Accounting for temporal variation in morbidity measurement and projections

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September 15, 2015

Abstract

This is important stuff!

G is a bad health condition that varies as a function of time to death, y and not as a function of chronological age, a. However, there will still be an apparent age function, $g'(a)$, given that $g(y)$ is regular and mortality is sort of stable, but not really. $g'(a)$, in this case, is an aggregate based on both mortality and the real underlying time-to-death process:

$$g'(a) = \frac{\int_0^\omega g(y)N(a,y)\ \mathrm{d}y}{N(a)} \tag{1}$$

$$= \frac{\int_0^\omega g(y)N(a)\mu(a+y)\frac{\ell(a+y)}{\ell(a)}\ \mathrm{d}y}{N(a)} \tag{2}$$

$$= \int_0^\omega g(y)f(y|a)\ \mathrm{d}y \tag{3}$$

a little excercise we still need to do: find the $g'(a)$ that belongs to $g(y)$ in our canned example. It will be different for males and females because they have different mortality schedules. In this case, we can make the healthy l;ife expectancy function be based on mortality and $g'(a)$ and see what would be the prediction if $g'(a)$ is held constant and we induce mortality improvement. The answer is that mortality improvement will appear to increase the proportion of remaining life expectancy that is unhealthy: also the absolute years spent unhealthy, but the change in sex gap is maybe ambiguous (gotta check, maybe not), depending on the changes induced.

brief interlude .... This is a simple caes of $g(y)$, but in reality morbidity often varies as a function of both chronological and thanatological age, and we ought to have a function $g(a, y)$.

If

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