Life Expectancy and Lost Life Expectancy

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What is lost life expectancy $e^\dagger$?

$$e^\dagger(t) = \int_0^\omega e^o(a,t) f(a,t)\, da$$

$$e^o(a,t) = \frac{\int_a^\omega \ell(x,t)\,dx}{\ell(a,t)}$$

$$f(a,t) = \ell(a,t)\mu(a,t),$$

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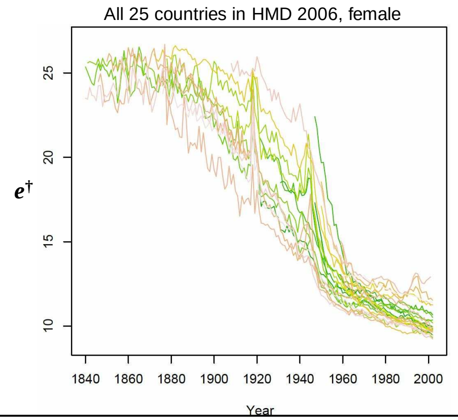
The Historical Trends of $e^\dagger$



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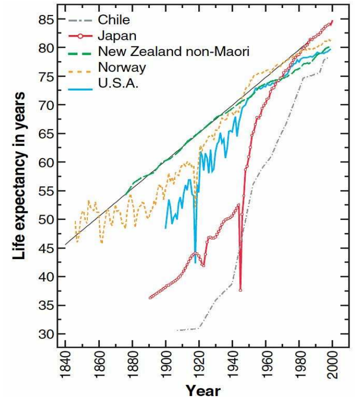
The Historical Trends of e^o



Source: Oeppen & Vaupel 2002

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The Decomposition of $\dot{e}^o$

$$\dot{e}^o(t) = \tilde{\rho}(t)e^\dagger(t)$$ (Vaupel & Canudas Romo 2003)

$$\dot{e}^o(t) \doteq 0.25$$ (Oeppen & Vaupel 2002)

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The Historical Trends of $\tilde{\rho}$

$$\tilde{\rho}(t) = \frac{\int_0^\omega \rho(a,t)e^o(a,t)f(a,t)dx}{\int_0^\omega e^o(a,t)f(a,t)dx}$$

$$\rho(a,t) = -\acute{\mu}(a,t) = -\frac{\frac{\partial}{\partial t}\mu(a,t)}{\mu(a,t)}$$

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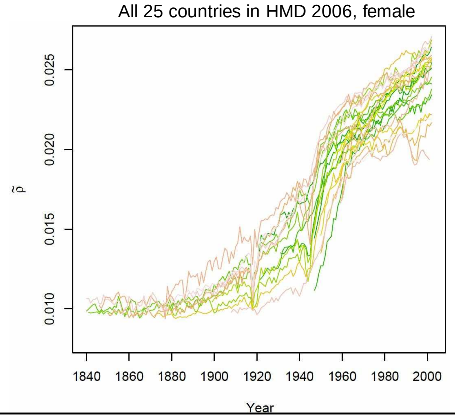
The Historical Trends of $\tilde{\rho}$



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The Relation of S_{10} with $e^\dagger$

- S_{10} is the standard deviation in the life-table age at death past age 10 years (Edwards & Tuljapurkar, 2005)
- $e^\dagger$ is a measure of the homogeneity of a population's life chances and is correlated with the standard deviation of the distribution of lifespans

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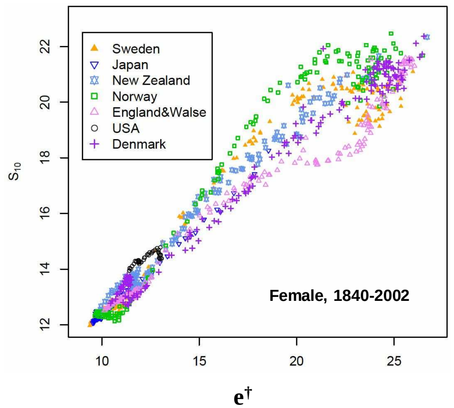

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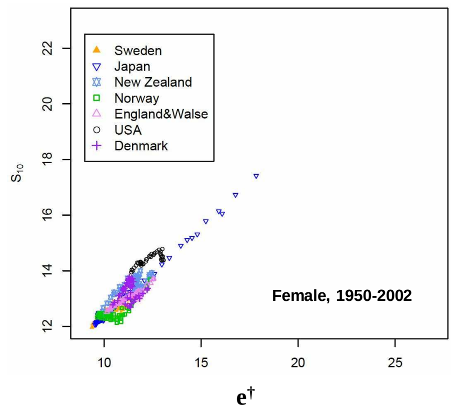

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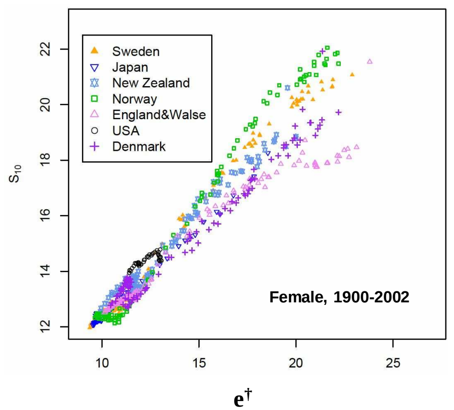

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Three Major Findings about $e^{\dagger}$

I. The national population with the longest e^{o} in the world in some year – the "best-practice" or "record-holding" population – is generally also the population with the lowest values (or one of the very lowest values) of $e^{\dagger}$ in that year

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Three Major Findings about $e^\dagger$

II. The differences of e^o between the record-holding population and others are linearly correlated to $e^\dagger$

III. The rate of change of $e^\dagger$ is related not only to the level of e^o but also to the rate of increase of e^o – this trend is more obvious after 1950

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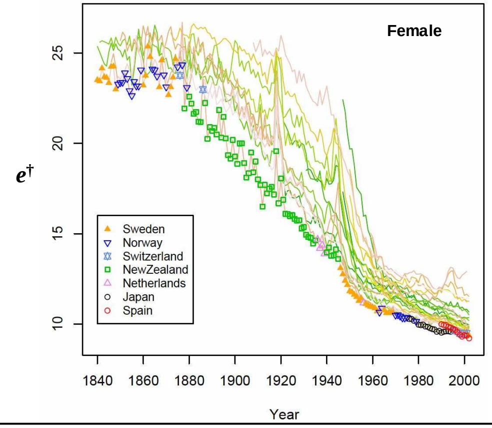
Finding I: Record $e^\dagger$



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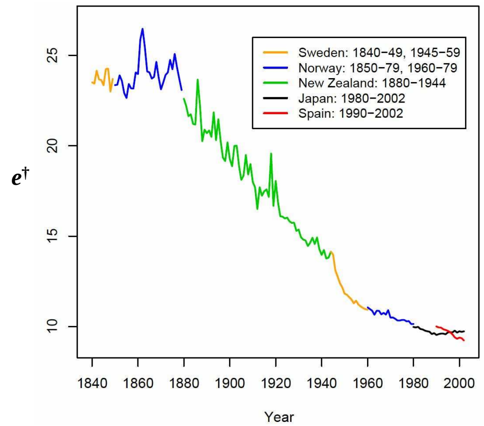

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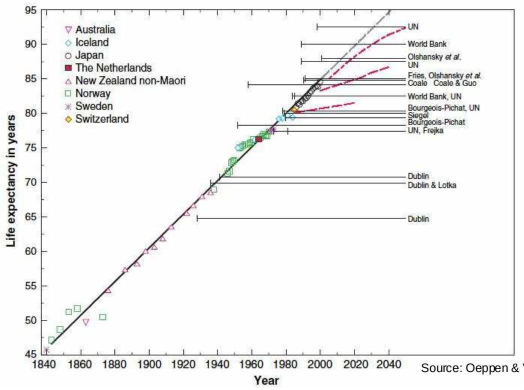

Source: Oeppen & Vaupel 2002

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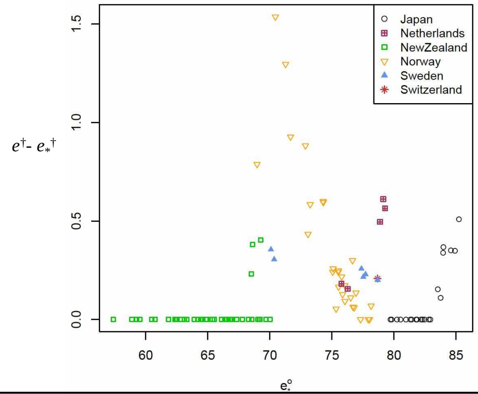
Finding I: Records of e^o and $e^\dagger$

e^o record-holding population, female, 1900-2002



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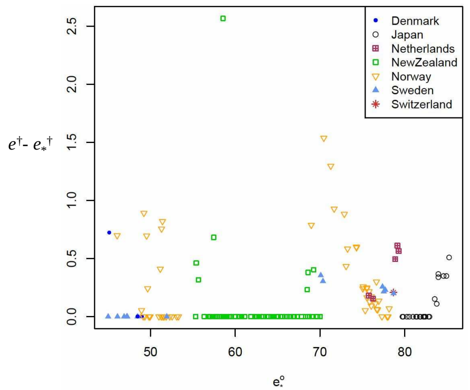
Finding I: Records of e^o and $e^\dagger$

e^o record-holding population, female, 1840-2002



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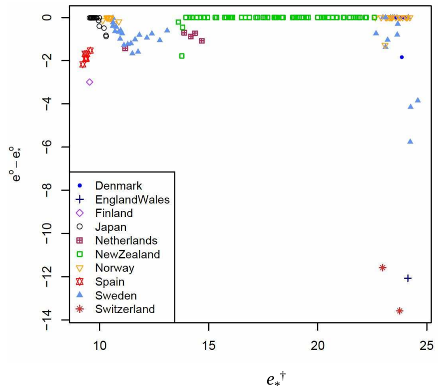
Finding I: Records of e^o and $e^\dagger$

$e^\dagger$ record-holding population, female, 1840-2002



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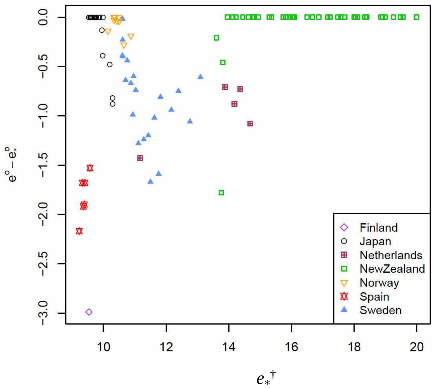

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Three Major Findings about $e^\dagger$

II. The differences of e^o between the record-holding population and others are linearly correlated to $e^\dagger$

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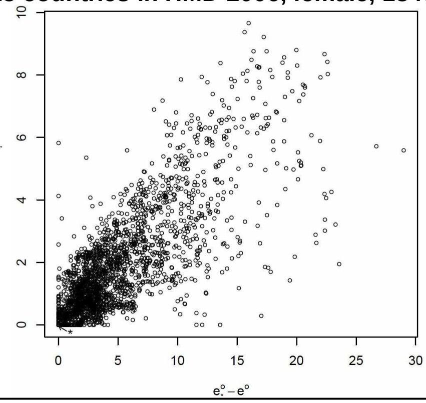
Finding II: $e^\dagger$-$e_*^\dagger$ vs. e_*^o-e^o

all 25 countries in HMD 2006, female, 1840-2002



Note: * 92 points of 163 total lie at the same point (0,0)

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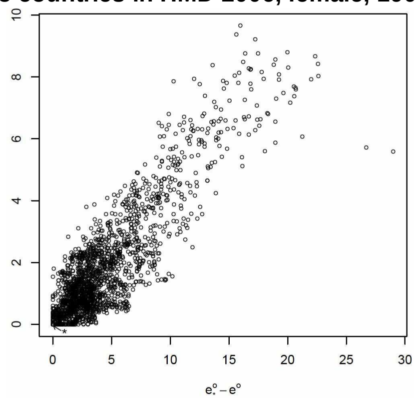
Finding II: $e^\dagger$-$e_*^\dagger$ vs. e_*^o-e^o

all 25 countries in HMD 2006, female, 1900-2002



Note: * 53 points of 103 total lie at the same point (0,0)

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Three Major Findings about $e^{\dagger}$

III. The rate of change of $e^{\dagger}$ is related not only to the level of e^{o} but also to the rate of increase of e^{o} – this trend is more obvious after 1950

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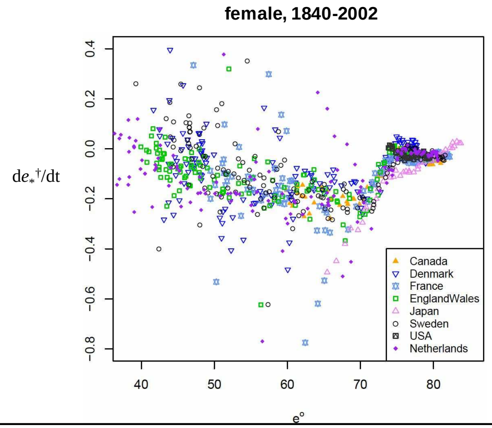
Finding III: $\dot{e}^{\dagger}$ and the level of e^{o}



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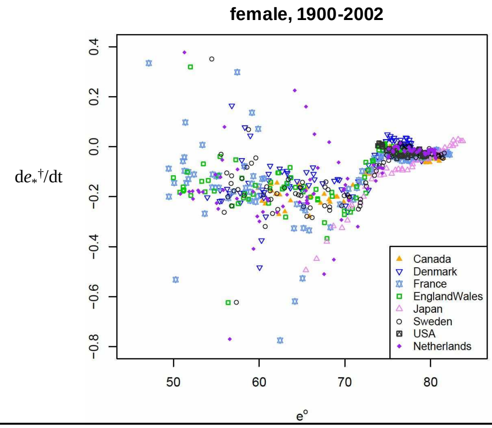

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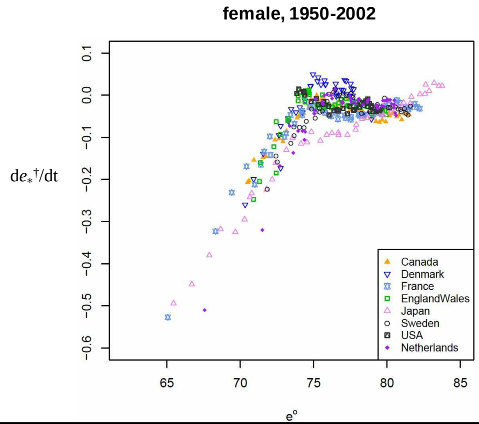

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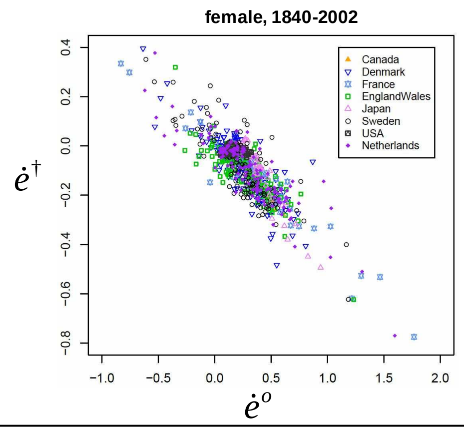

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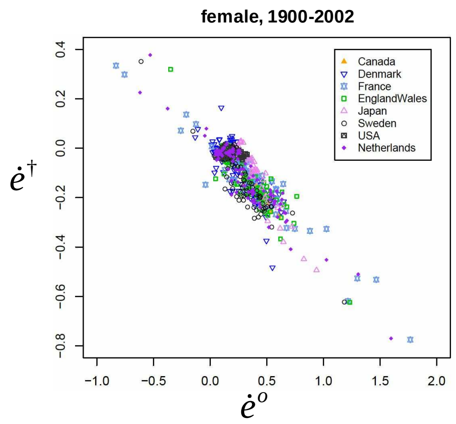

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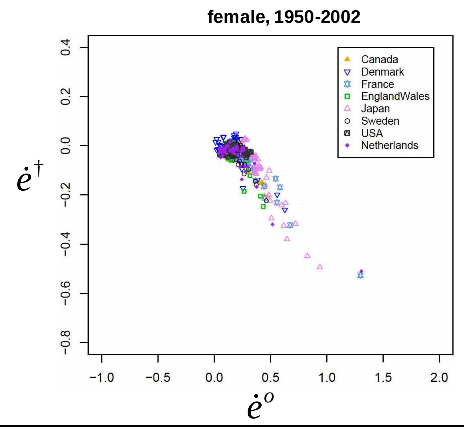

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Next Steps

- To explore the intrinsic relationship between e^o and $e^\dagger$, e.g. decompose the change of $e^\dagger$
- To investigate the policy implications of change in $e^\dagger$

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