A Gravity Model of Mortality Rates for Two Populations

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Overview

The paper proposes a gravity model to better estimate the mortality rate for two related populations:

- On ground of biological reason, mortality rates of one population is not independent of those of others.

- The larger population exerts a gravitational pull on the smaller one.

Overview

- The authors use cases of England & Wales (E&W) v.s. Continuous Mortality Investigation (CMI) to illustrate the gravity effects by using Age-Period-Cohort (APC) model.

- The parameters of the model can be estimated using MLE and the statistical significance of the gravity effects can be tested.

The Results

- The gravity effects are highly significant which implies that a model that ignores the gravity effects would be misspecified.

- In particular, it is essential to take account of gravity effects if one is to obtain forward mortality-improvement correlations that match those to be found in the historical data.

Comments

- The paper is very well written.

- Modeling of the gravity effect is an important contribution to the literature to improve the estimation of the mortality rate.

Question?

- Why gravity model is better than the other two population models:

  - Li and Lee (2005) which adopt the global improvement process;
  - Jarner and Kryger (2009) which use multifactor, mean reverting spread in the short run;
  - Cairns et al (2009b) which use Bayesian framework;

- When will the gravity model perform better than the other models?

=> Suggest to add more guidelines to explain when the gravity model can be better fitted than the other two population models ?
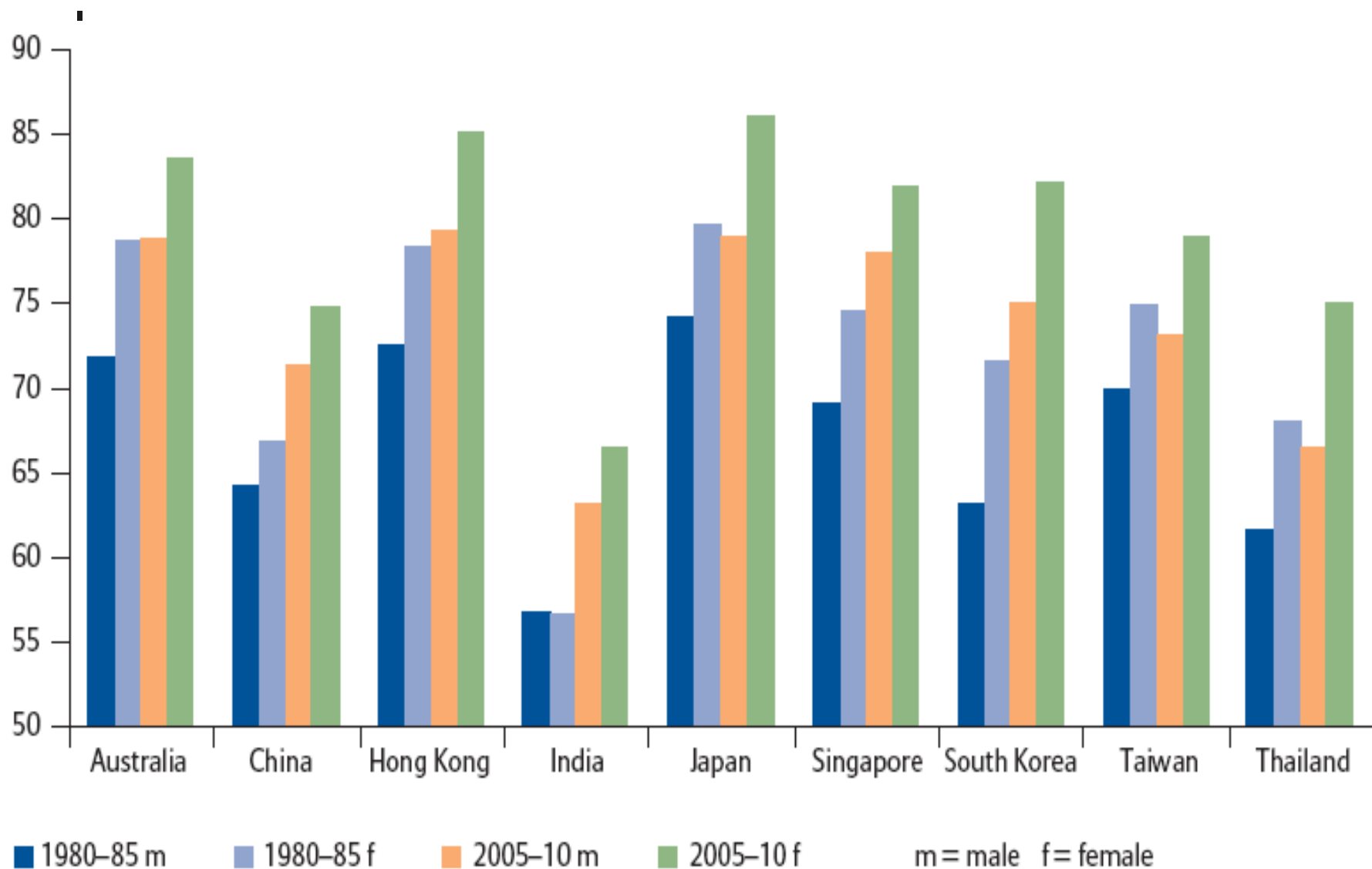
Question?

- How to choose the related populations ?
- Why (E&W) v.s. (CMI) ? any biological reason?
- Does the related populations must be a subsample of the population?
- What kind of larger population will be better fit?

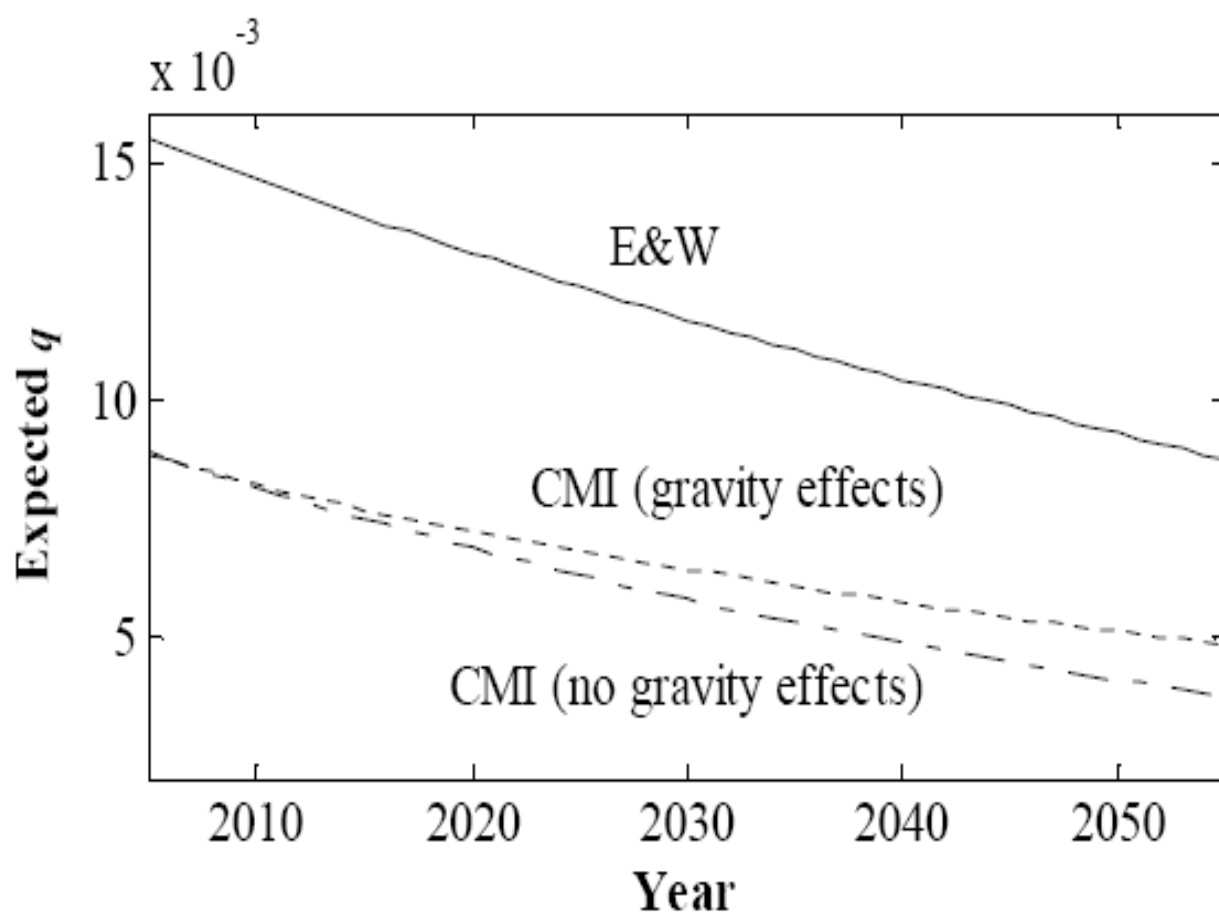# Life expectancy at birth (years) in Asia

Question?

- What kinds of criteria can be use to select the larger population in order to produce better fitting results?

=> Suggest to add a better explanation on how to choose the larger population?

Figure 6: Expected Future q : Age 65

Question?

- The paper use past data to test the estimate results. How good is the acceptable fitness?

- DO we need any measurement to judge the fitness?

=> Suggest to add a better explanation on how good is the fitness when using the historical data to test the estimate result?

Figure 10: Forward and Historical Mortality Improvement Correlations between E&W and CMI: Age 65