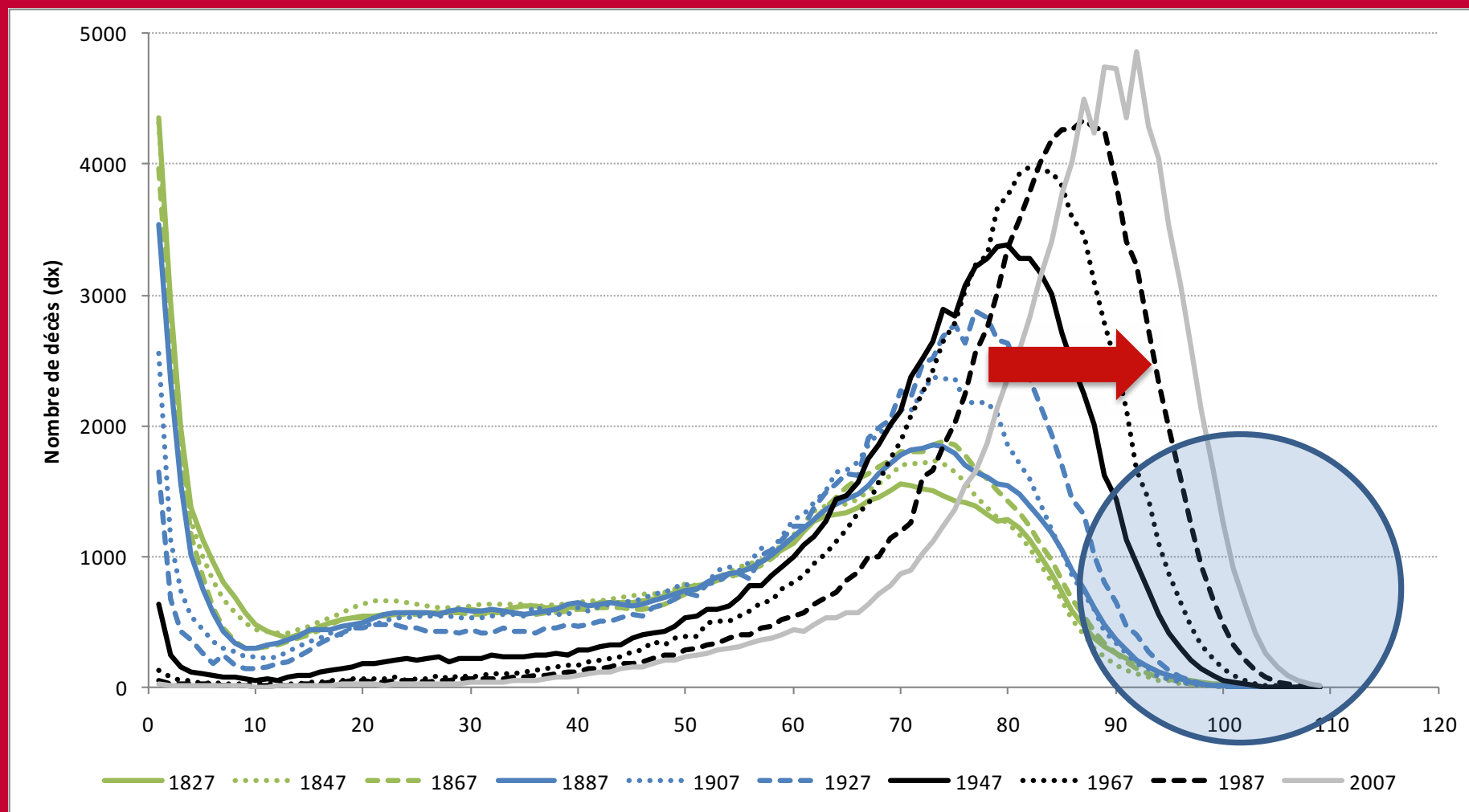
† CFAS denotes Cognitive Function and Ageing Study.

Plus de personnes très âgées ?

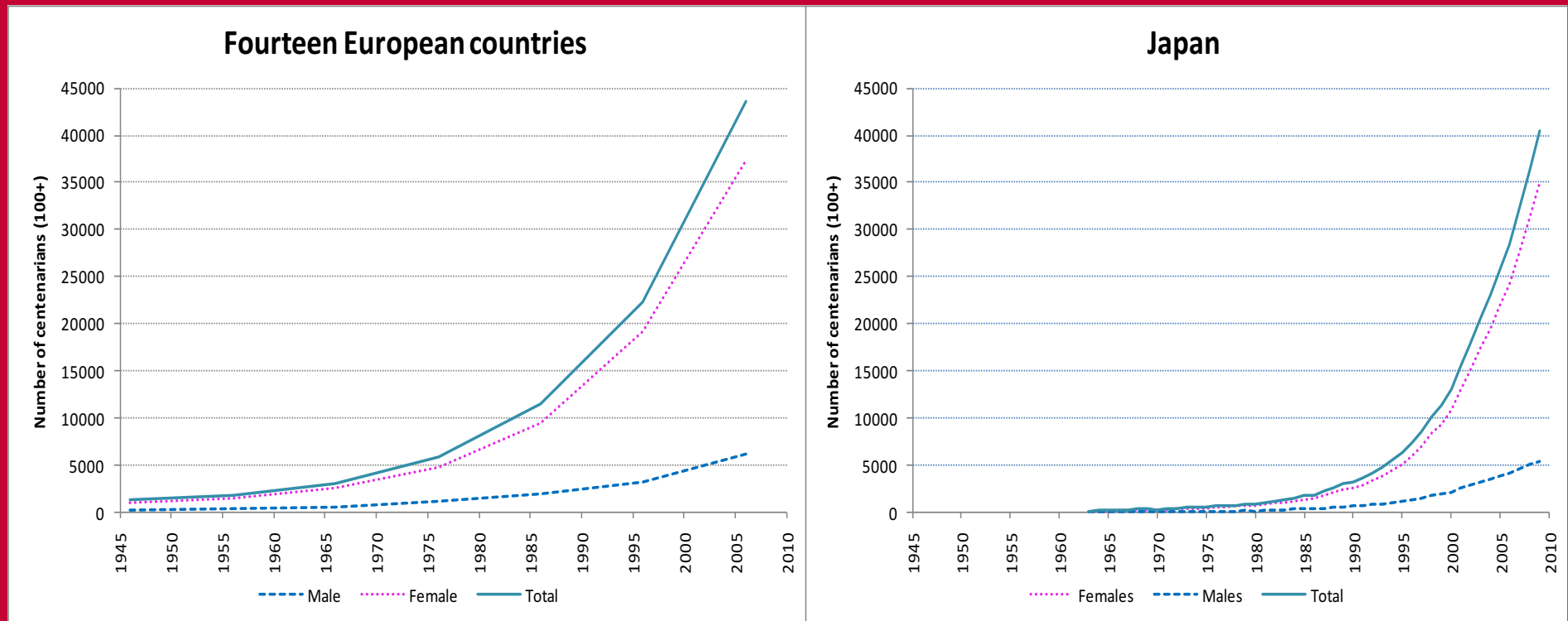
Change over time in the distribution of the ages at death in France since 1827, female - for 100.000 newborn



La révolution de la longévité



Nombre de centenaires: Europe vs. Japon



Europe vs. Japon

Number of Future Centenarians

December 2010

DWP Department for
Work and Pensions

Table 2: Number of centenarians in the United

Year	100+	110+
1980	2,300	-
1985	3,400	-
1990	4,400	-
1995	5,700	-
2000	6,800	-
2005	8,900	-
2010	11,800	-
2015	15,000	-
2020	21,900	-
2025	37,600	-
2030	58,800	100
2035	97,300	100
2040	148,900	400
2045	202,100	1,000
2050	276,600	2,100
2055	306,200	3,500
2060	378,200	5,600
2065	487,400	7,200
2066	507,000	7,700
2070	563,500	10,700
2075	587,000	16,200
2080	626,900	21,000

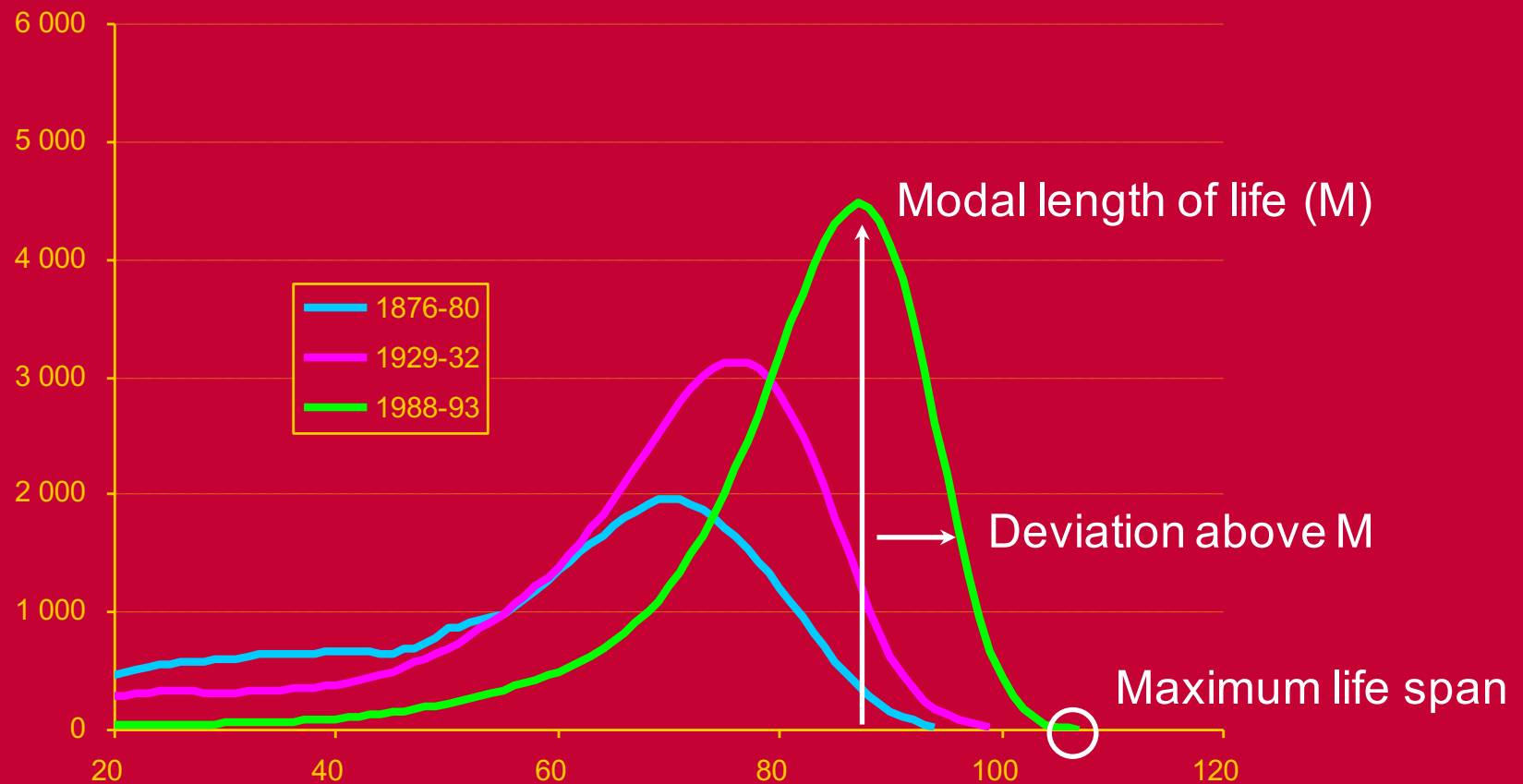
Numbers rounded to nearest 100. Population estimates have been based on the 2009, and 2008-based population projections from 2010

Source: Office for National Statistics, 2008-based Population Projections

Estimates of the very elderly:

www.statistics.gov.uk/statbase/Product.asp?vlnk=15003

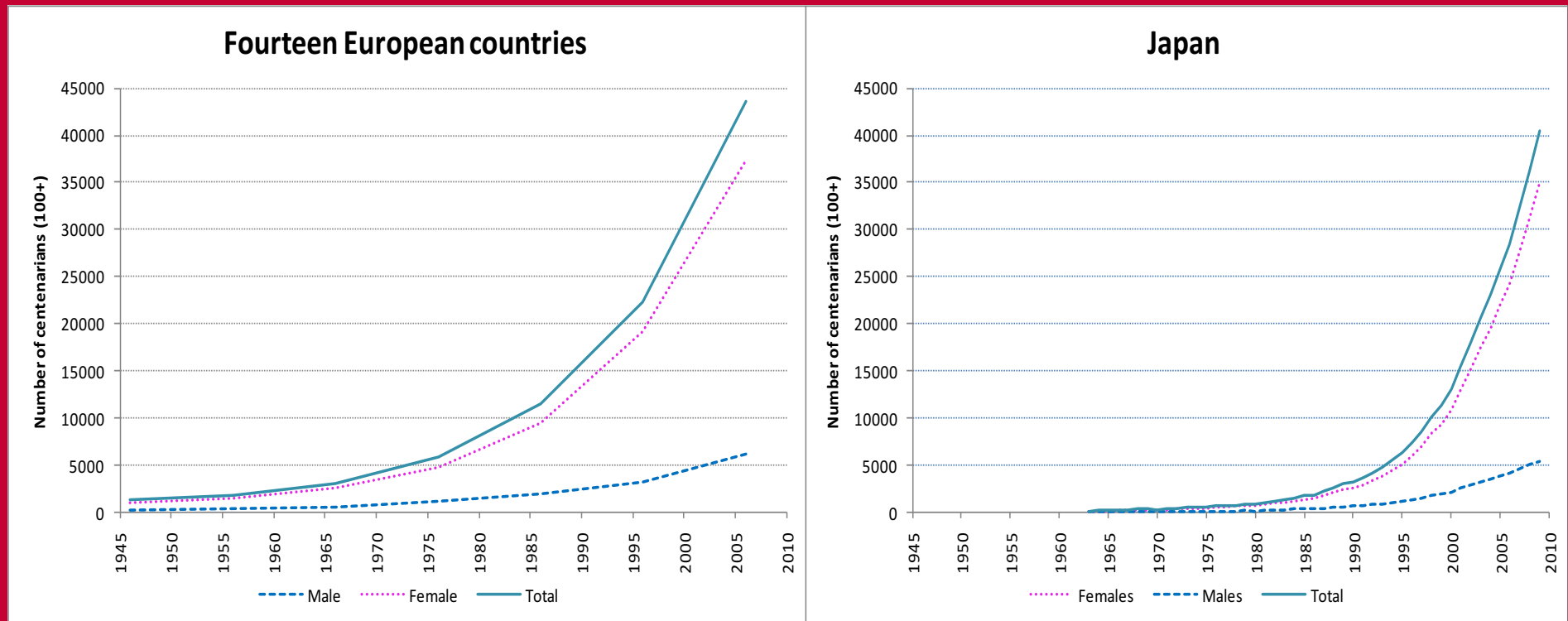
How long are adult life durations $d(x)$ series



Distribution of the ages at death in Switzerland
1876-1880, 1929-1932, 1988-1993

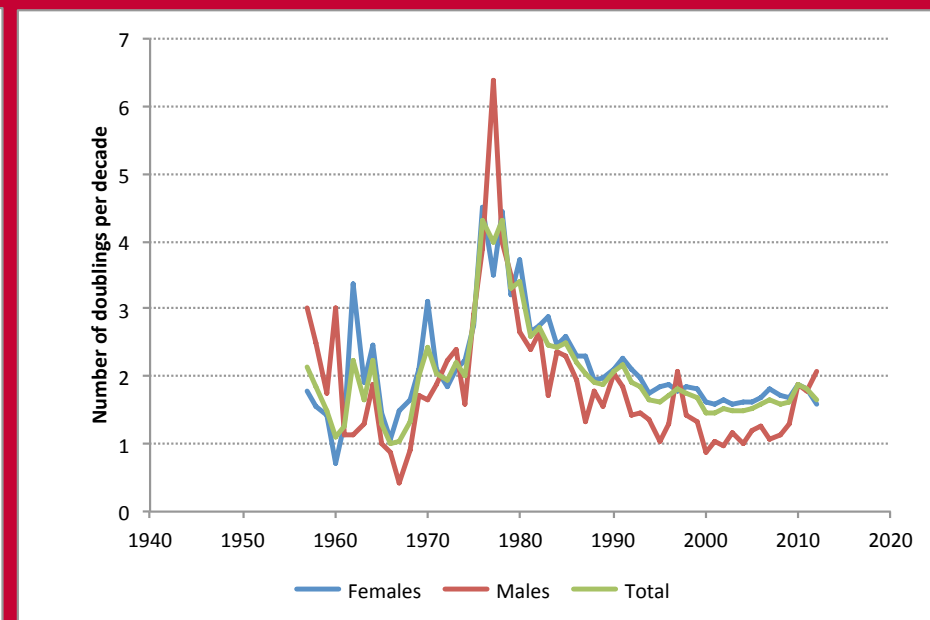
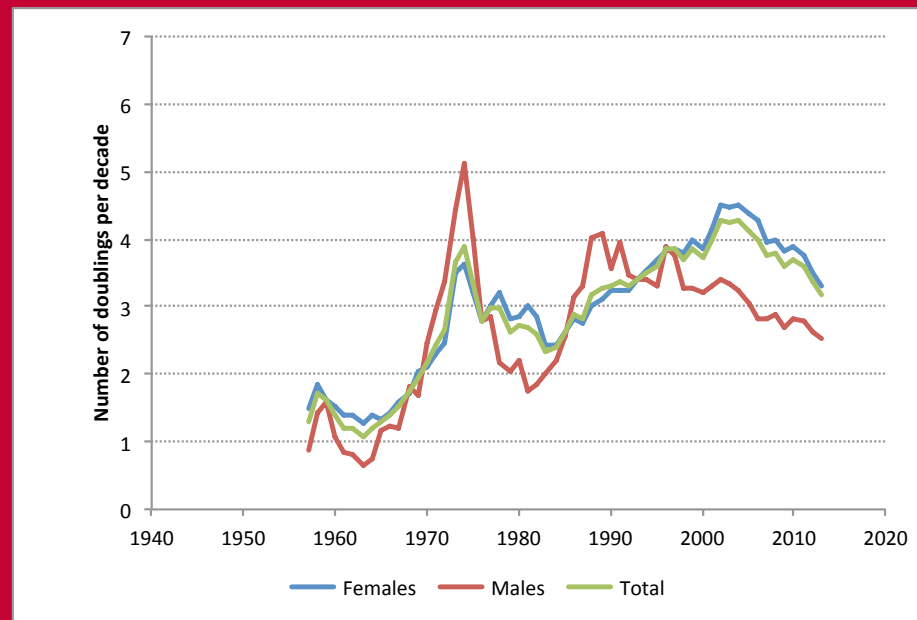
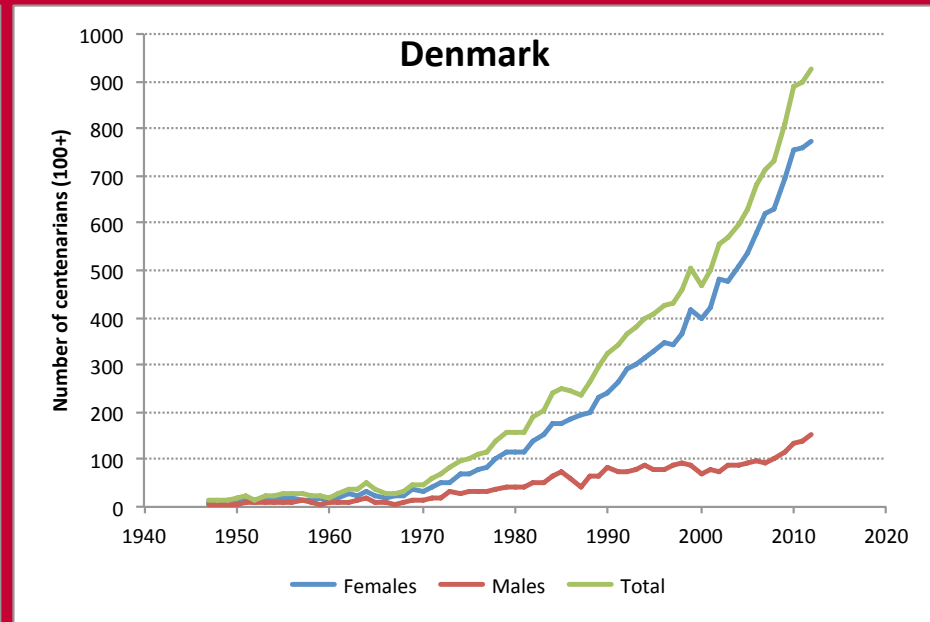
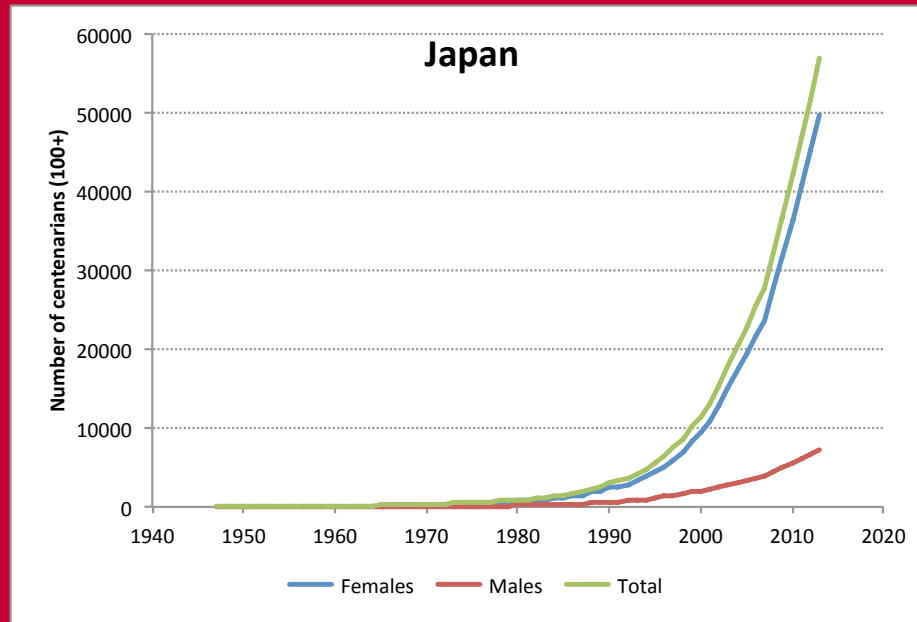
Compression vs. shifting mortality

Change in the number of centenarians in Europe vs. Japan



Europe vs. Japan

Nombre de centenaires (100+): Japon vs. Danemark



Plus de personnes très âgées
en bonne santé ?

Genetic and Environmental Determinants of Healthy Aging

Improving Activities of Daily Living in Danish Centenarians—But Only in Women: A Comparative Study of Two Birth Cohorts Born in 1895 and 1905

Henriette Engberg,¹ Kaare Christensen,¹ Karen Andersen-Ranberg,¹
James W. Vaupel,² and Bernard Jeune¹

¹The Danish Aging Research Center, Institute of Public Health, University of Southern Denmark, Odense.

²Max Planck Institute for Demographic Research, Rostock, Germany.

Background. The number of centenarians has increased rapidly since the 1950s. In Denmark, 42% more of the 1905

Results. The 1905 cohort displayed better self-reported ADLs than the 1895 cohort did. Stratified by gender, this apparent cohort advantage was due to women in the 1905 cohort performing significantly better than their female counterparts in the 1895 cohort.

Activities of Daily Living (ADLs) were assessed in both cohorts.

Conclusion. The increasing number of female centenarians does not entail increasing proportions of disabled individuals. In contrast, there is a lack of improvement in ADLs among male centenarians even though the number of male centenarians is stagnating.

Key Words: Centenarians—Activities of Daily Living—Cohort comparisons.

Physical and cognitive functioning of people older than 90 years: a comparison of two Danish cohorts born 10 years apart



Kaare Christensen, Mikael Thinggaard, Anna Oksuzyan, Troels Steenstrup, Karen Andersen-Ranberg, Bernard Jeune, Matt McGue, James W Vaupel

Summary

Background A rapidly increasing proportion of people in high-income countries are surviving into their tenth decade. Concern is widespread that the basis for this development is the survival of frail and disabled elderly people into very old age. To investigate this issue, we compared the cognitive and physical functioning of two cohorts of Danish nonagenarians, born 10 years apart.

Methods People in the first cohort were born in 1905 and assessed at age 93 years (n=2262); those in the second cohort were born in 1915 and assessed at age 95 years (n=1584). All cohort members were eligible irrespective of type of residence. Both cohorts were assessed by surveys that used the same design and assessment instrument, and had almost identical response rates (63%). Cognitive functioning was assessed by mini-mental state examination and a composite of five cognitive tests that are sensitive to age-related changes. Physical functioning was assessed by an activities of daily living score and by physical performance tests (grip strength, chair stand, and gait speed).

Lancet 2013; 382: 1507–13

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July 11, 2013

[http://dx.doi.org/10.1016/S0140-6736\(13\)60777-1](http://dx.doi.org/10.1016/S0140-6736(13)60777-1)

See [Comment](#) page 1473

See [Online](#) for a podcast interview with Kaare Christensen

Danish Aging Research Center, Institute of Public Health (Prof K Christensen MD, M Thinggaard MSc, A Oksuzyan MD,

Interpretation Despite being 2 years older at assessment, the 1915 cohort scored significantly better than the 1905 cohort on both the cognitive tests and the activities of daily living score, which suggests that more people are living to older ages with better overall functioning.

the physical performance tests, but the 1915 cohort had significantly better activities of daily living scores than did the 1905 cohort (2·0 [SD 0·8] vs 1·8 [0·7]; $p<0\cdot0001$).

Interpretation Despite being 2 years older at assessment, the 1915 cohort scored significantly better than the 1905 cohort on both the cognitive tests and the activities of daily living score, which suggests that more people are living to older ages with better overall functioning.

Funding Danish National Research Foundation; US National Institutes of Health—National Institute on Aging; Danish Agency for Science, Technology and Innovation; VELUX Foundation.

Summary, Background, Methods, Results, Interpretation, and Funding. Department of Clinical Genetics (K Christensen), Department of Clinical Biochemistry and Pharmacology (K Christensen), and Department of Geriatrics (K Andersen-Ranberg), Odense University Hospital, Odense, Denmark; Department of Psychology, University of Minnesota, Minneapolis, MN, USA (Prof M McGue PhD); and

Etudes japonaises, de 1973 à 2000

Prevalence of centenarians confined to the room						
Year	Population size	Sampling rate	% confined to the room		% bedridden	
			Males	Females	Males	Females
1973 (1)	405	28.9	19.1	37.5	14.3	21.9
1975 (2)	548	39.1	38.5	46.8	15.4	25.7
1981 (3)	1072	94.2	33.1	50.7	18.2	27.9
1992 (4)	4152	13.2	36.5	59.8	21.2	36.6
1993 (5)	4802	59.9	39.3	61.1	17.9	34.4
2000 (6)	13036	14.6	57,0	78,0	22.2	41.1

Research reports

- (1) Tokyo metropolitan institute of aging (1973)
- (2) Center for development of elderly welfare (1976)
- (3) Japan Health promotion and Fitness Foundation (1992)
- (4) Japan College of Social Work (1992)
- (5) Japan Health promotion and Fitness Foundation (1993)
- (6) Japan Health promotion and Fitness Foundation (2002)

Courtesy Yasuyuki Gondo

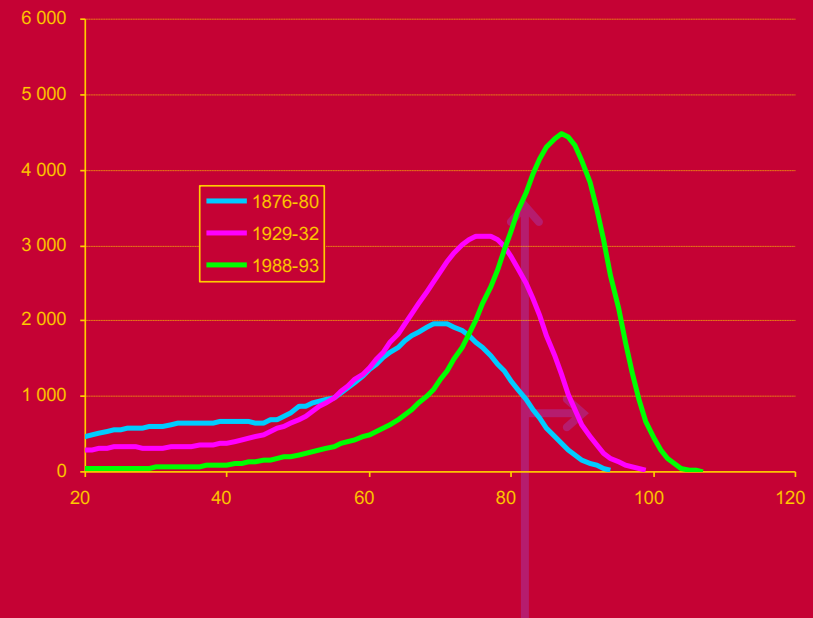
La longévité? Quels gains?

- Plus d'années de vie? **Oui, dans tous les pays.**
- Plus d'années en bonne santé? **A priori non en Europe. Mais oui aux Etats-Unis.**
- Plus de personnes très âgées? **Oui, beaucoup plus. Mais de grandes disparités entre les pays.**
- Plus de personnes très âgées en bonne santé? **Oui au Danemark. Mais non au Japon. Pourrait dépendre de la dynamique démographique: compression de la mortalité ou scénario "shifting mortality". Plus de personnes démentes? Peut-être pas? Plus de personnes fragiles? Nous ne savons pas encore.**

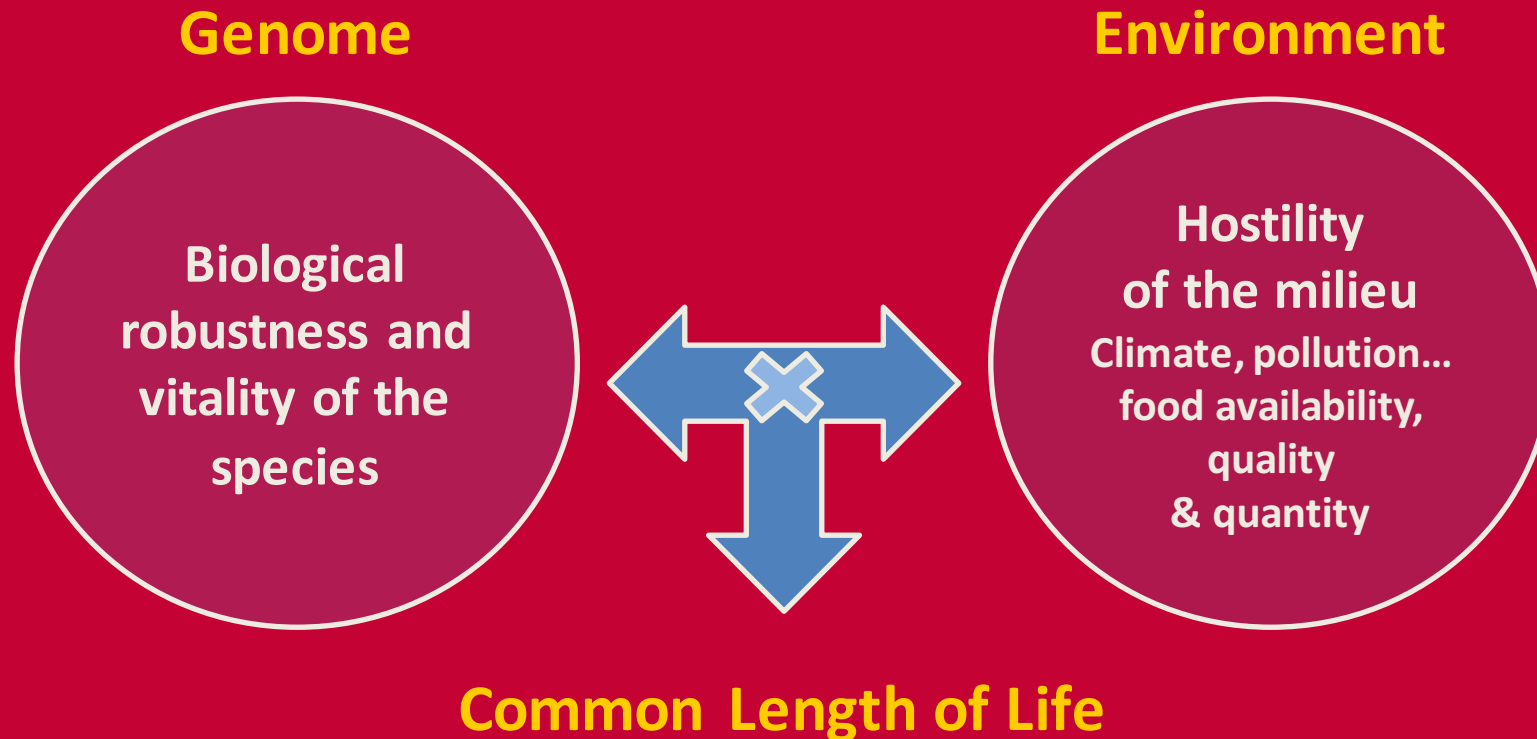
Les déterminants de la longévité humaine

Les déterminants de la longévité des adultes

- La durée de vie la plus commune (M)
- La distribution des durées de vie individuelles (**dispersion**)



La durée de vie la plus commune (M)



La distribution des durées de vie individuelles (**dispersion**)

Genes

- Estimated circa 25% (*from twin studies*)

Environment (?)

Culture

- Role and place of the oldest old (*society and family*)
- The meaning and values of ageing (*well, successful, active...*)
- Caring (*technical, formal or not*)

Level of development

Le niveau de développement

Political and economic freedom

- Well established democracies and market economies

Free access to health services & education

- Social democracies

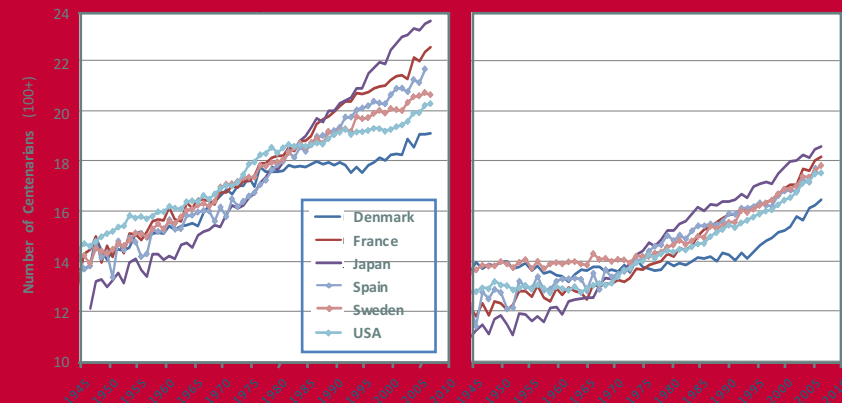
Gender equality

Solidarity and social justice

- Wealth and income inequality

Social cohesion

- Nation vs communities



Merci pour votre attention!

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