

Forecasts of national health expenditures as share of GDP: A demographic-economic model

Tim Miller

United Nations Economic Commission
for Latin America and the Caribbean

August 25, 2015

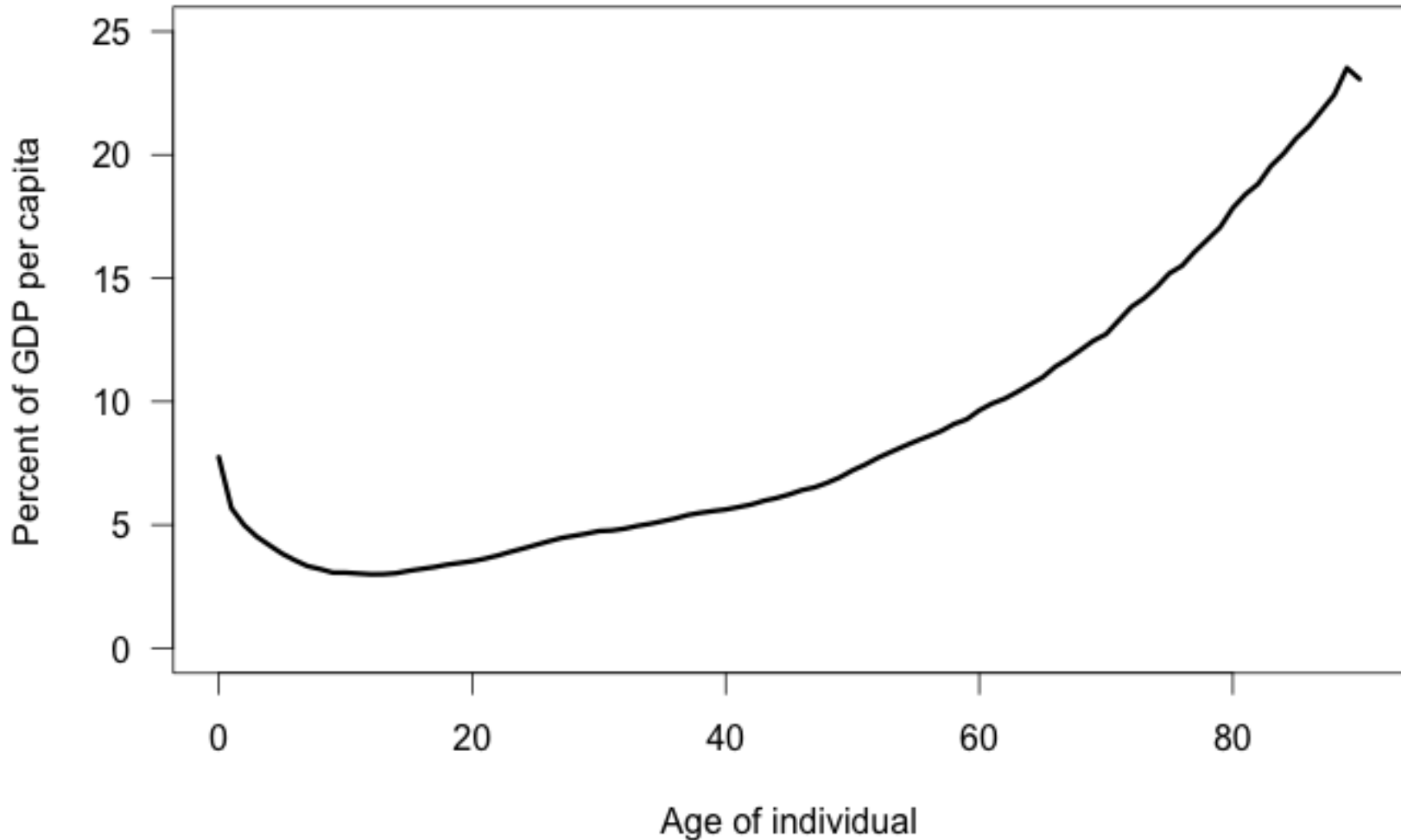
Regional Workshop Economics of
Non-communicable Diseases

- Joint work with Carl Mason (University of California at Berkeley).
- Makes use of data on health expenditures by age taken from the National Transfer Accounts of 36 countries. Our thanks to these 36 country teams for providing us with these data.

The 36 Country Teams

Gilberto Norte (**Mozambique**), Latif Dramani (**Senegal**), Germano Mwabu, Moses Muriithi, and Reuben Mutegi (**Kenya**), M.R. Narayana and L. Ladusingh (**India**), Nguyen Lan Huong (**Vietnam**), Rachel Racelis and J.M. Ian Salas (**Philippines**), Adedoyin Soyibo and Lanre Olaniyan (**Nigeria**), Maliki (**Indonesia**), Maurice Harris (**Jamaica**), Quilin Chen and Li Ling (**China**), Janina León Castillo, Carlos Aramburú, and Javier Olivera (**Peru**), Rafael Rofman, Jorge Paz, and Pablo Comelatto (**Argentina**), Luis Rosero-Bixby and Pamela Jiménez-Fontana (**Costa Rica**), Jorge Tovar and Piedad Urdinola (**Colombia**), Amonthep Chawla (**Thailand**), Morné Oosthuizen (**South Africa**), Cassio Turra and Bernardo Lanza Queiroz (**Brazil**), Marisa Bucheli and Cecilia González (**Uruguay**), Mauricio Holz (**Chile**), Iván Mejía (**Mexico**), Robert Gal (**Hungary**), Joze Sambt (**Slovenia**), Chong-Bum An (**South Korea**), Rikiya Matsukura and Naohiro Ogawa (**Japan**), Concepció Patxot, Elisenda Rentería, Guadalupe Souto (**Spain**), Hippolyte d'Albis (**France**), David McCarthy and James Sefton (**United Kingdom**), Fanny Kluge (**Germany**), Marina Zannella (**Italy**), An-Chi Tung and Mun-Sim Lai (**Taiwan**), Vaittinen Risto and Reijo Vanne (**Finland**), Marcel Merette (**Canada**), James Rice and Jeromey Temple (**Australia**), Alexia Fürnkranz-Prskawetz (**Austria**), Bo Malmberg (**Sweden**), Gretchen Donehower (**USA**).

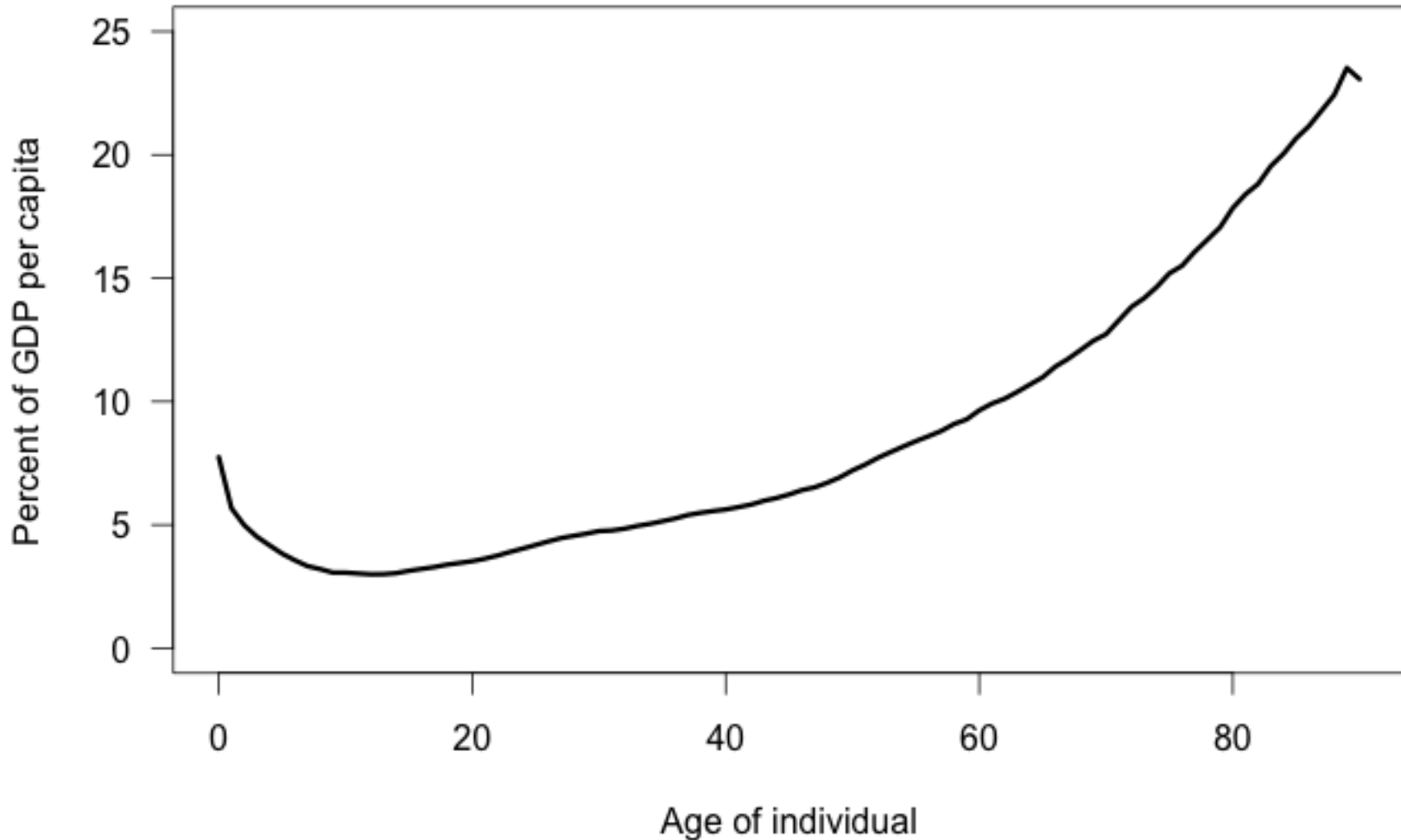
Health care spending by age, average of 36 countries



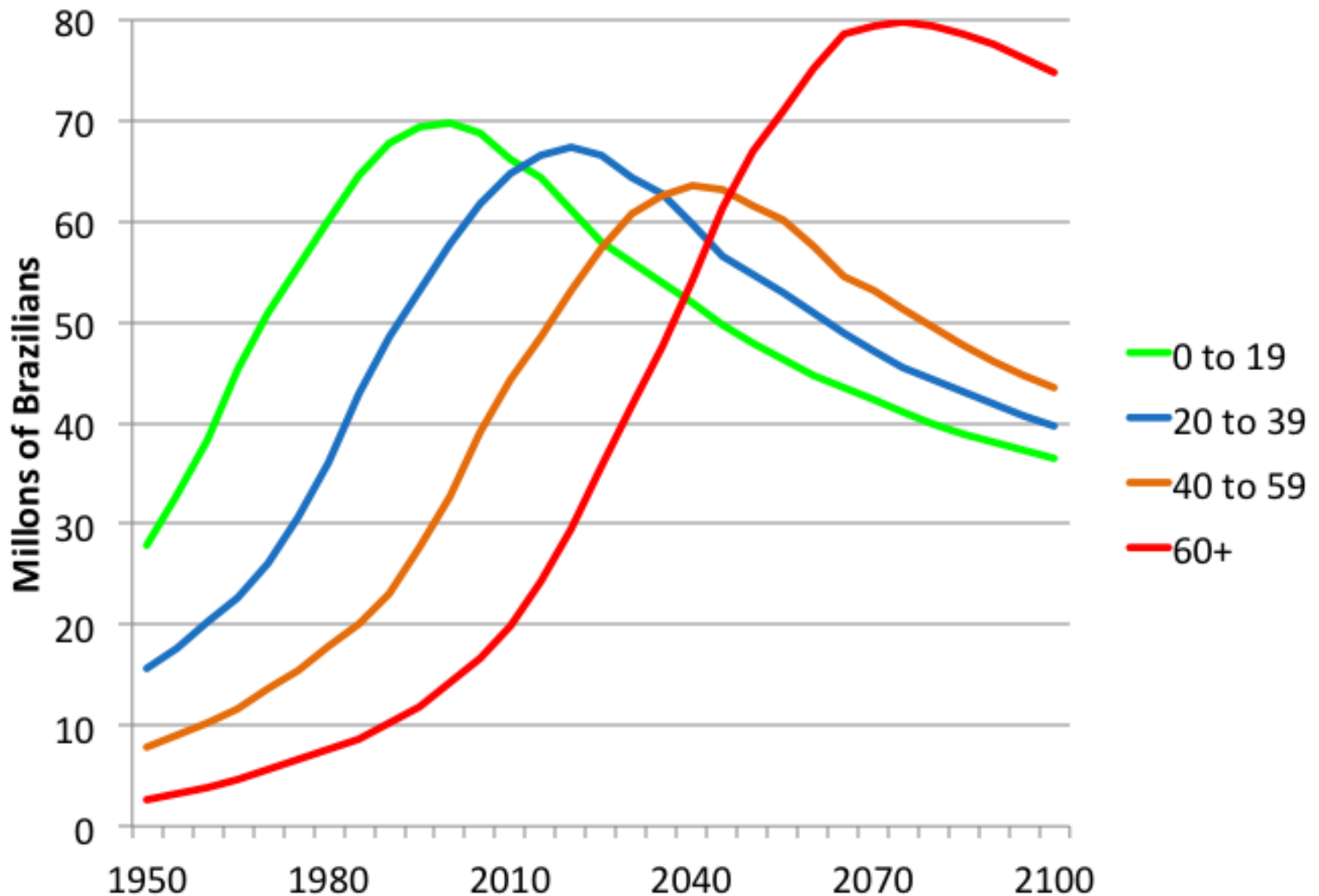
What drives future health expenditures?

1. Population aging

Health care spending by age, average of 36 countries



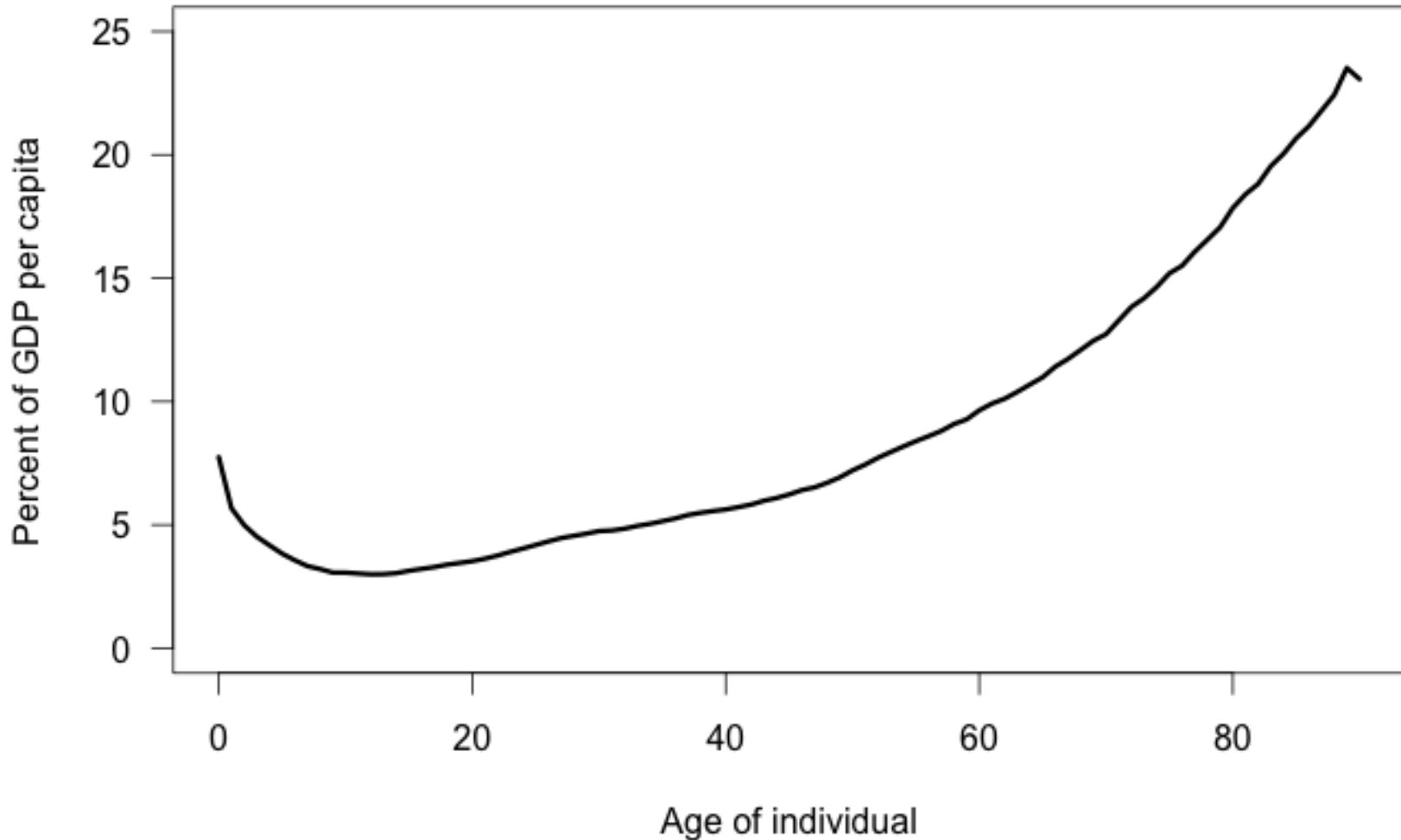
What population aging looks like...



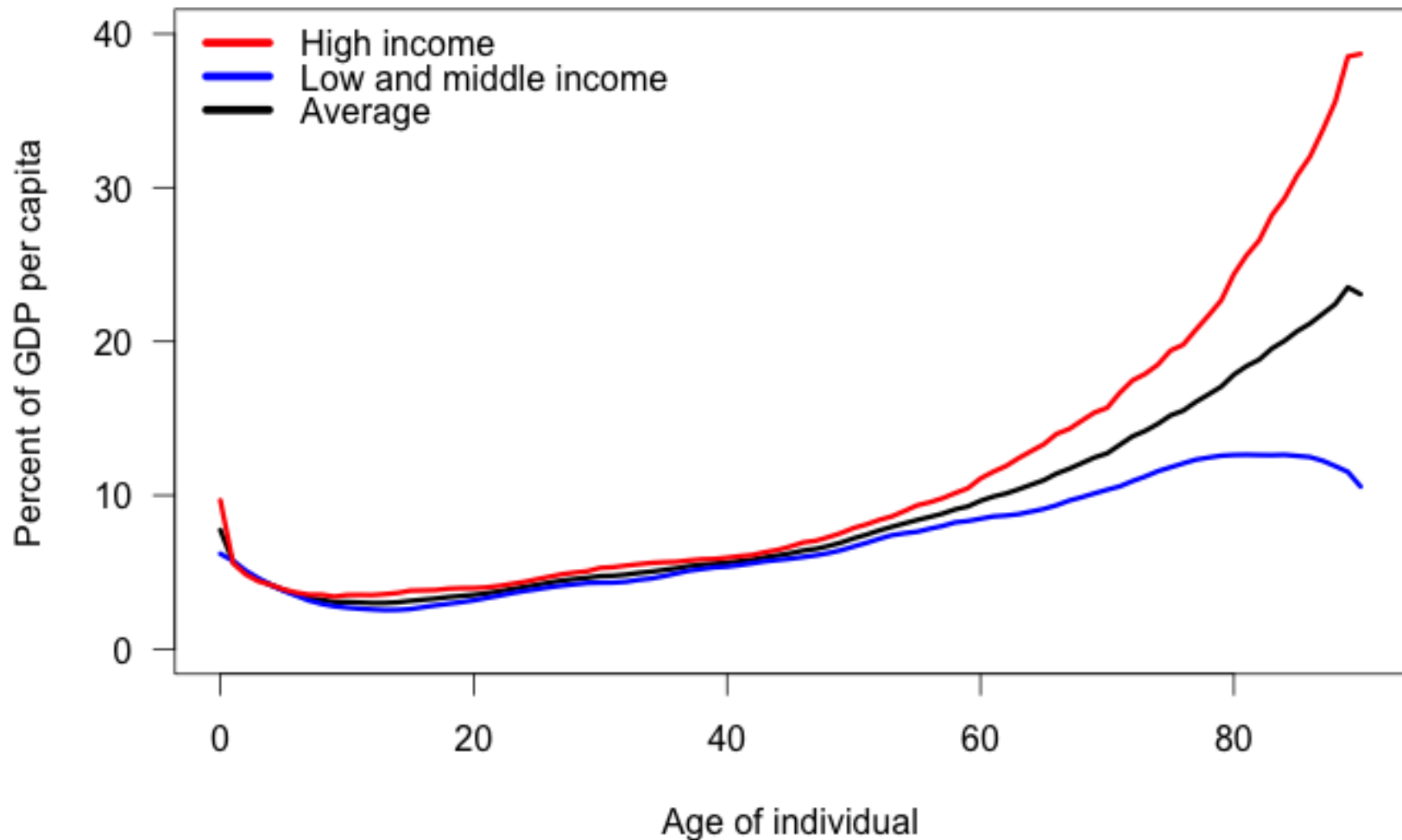
What drives future health expenditures?

2. Economies growing wealthier

Health care spending by age, average of 36 countries



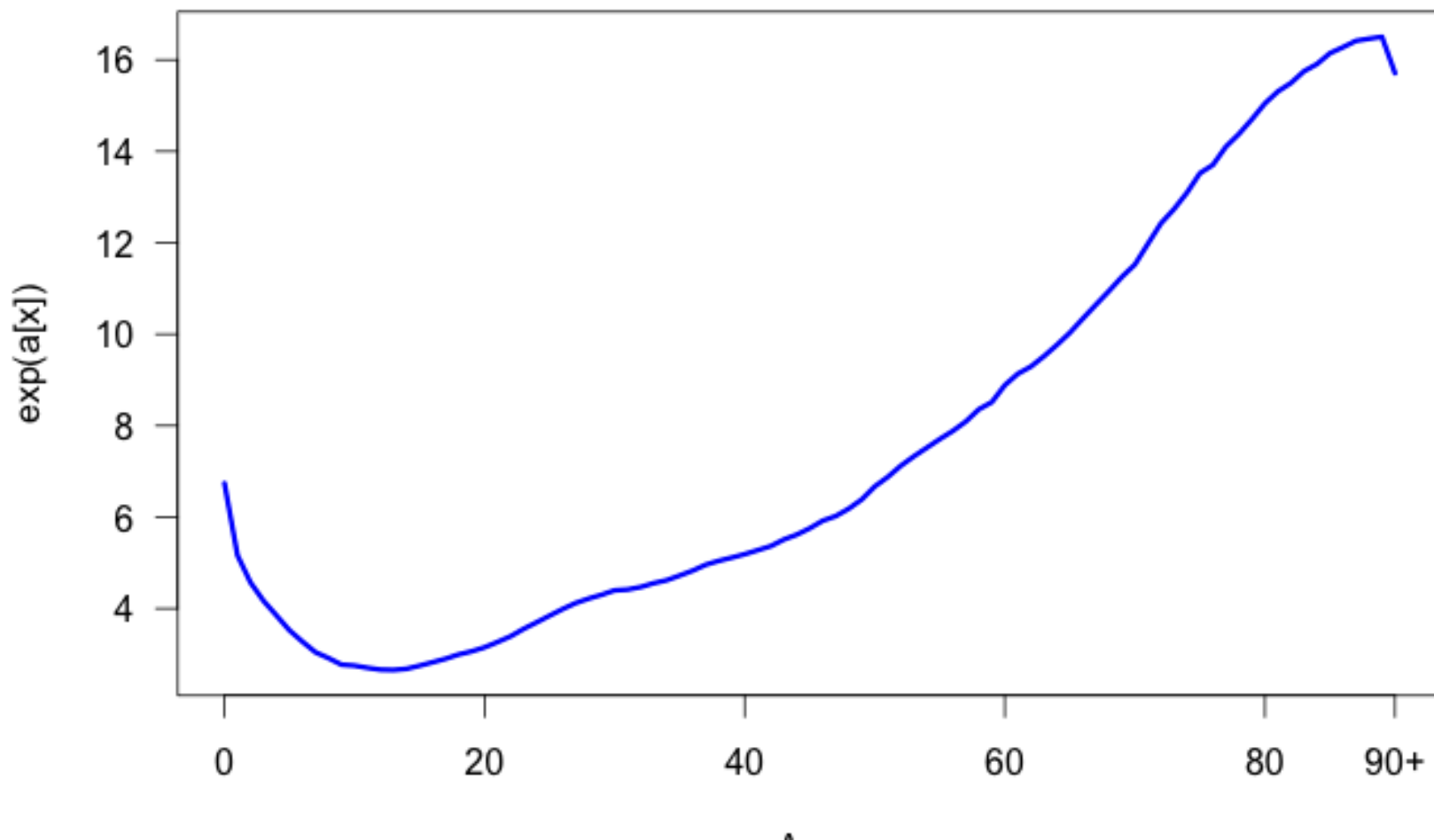
Health care spending by age, High income (16 countries) vs. Low and middle income (20 countries)



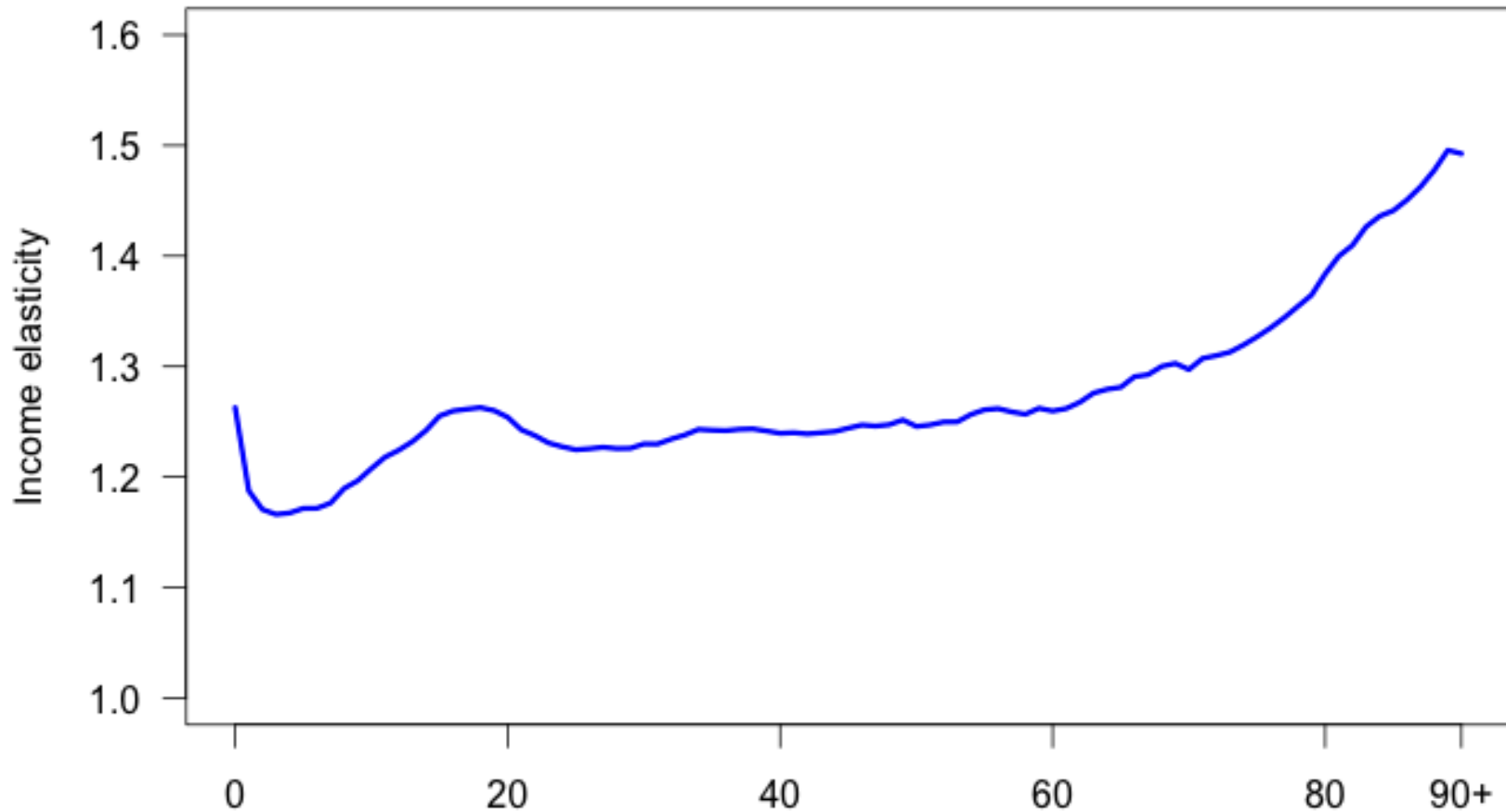
$$\ln (h[x, j]) = a[x] + b[x]*f(\ln(Y[j])) + e[x, j]$$

- $h[x, j]$ = Health expenditure at age x in country j , measured relative to GDP per capita
- $a[x]$ = age-specific effect, common to all countries
- $b[x]$ = age-specific deviations from common pattern as GDP per capita ($Y[j]$) increases
- $e[x, j]$ = age-specific residual in country j , reflecting the idiosyncrasies of country j

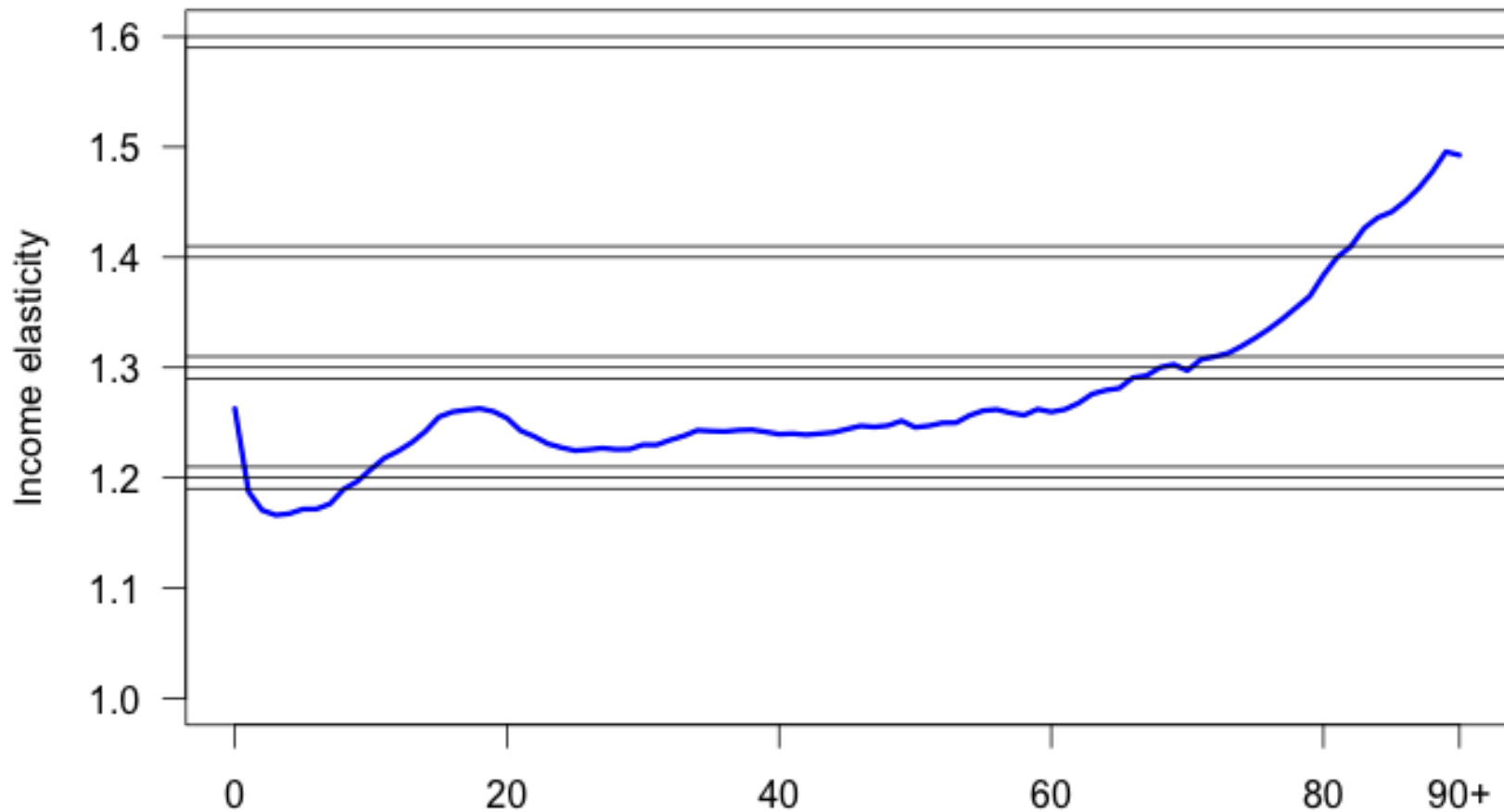
a[x] = age-specific effect,
common to all countries



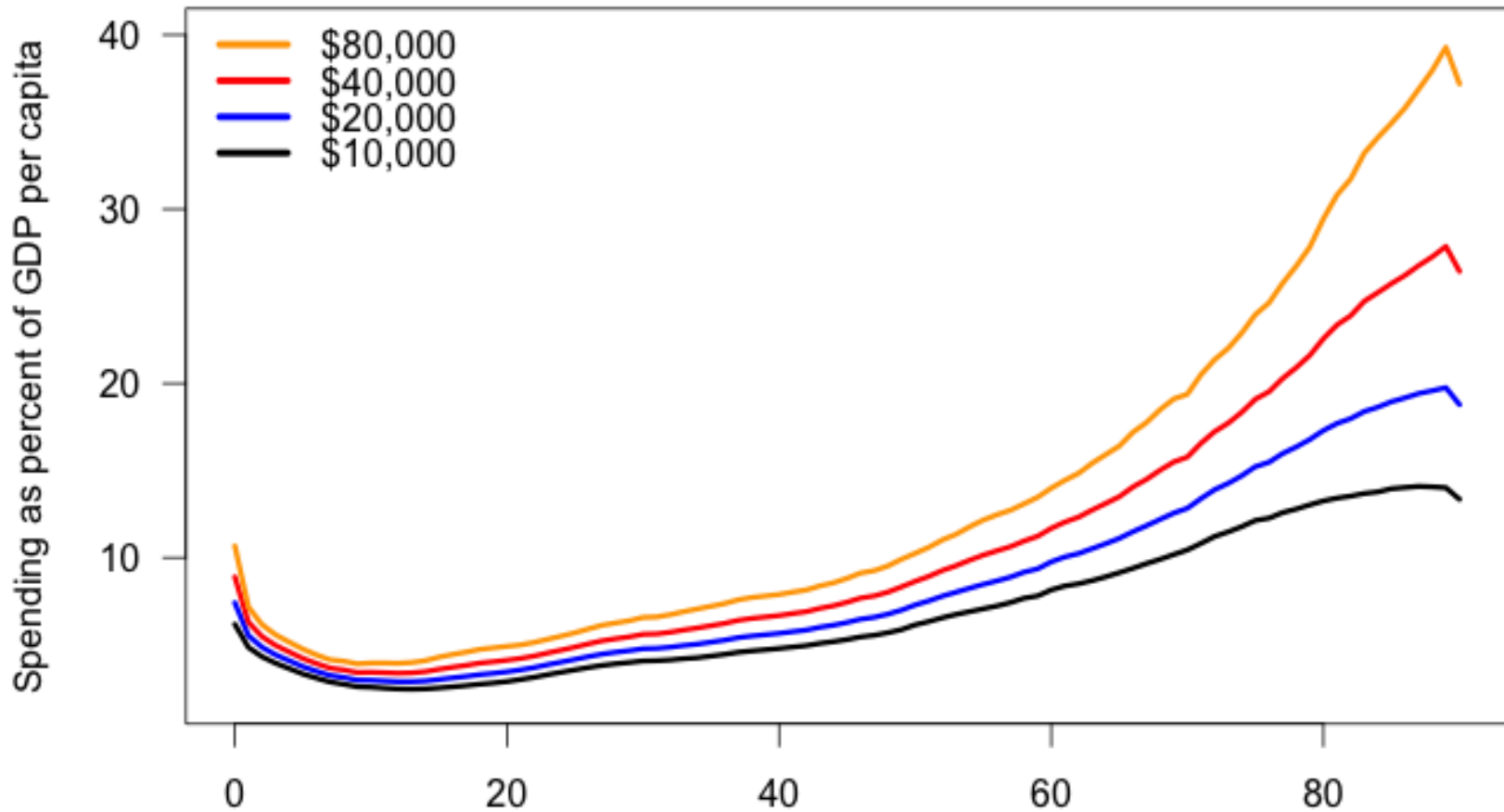
b[x] = age-specific deviations
from the common pattern
as GDP per capita increases



b[x] = age-specific deviations
from the common pattern
as GDP per capita increases



Model predictions: Age-specific health spending



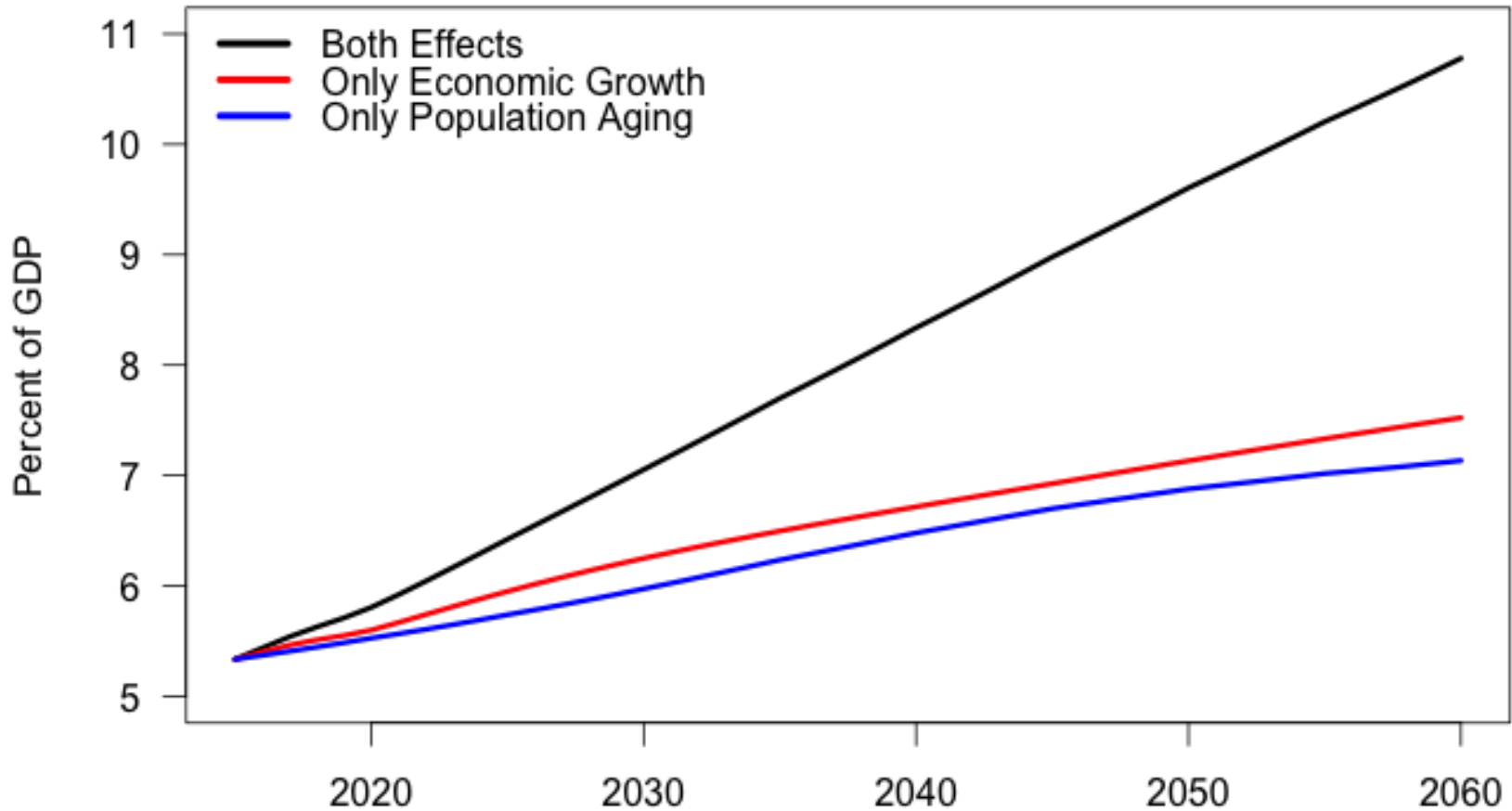
$$\ln(h[x, t]) = a[x] + b[x] * f(\ln(Y[t])) + e[x, t]$$

- **Forecast for Chile:**
- $Y[t]$ = GDP per capita over time: 2015-2060...Thanks OECD!
- $e[x, t]$ = age-specific residual for Chile over time

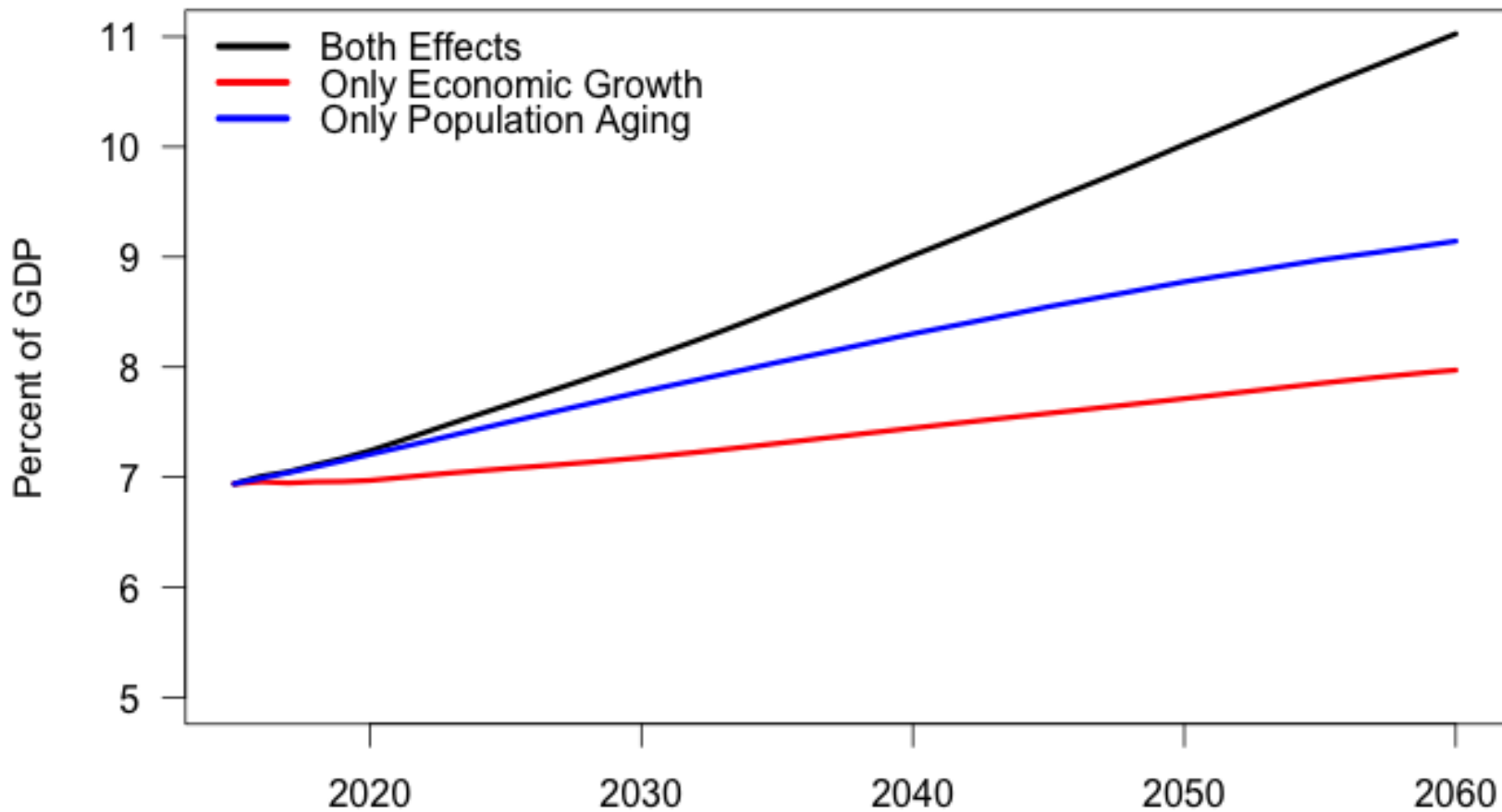
Idiosyncrasies of Chile persist forever: $e[x, t] = e[x]$
or

Idiosyncrasies of Chile fade away: $e[x, t] = e[x] * z(t)$

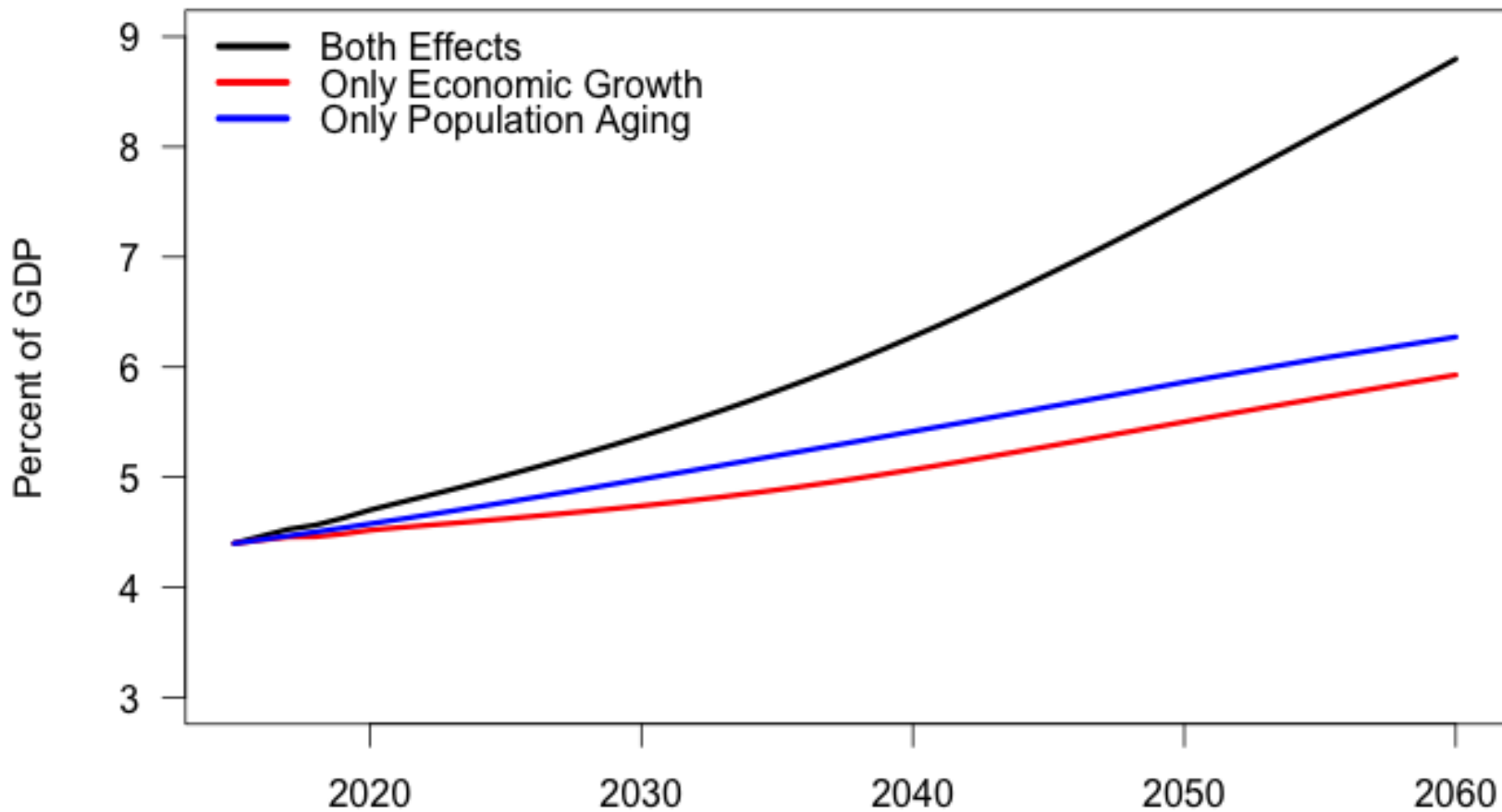
Chile: Health expenditures increase by 100% relative to GDP



Brazil: Health expenditures increase by 60% relative to GDP



Mexico: Health expenditures increase by 100% relative to GDP



Next steps

- Formal modeling of uncertainty.
- Explore use of thanatological age rather than chronological age (to model improving health).
- Estimation of health expenditures on NCDs as a share of GDP.

Thanks!