

Optimal Fertility

What level of fertility should society's aim for?

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Workshop on “Optimal Fertility in Ageing Societies”

December 9, 2010

Outline

- 1 Introduction
- 2 The Model
- 3 Results
- 4 Sensitivity Analysis
- 5 Conclusion

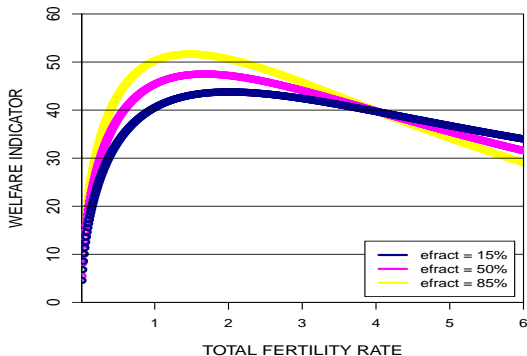
Optimal Fertility

Our optimality criterion:

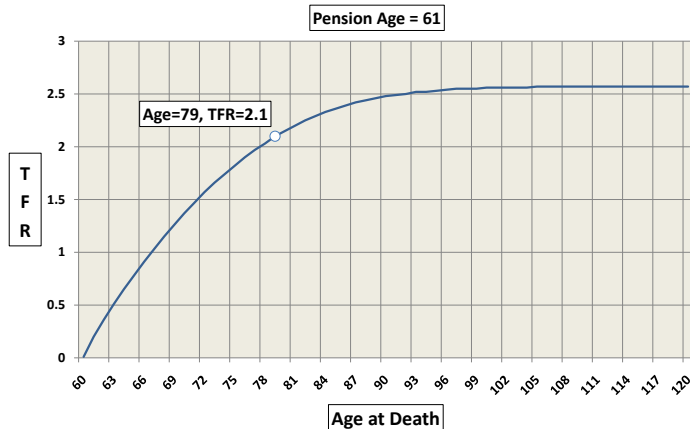
Support Ratio considering level of education in addition to age

Previous Work

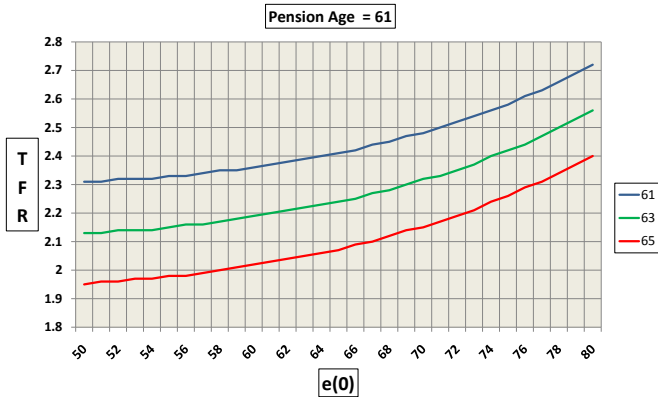
Lutz, W., W.C. Sanderson, and B.C. O'Neill, *Conceptualizing Population in Sustainable Development: From "Population Stabilization" to "Population Balance"*, in *The End of World Population Growth in the 21st Century: New Challenges for Human Capital Formation and Sustainable Development*, W. Lutz, W.C. Sanderson, and B.C. O'Neill, Editors. 2004, Earthscan: London. p. 315-334.



Optimal Fertility and Age of Death



Optimal Fertility for Different Pension Ages



Education Weighted Support Ratio

$$\text{Support Ratio} = \text{Working} / (\text{Children} + \text{Retired})$$

- $\text{Children} = \text{pop}_{\text{preschool}}^{0-5} * \text{ed0cost} + \text{pop}_{\text{prim}}^{6-10} * \text{ed1cost} + \text{pop}_{\text{sec}}^{11-15} * \text{ed2cost} + \text{pop}_{\text{tert}}^{16-25} * \text{ed3cost}$
- $\text{Working} = \text{pop}_{\text{prim}}^{16-57} * \text{ed1weight} + \text{pop}_{\text{sec}}^{16-61} * \text{ed2weight} + \text{pop}_{\text{tert}}^{26-65} * \text{ed3weight}$
- $\text{Retired} = \text{pop}_{\text{prim}}^{57+} * \text{pencost} + \text{pop}_{\text{sec}}^{62+} * \text{pencost} + \text{pop}_{\text{tert}}^{66+} * \text{pencost}$

Baseline assumptions

Real 2010 population age-structures

- Constant 2010 survival probabilities
- Constant 2010 age-specific fertility pattern
- Men and women retire at the same age
- No unemployment

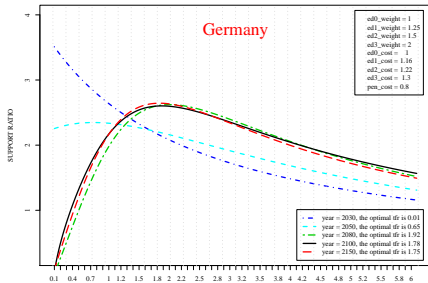
Baseline assumptions (cont.)

- Population is sub-divided into four different education categories
 - cost of education differs by educational attainment level
 - different ages of labor market entry and exit
 - education-specific labor productivity
- Pension costs are not education specific

=> Education Weighted Support Ratios

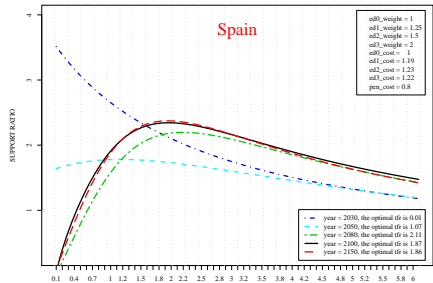
Baseline Results

Support Ratio for Global Education Trend (GET) – Scenario



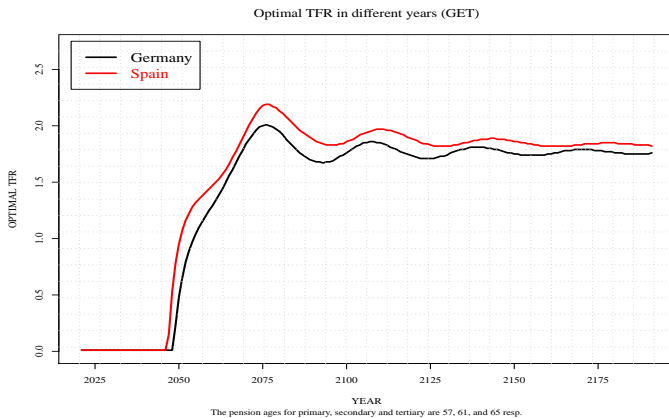
The pension ages for primary, secondary and tertiary are 57, 61, and 65 resp.

Support Ratio for Global Education Trend (GET) – Scenario



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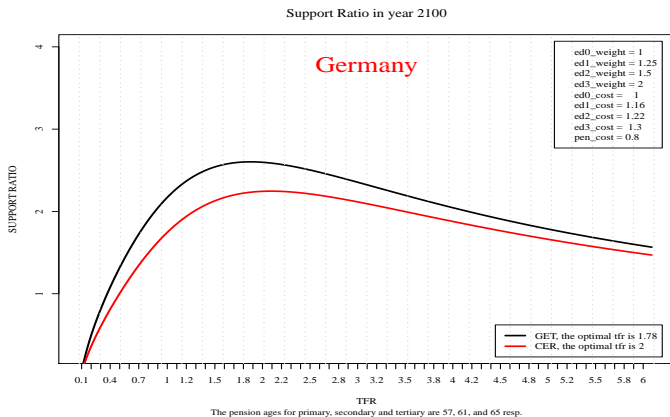
Baseline Results (cont.)



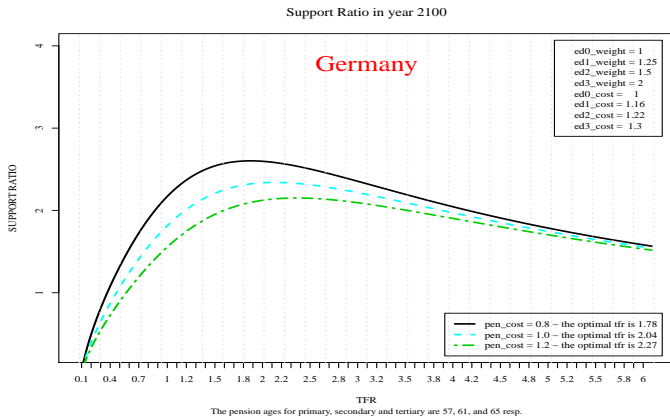
What's "optimal" depends on the time horizon

- On the short run, children only increase the dependency burden
=> optimal, not to have children at all!
- ... at some point, this strategy starts to starve out the labor force
=> better to have at least some children

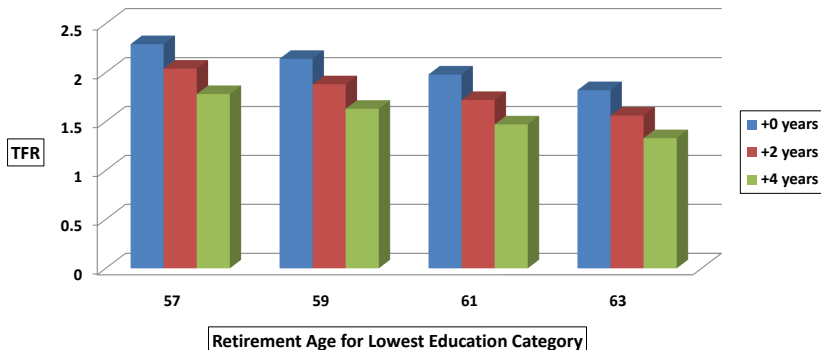
Different Education Scenarios



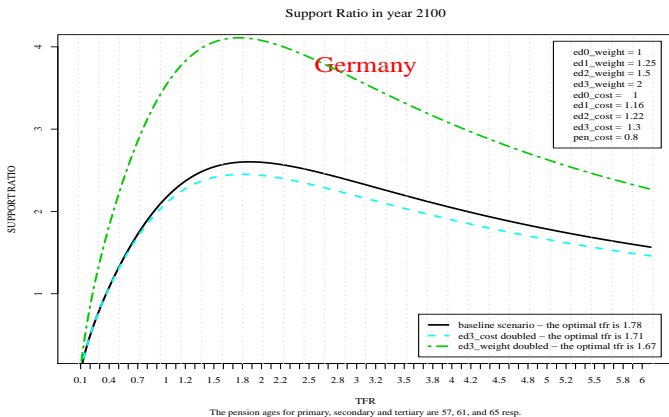
Different Pension Costs



Different Pension Ages



Higher education costs and higher productivity weights



It is far from self evident that replacement level fertility should be optimal.

- What's "optimal" depends highly on the time horizon
- Only higher pension incomes relative to earnings of people in the labor force lead to a higher optimum
- Adding education to age and sex is crucial in determining the optimal level of fertility
- Global environmental change has to be factored in as well

=> **the optimal level of fertility then might be even lower**

Thank you!