How population aging affects the macroeconomy: a global perspective

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Ageing Europe: An application of National Transfer Accounts (NTA) for explaining and projecting trends in public finances; Vienna /Austria

Grateful to Andy Mason and Gretchen Donehower and to NTA country team members,.

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1. INTRODUCTION

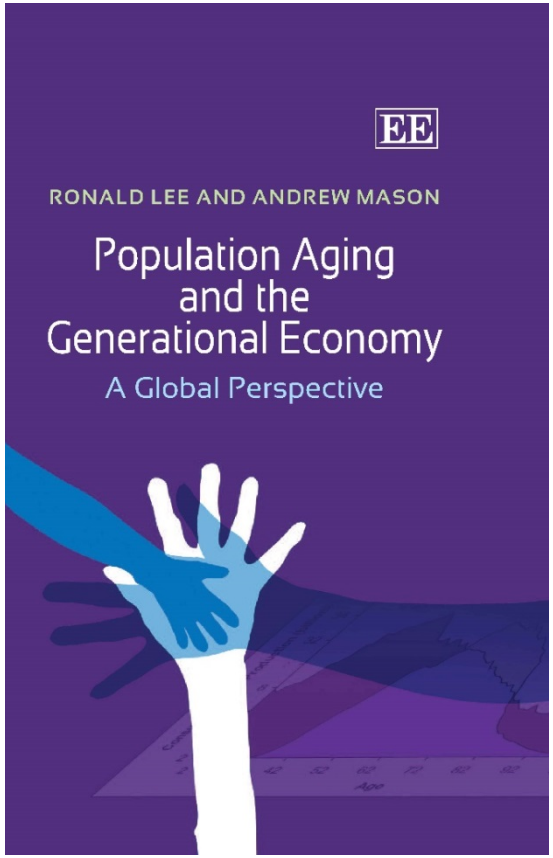
- Population age distributions influence economic development ("demographic dividend") and growth of rich industrial economies (population aging) because economic needs and behavior vary by age.
- Various approaches for analyzing this interaction
  - Simulation models based on theory and calibrated
  - Statistical analysis of empirical associations across countries and over time
  - Use age profiles for economic behavior to calculate the ***initial*** economic impact of changing pop age distr., ***other things equal***.
- National Transfer Accounts (NTA) focuses on this initial impact
- It will lead to further economic and policy responses, but these are not focus of NTA.

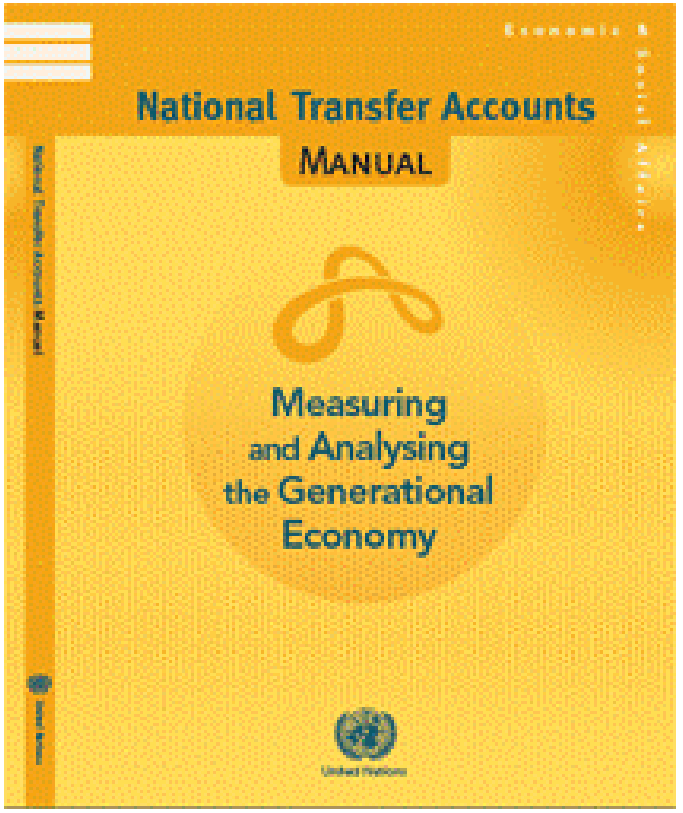
Talk is about National Transfer Accounts (NTA)

- NTA is **consistent** with standard national accounts but it goes **beyond** them in two important new ways.
  - breaks down national accounts by age.
  - estimates transfers within families and households, between households, and through the public sector.
- Andy Mason and I co-direct NTA
- 42 countries, each with own team
- Today I focus on rich industrial countries, Europe and US

NTA countries

Recent publications, both free downloads (ntaccounts.org)





Coming: Special NTA issue of ***Journal of Economics of Aging***

Flow identity arranged to emphasize life cycle (budget at age x, individual or cohort)

Consump Labor Inc Transfers Received Given Asset Inc Saving

$$\underbrace{C(x) - Y^{l}(x)}_{\text{Lifecycle deficit}} = \underbrace{\underbrace{\tau^{+}(x) - \tau^{-}(x)}_{\text{Net transfers}} + \underbrace{Y^{A}(x) - S(x)}_{\text{Asset-based reallocations}}}_{\text{Age reallocations}}$$

- NTA estimates these flows, and subcomponents, public and private.
- Bequests too, but not discussed today.

2. Age Profiles, the Starting point for NTA

- Cross-sectional age profiles of labor income and consumption
- Based on existing surveys, demographic data, administrative data.
- Centralized methods, quality control, training, workshops. Compare different surveys, etc.

Age profiles are

- Population averages at each age, combining males and females, including 0's
- height of age profile adjusted to National Income and Product Account totals (given pop age distr).
- For comparative purposes, standardize by dividing each economy's age profiles by average labor income ages 30-49.

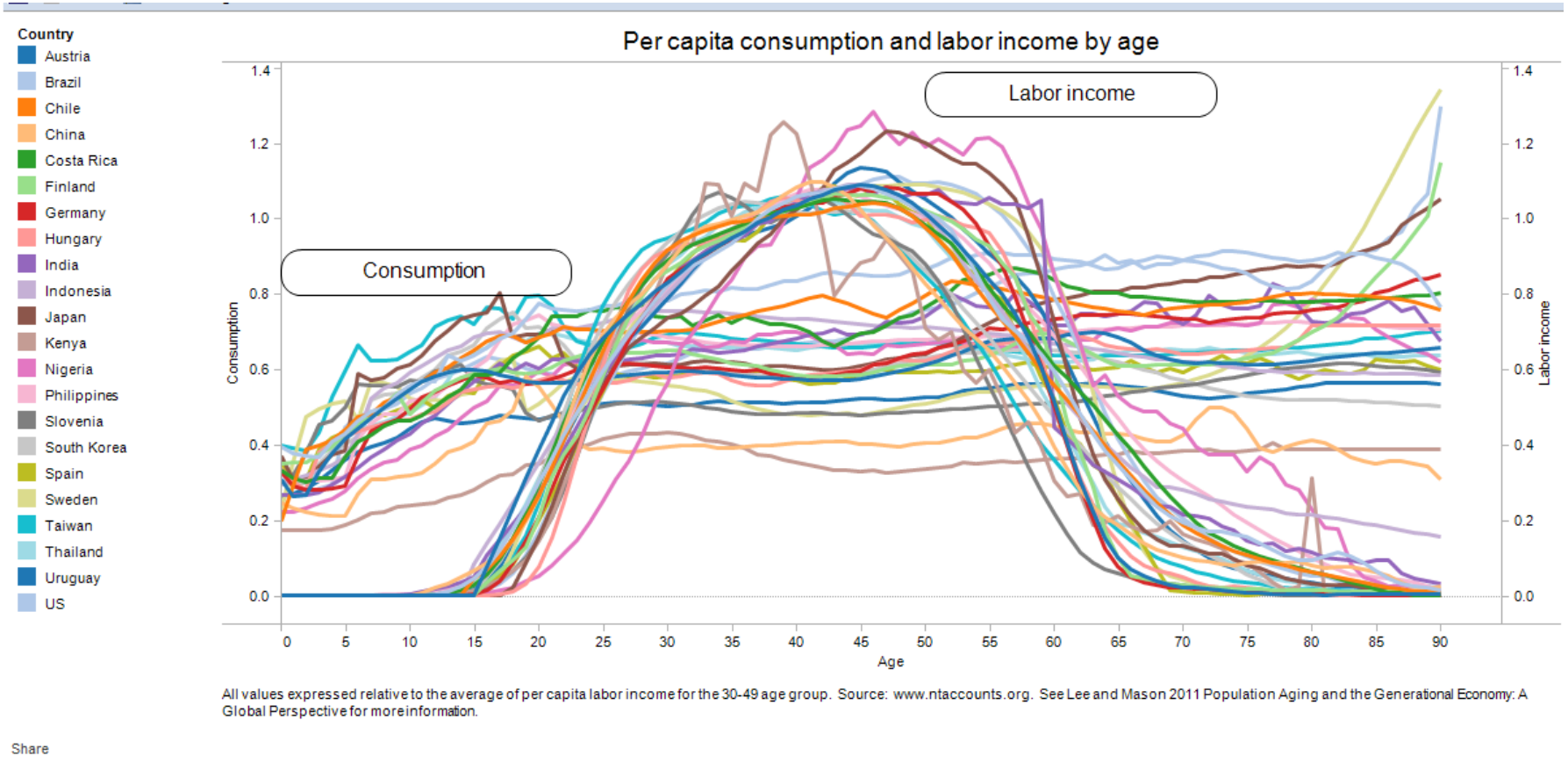
Estimation of consumption by age

- Consumption
  - Private expenditures imputed to individuals within each household
  - Public in-kind transfers (e.g. education, health care)
- Household expenditures on health and education
  - Regressed on household composition dummies.
  - Coefficients are used to allocate household totals to individuals within each household
- The balance of household consumption ("Other") is allocated in proportion to assumed equivalent adult consumer weights, same across all countries:
  - .4 for ages 0-4
  - Increases linearly to 1.0 at age 20
- After calculation for each individual in each household, find average across all individuals in population at each age.

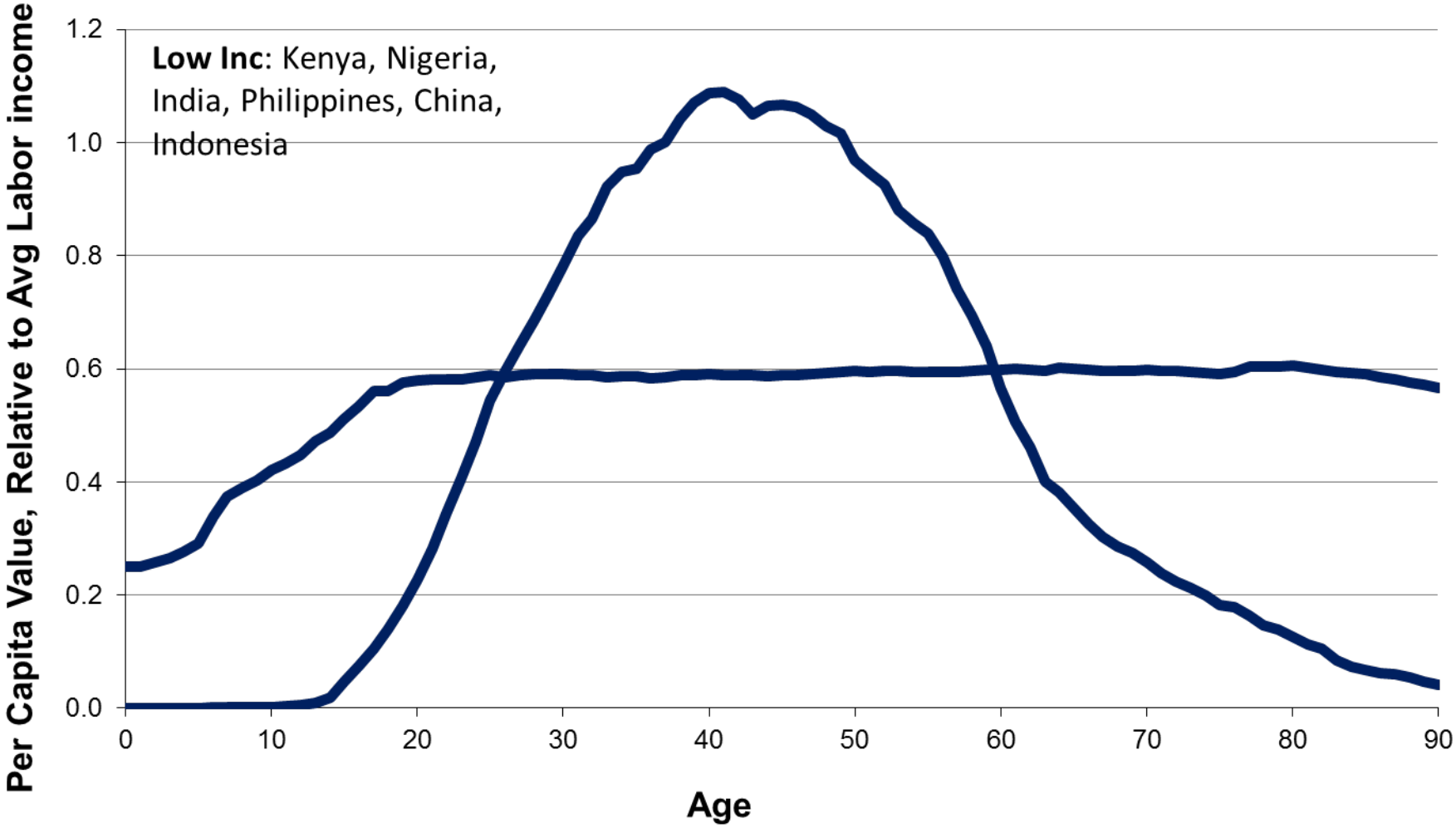
Labor Income

- Labor income includes
  - Wages, salaries, fringe benefits before tax
  - 2/3 of self employment income, unpaid family labor (1/3 to assets)
  - Average includes 0's.

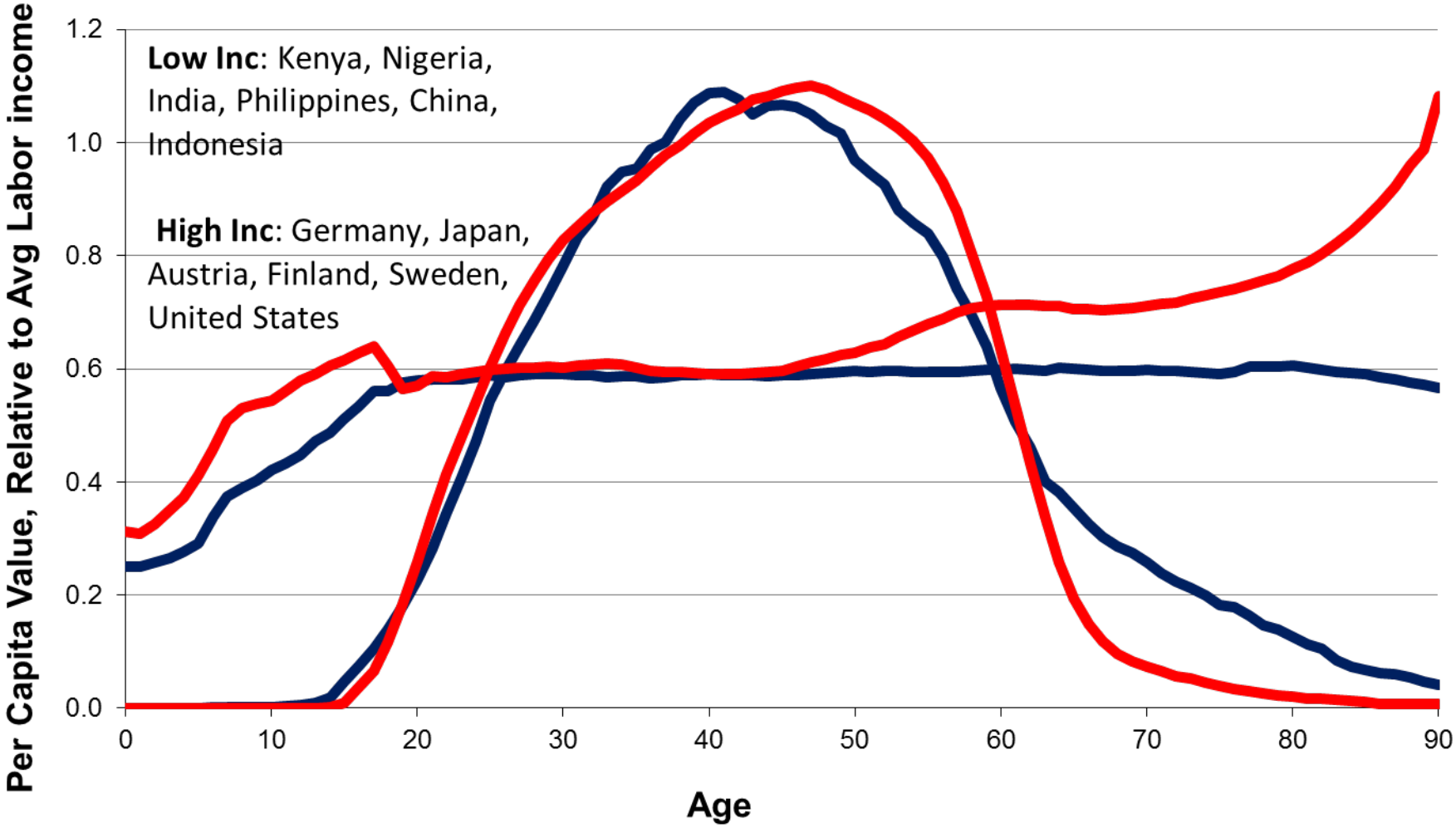
Age profiles of NTA labor income and consumption for 22 countries around the year 2000



Consumption and Labor Income of Low Income Countries (average of the bottom income quartile of NTA countries)



Consumption and Labor Income of High Income and Low Income Countries (averages of the top and bottom income quartile of NTA countries)



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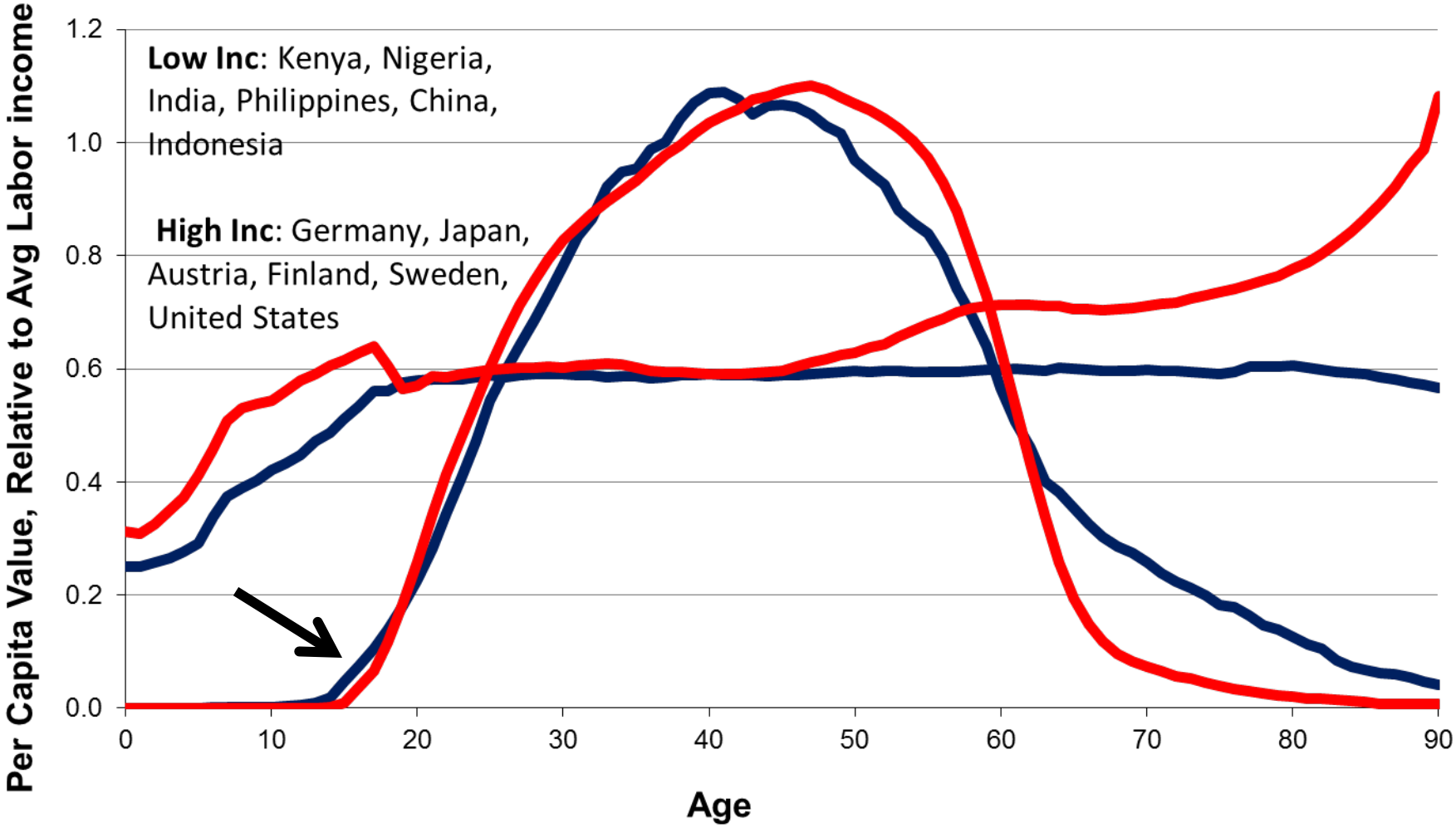

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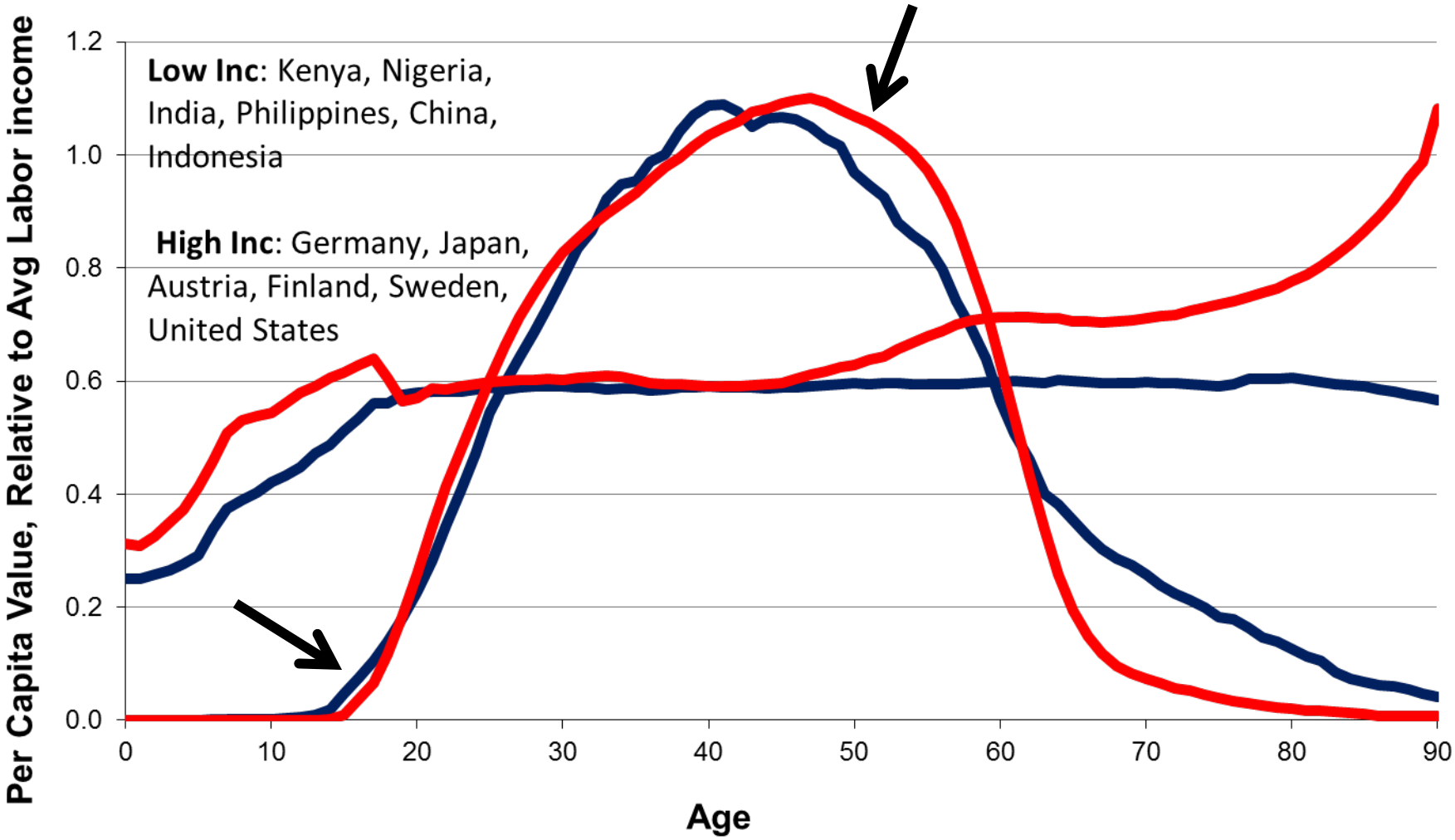

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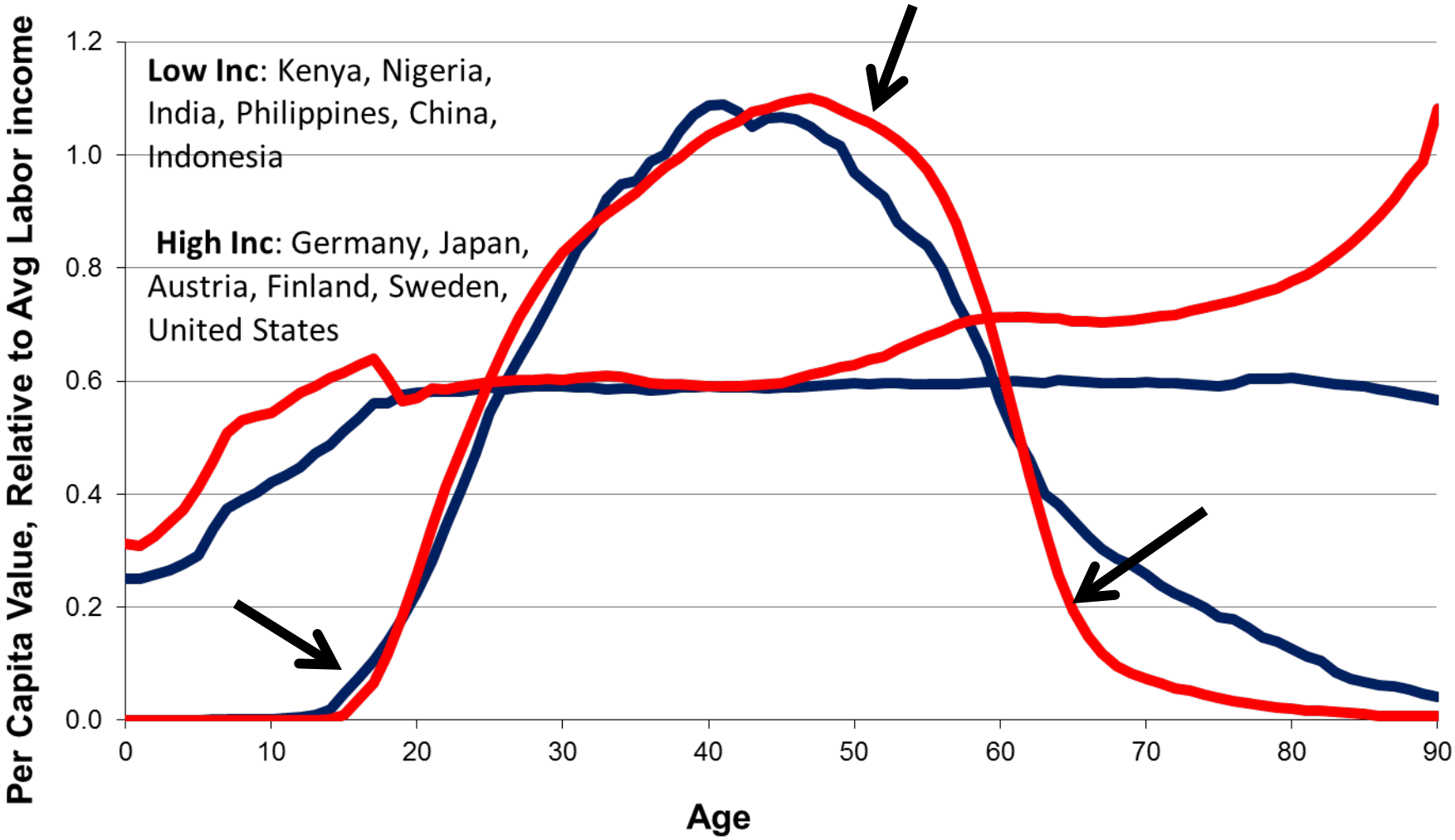

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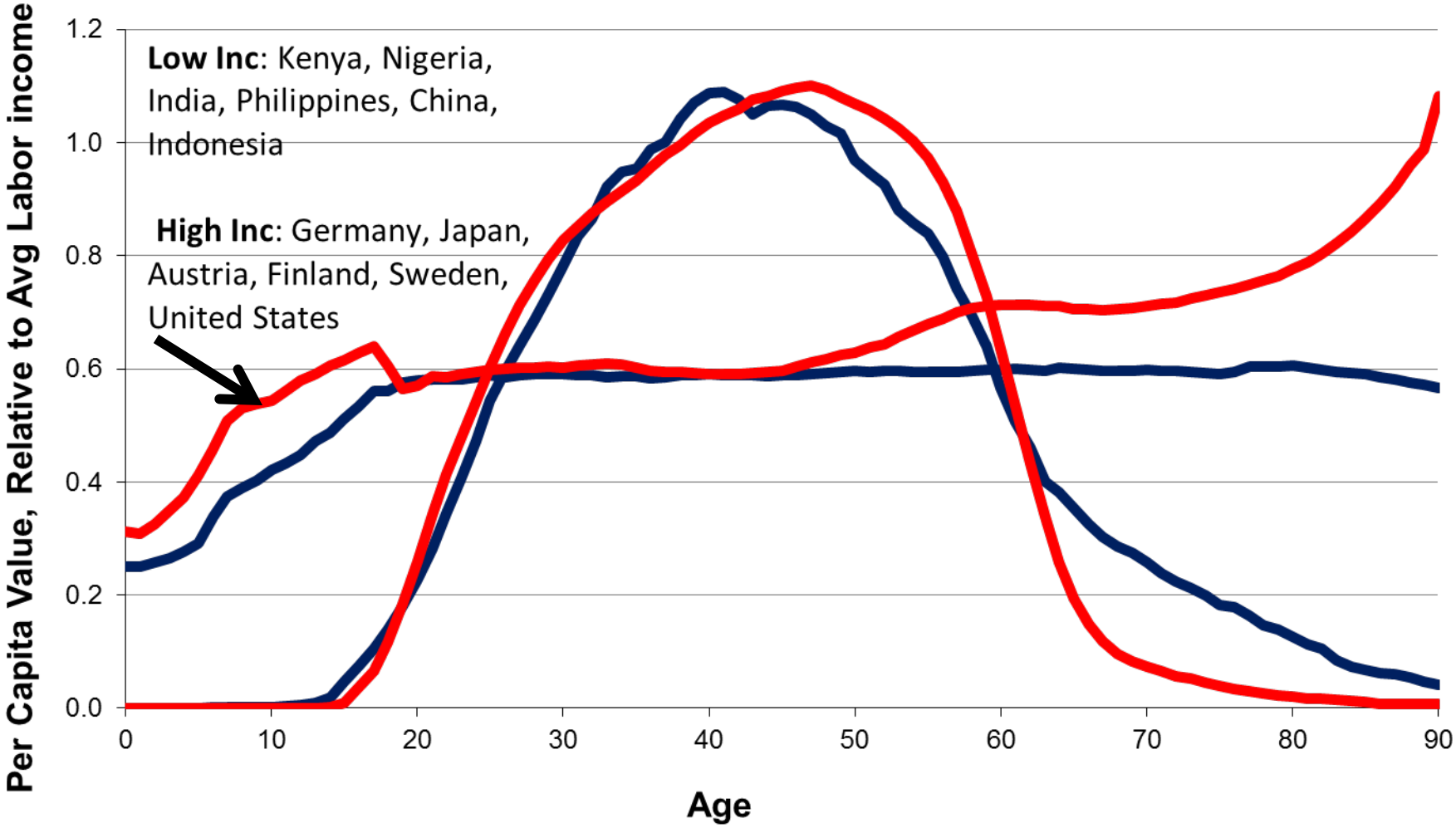

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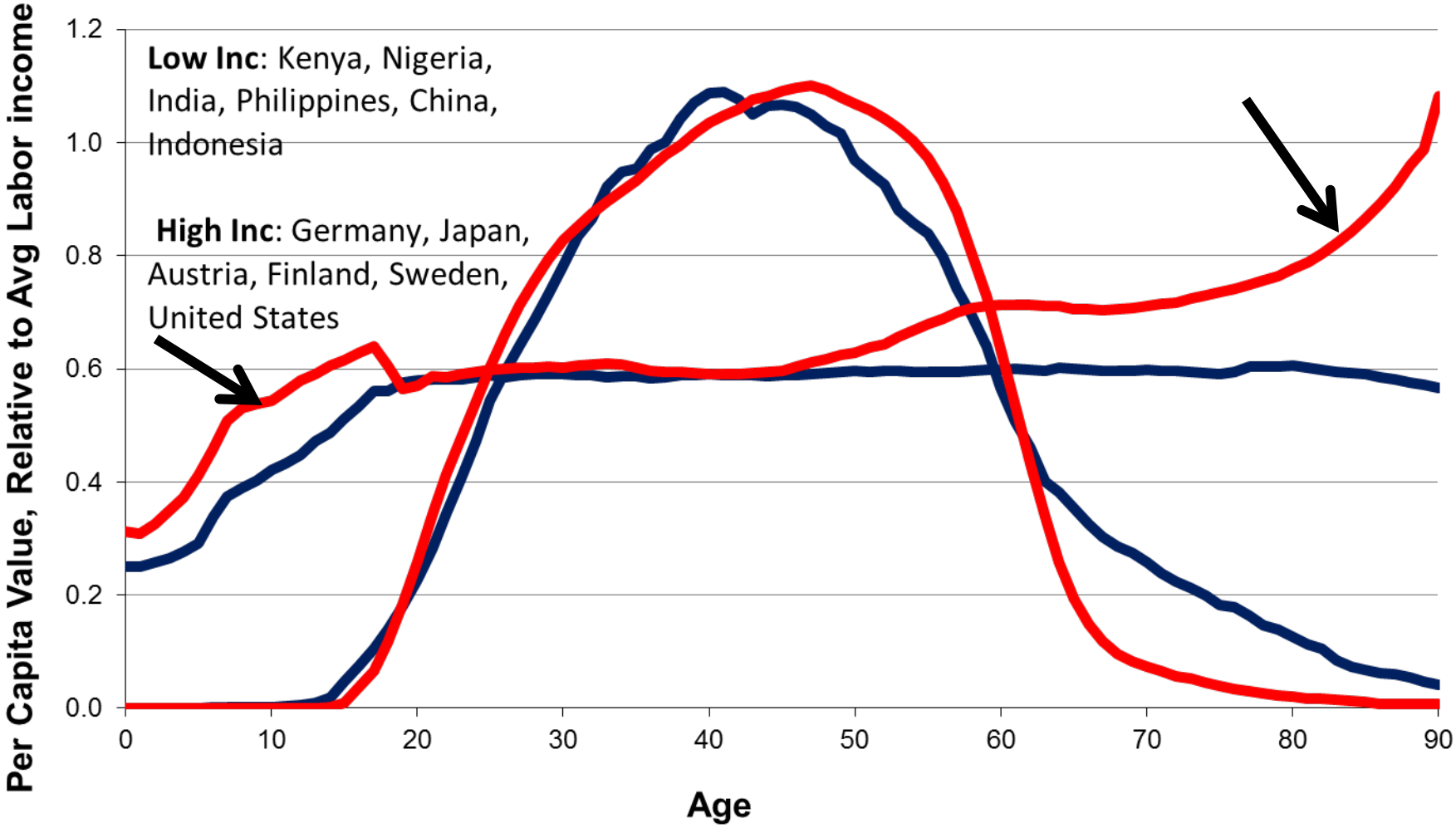
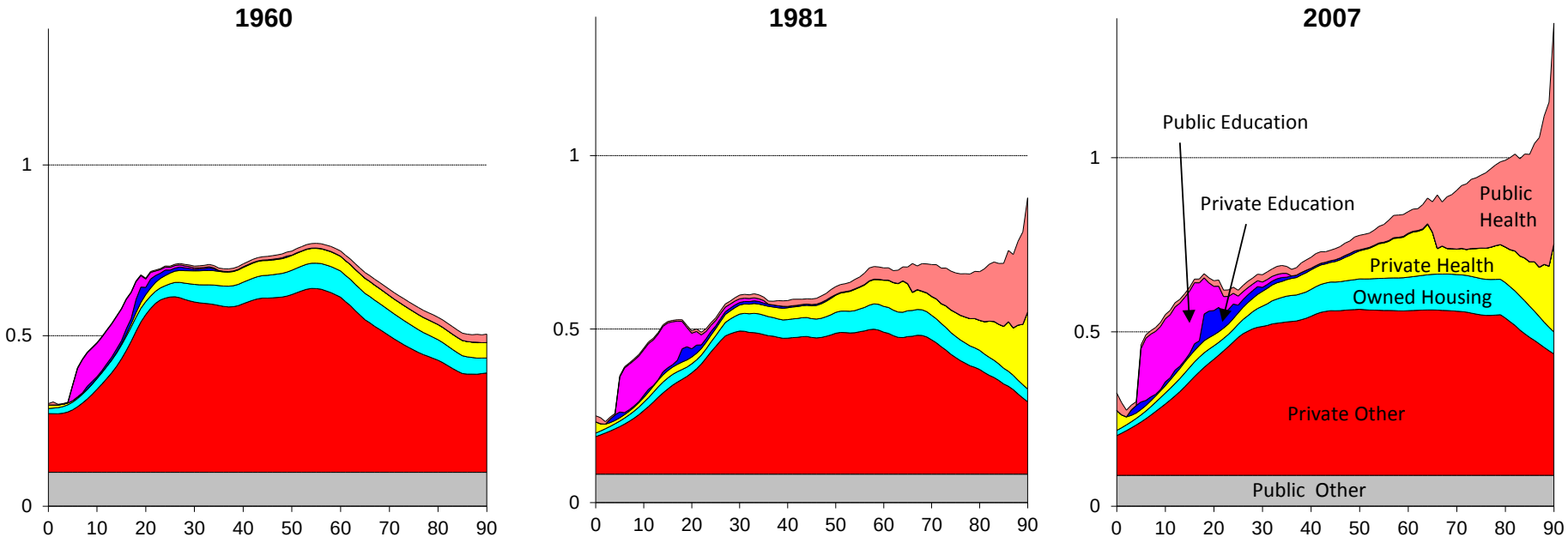
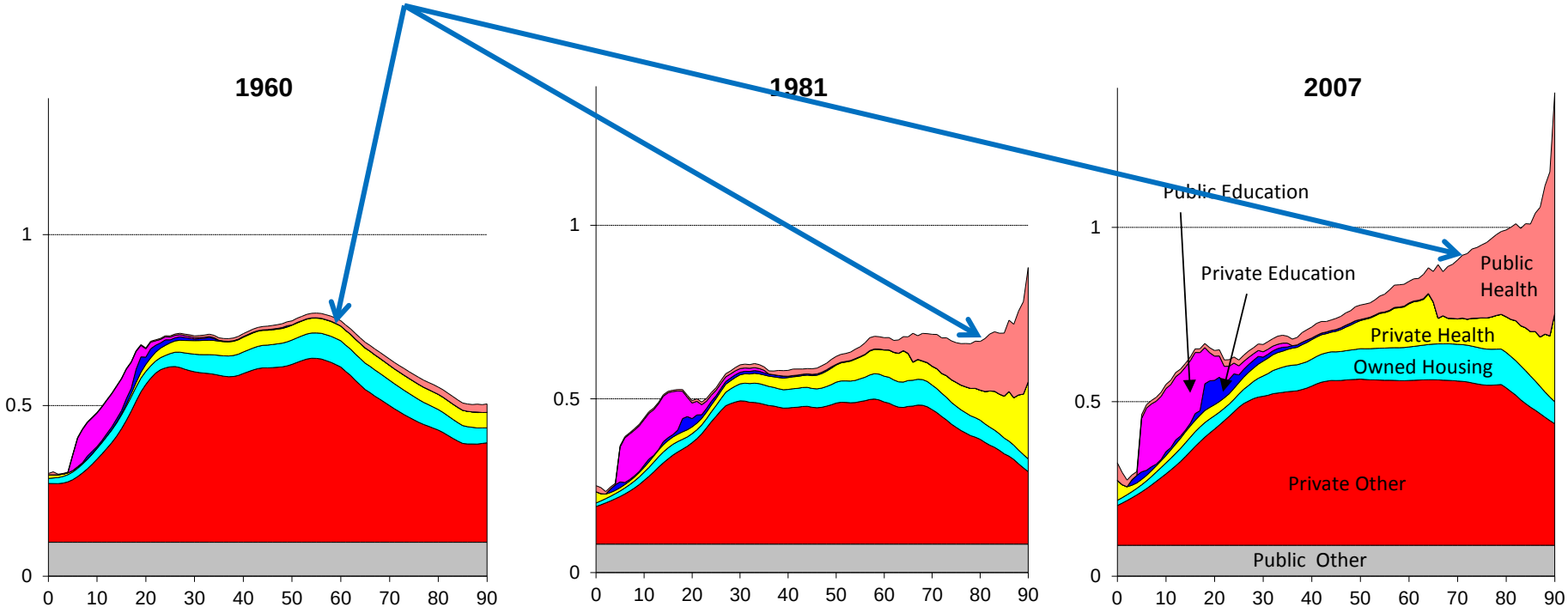


Age profiles may change: US cons over past half century: 1960, 1981 and 2007 (Ratio to labor income ages 30-49).



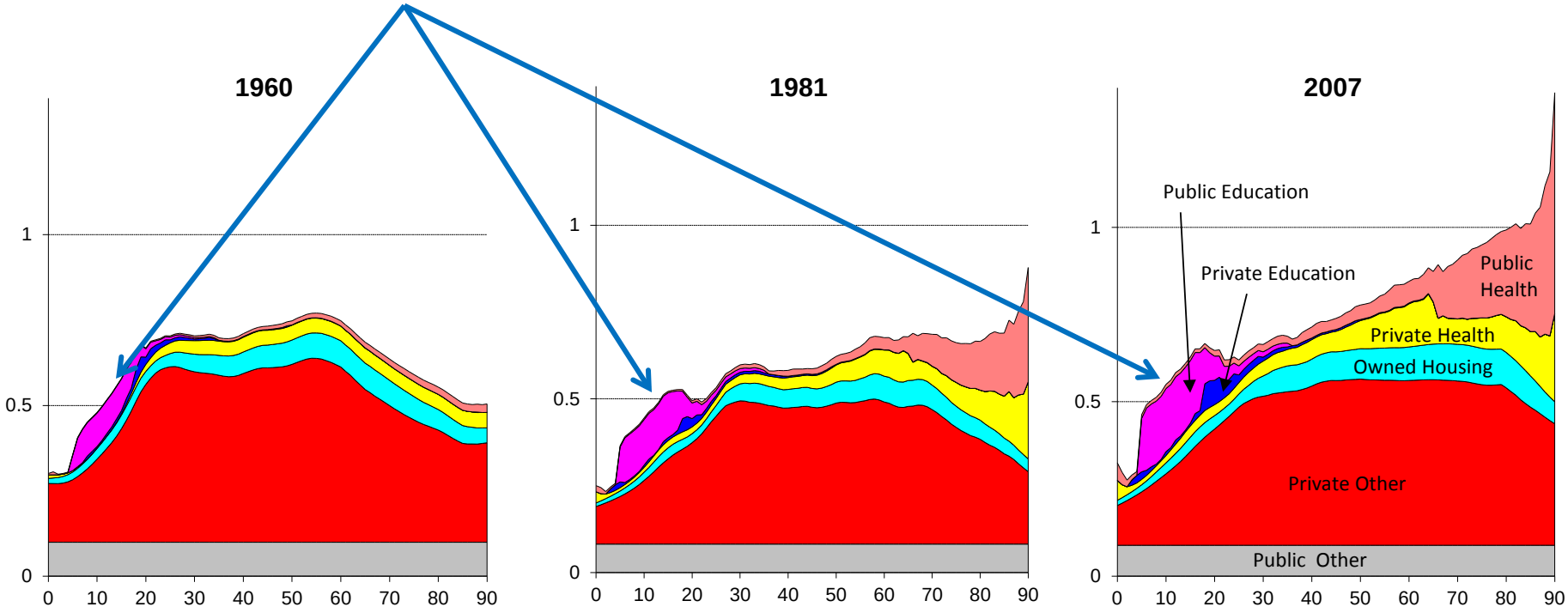
Source: US National Transfer Accounts, Lee, Donehower and Miller, 2011

Start and growth of public health care for poor and elderly a driving force



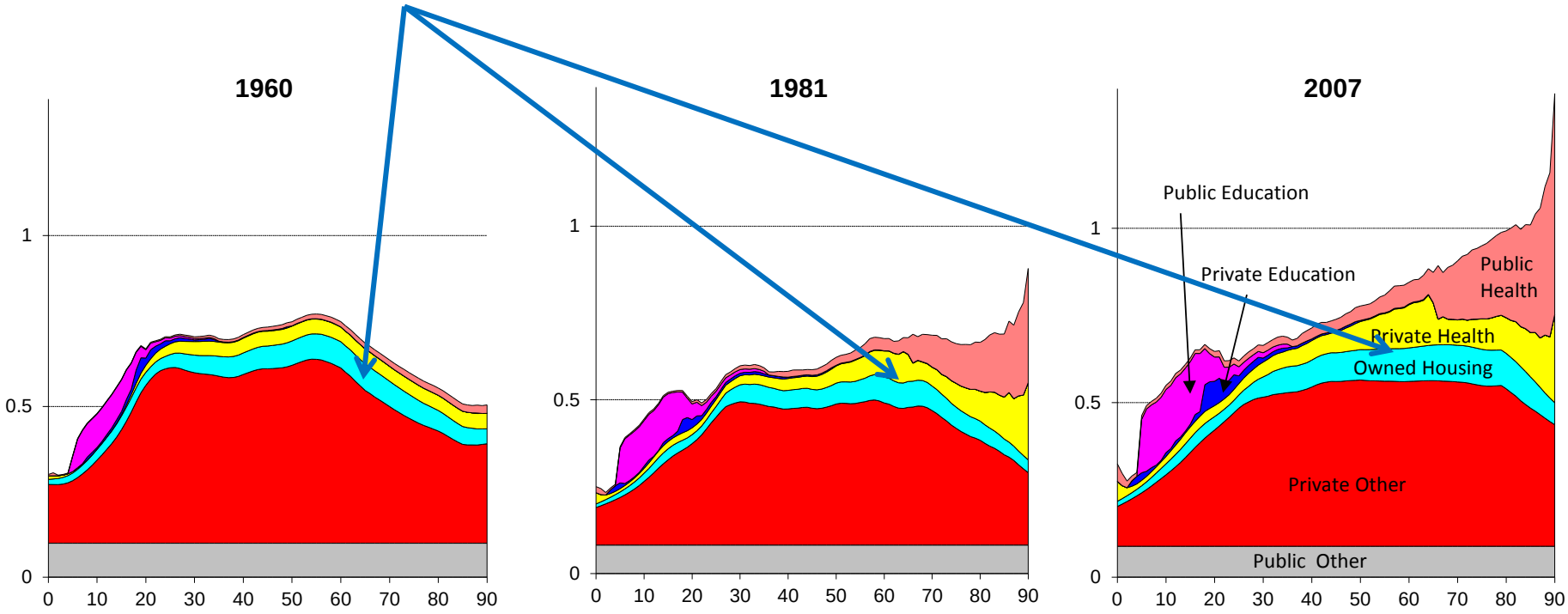
Source: US National Transfer Accounts, Lee, Donehower, 2011

Growth of spending for public education also notable



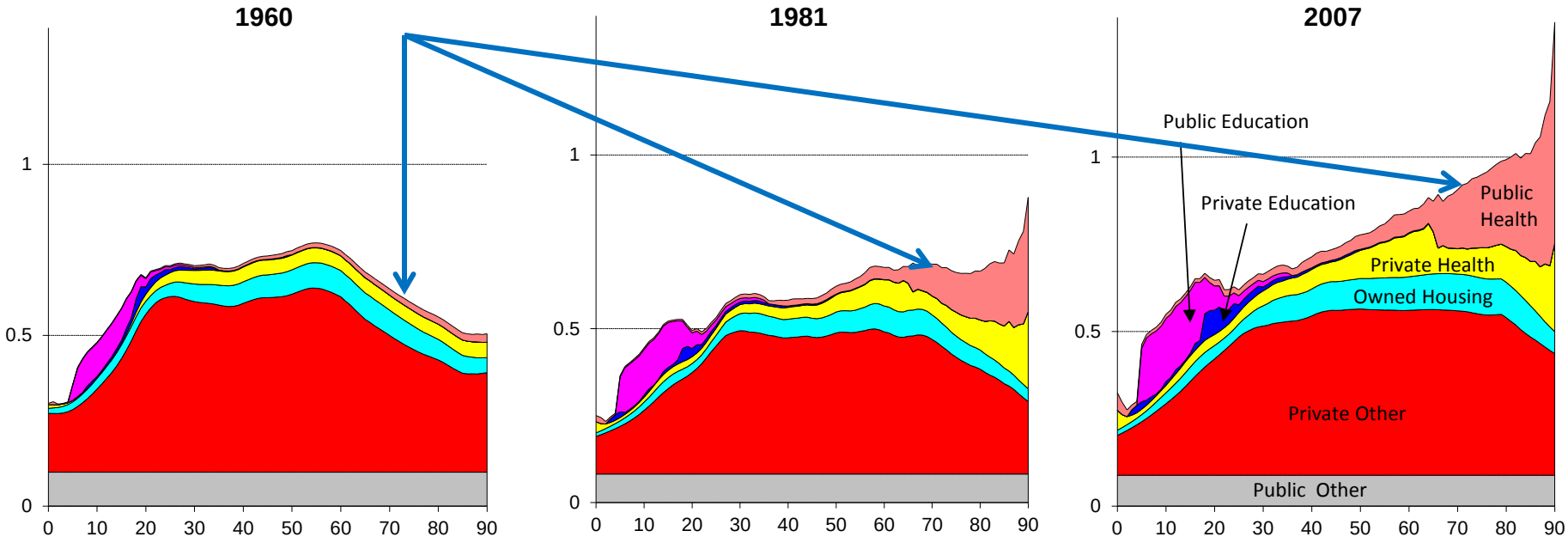
Source: US National Transfer Accounts, Lee, Donehower and Miller, 2011

Private consumption expenditures used to be lower for older people, but no longer true. Due to more generous public pension benefits?



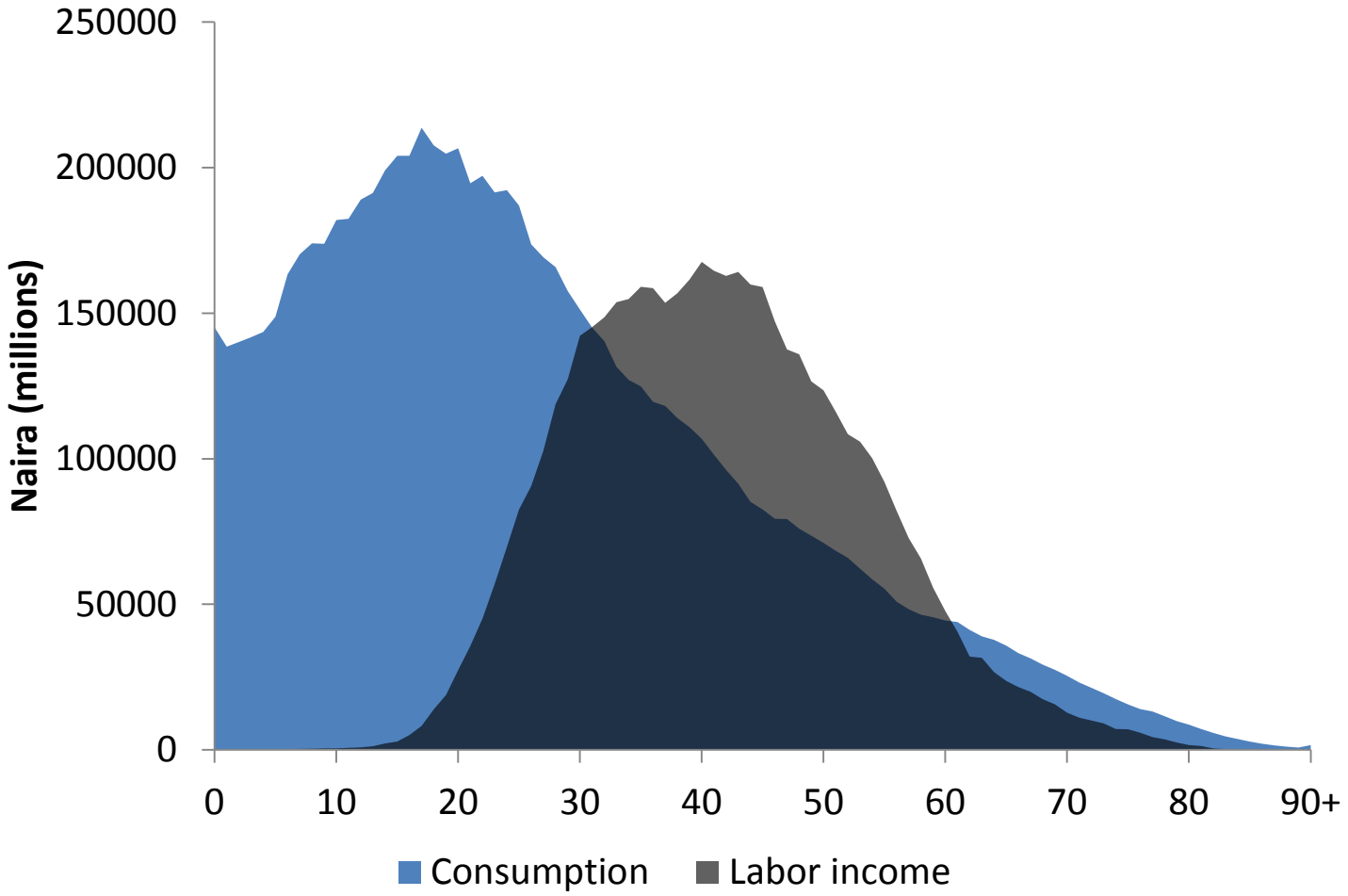
Source: US National Transfer Accounts, Lee, Donehower and Miller, 2011

Relative to 20 yr olds, cons by 80 yr olds has doubled since 1960. Many rich countries have similar changes

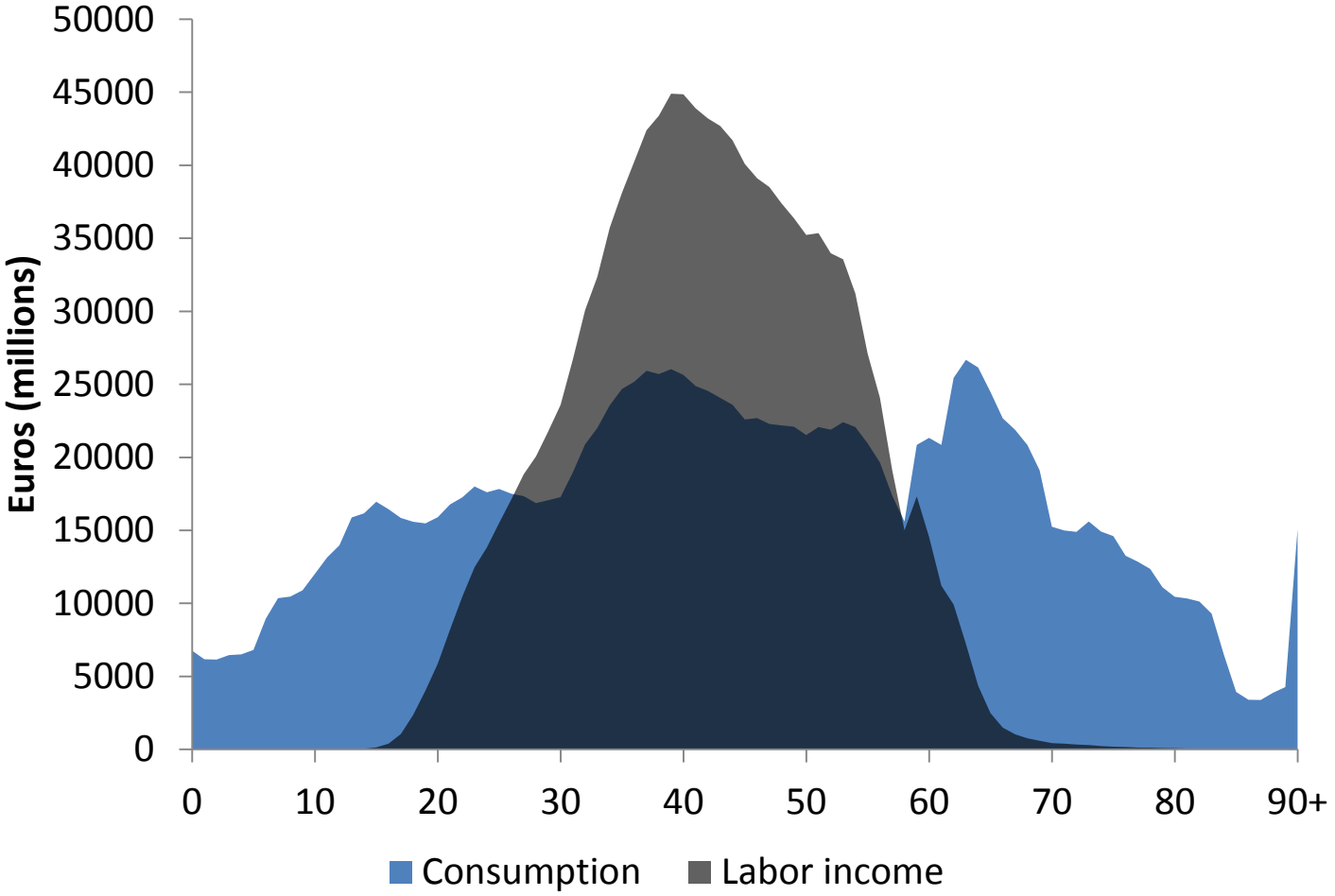


Source: US National Transfer Accounts, Lee, Donehower and Miller, 2011

Aggregate Consumption and Labor Income in Nigeria 2003



Aggregate Consumption and Labor Income in Germany 2003



3. Population age distributions and support ratios (SR)

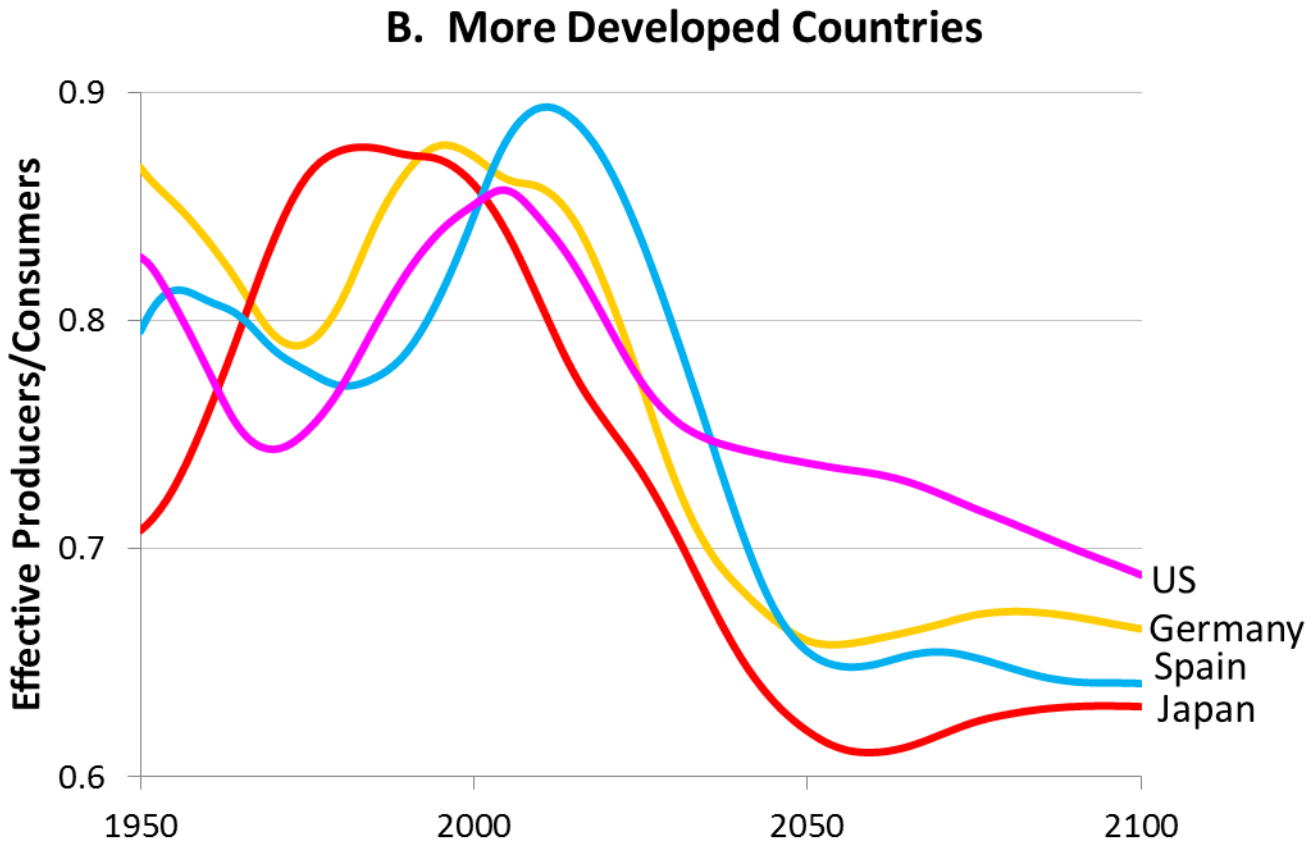
- How many working age people are available to support a society's consumers?
- Calculate hypothetical workers and consumers multiplying changing population age distributions times baseline NTA age profiles.
- "Support ratio" is:

$$\frac{hypothetical\ workers}{hypothetical\ consumers}$$

- Resources available per capita are proportional to this support ratio.

- Suppose age profiles of consumption and labor income remain constant
  - then rising SR means falling aggregate LCD because aggregate labor income (Yl) is rising faster than agg C
  - Rising SR releases income for other uses
  - Falling SR means rising agg LCD, taking income away from other uses
- How is extra income used when SR rises?
  - Consumed?
  - Invested in human capital?
  - Saved and invested?
- Population age distribution is also driving those changes
- Later we will look at this empirically for US

Support ratios based on the average rich country age profiles and United Nations population projections



	Rate of change of support ratio , 2010-2050 (%)			
	Germany	Japan	Spain	US
	-0.66	-0.66	-0.78	-0.34

4. How the life cycle deficit is funded

- Public transfers
- Private transfers
- Asset based reallocations (asset inc – svg)
- Depending on initial form and importance of each, population age distribution will affect these allocations to differing degrees.

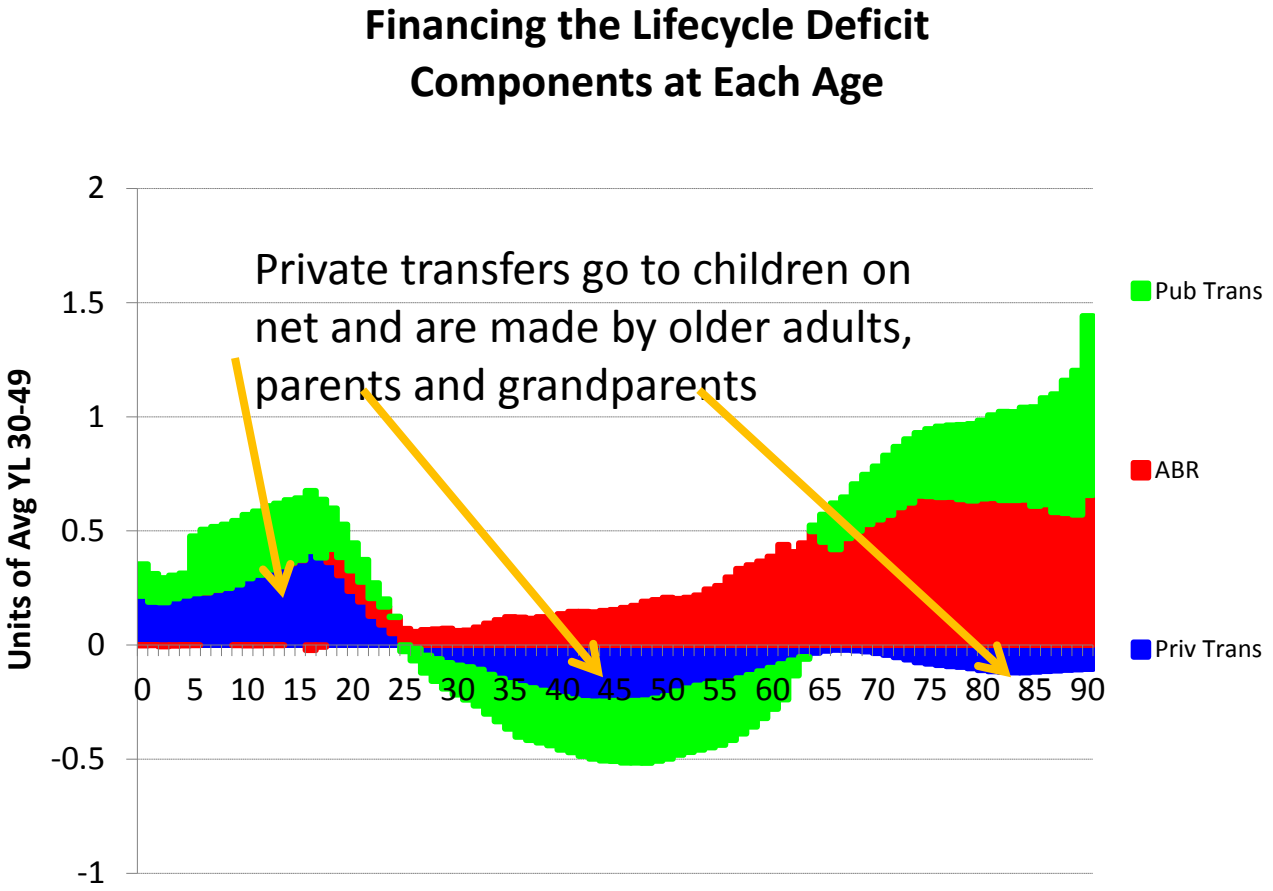
Data for US (2003), per capita

The "life cycle deficit" is consumption – labor income.

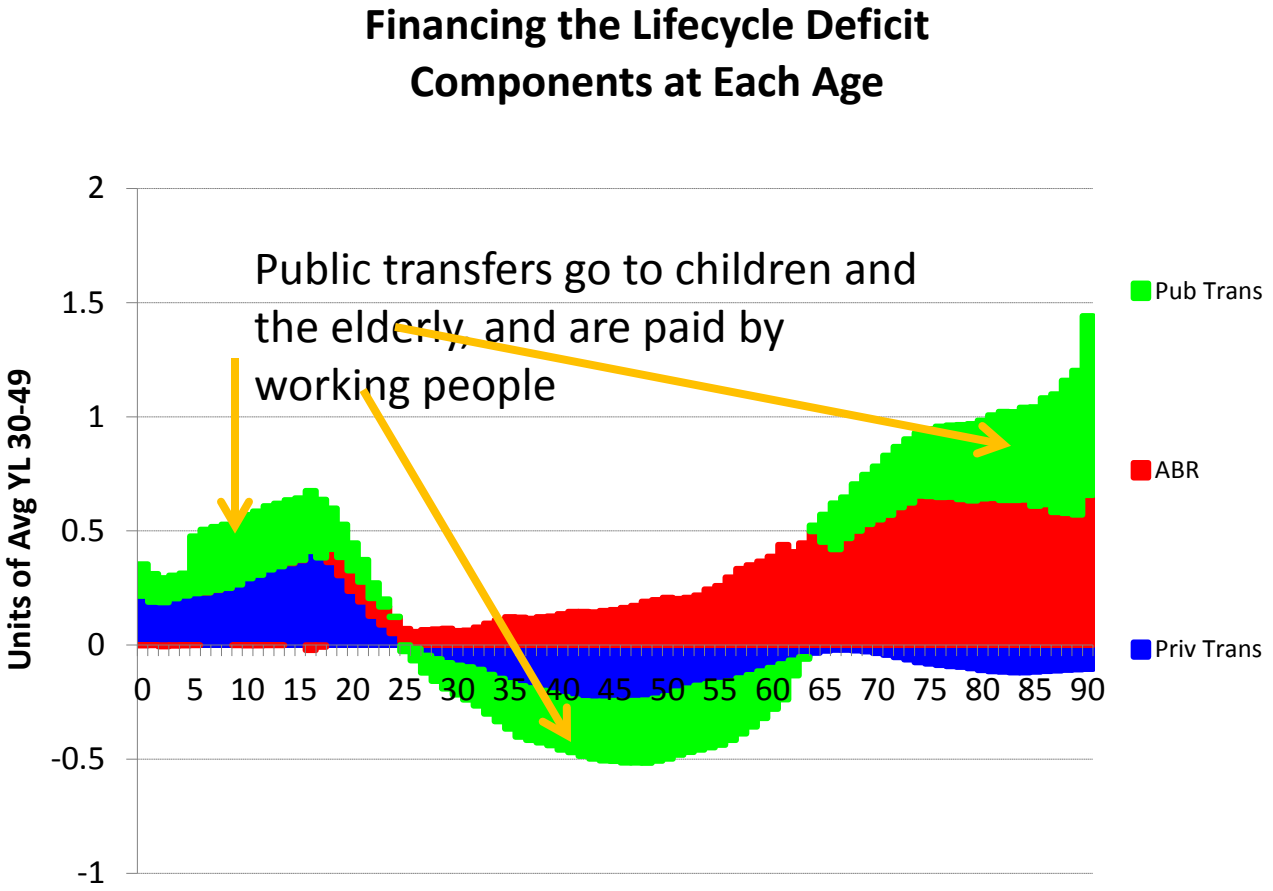
Net Private transfers is intra + inter household

Net pub transfers is benefits received – taxes paid

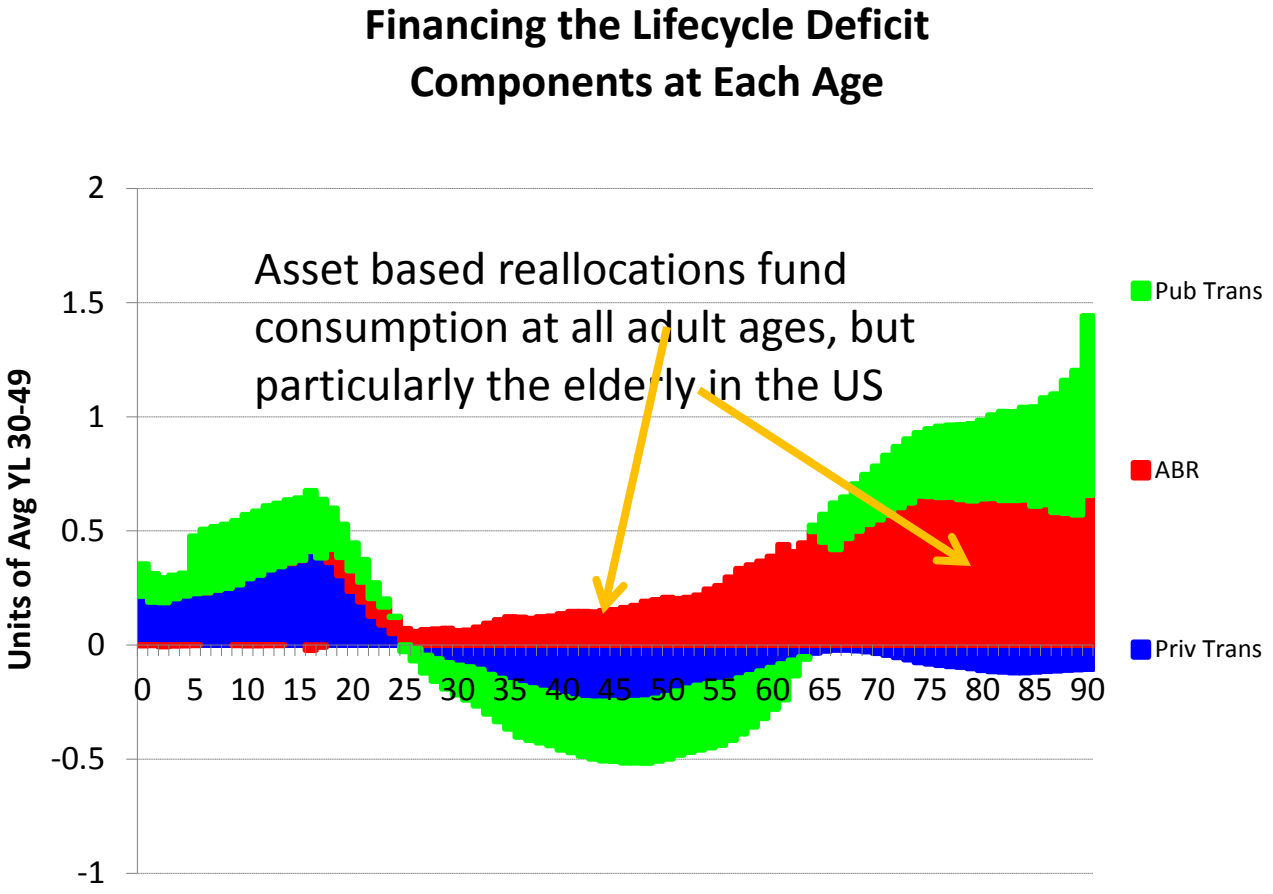
ABR=Asset Income – Saving=asset income consumed or transferred



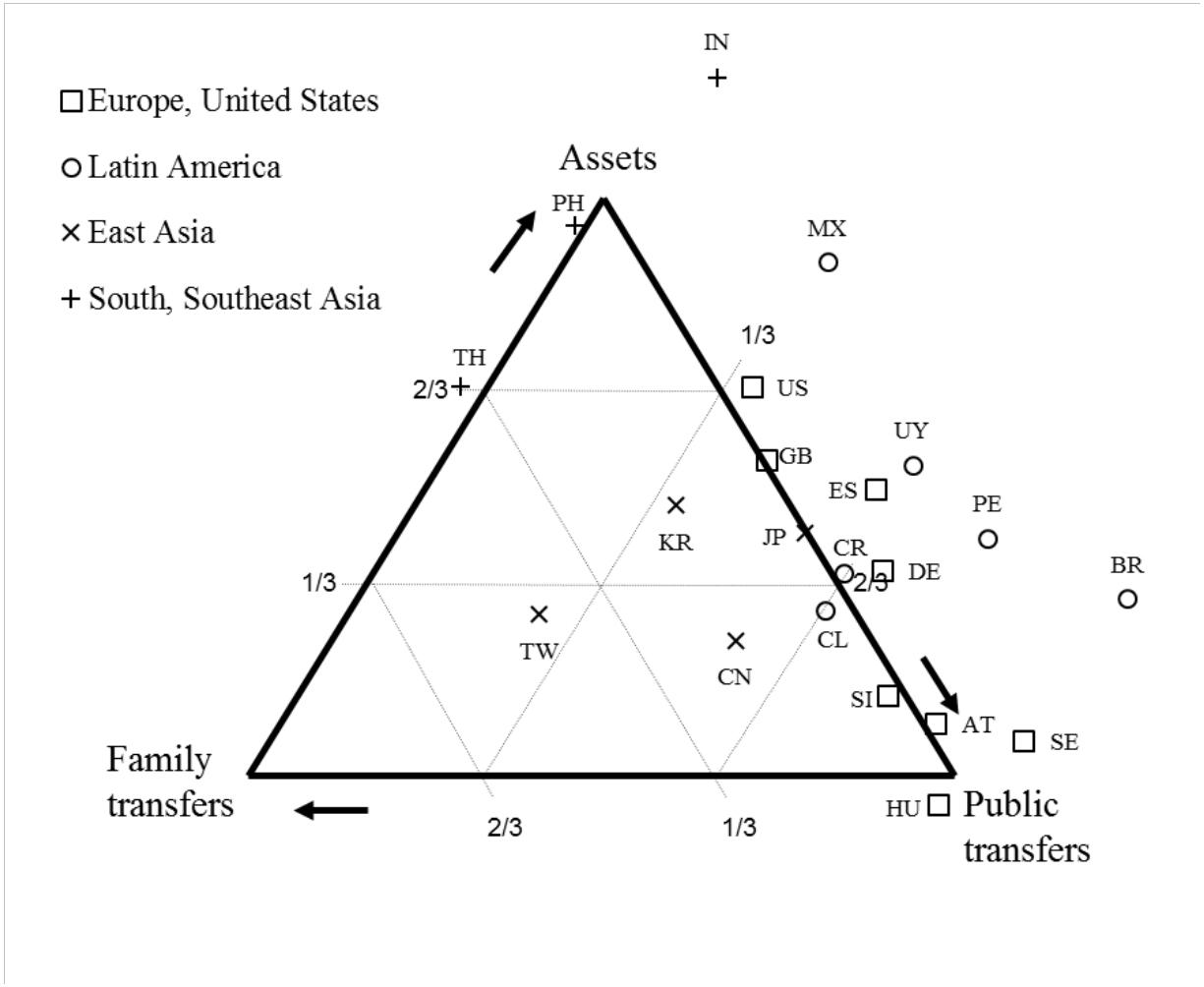
Public transfers are for public education, health care, pensions and other things. In the US they cover only about a third of consumption of elderly on average.



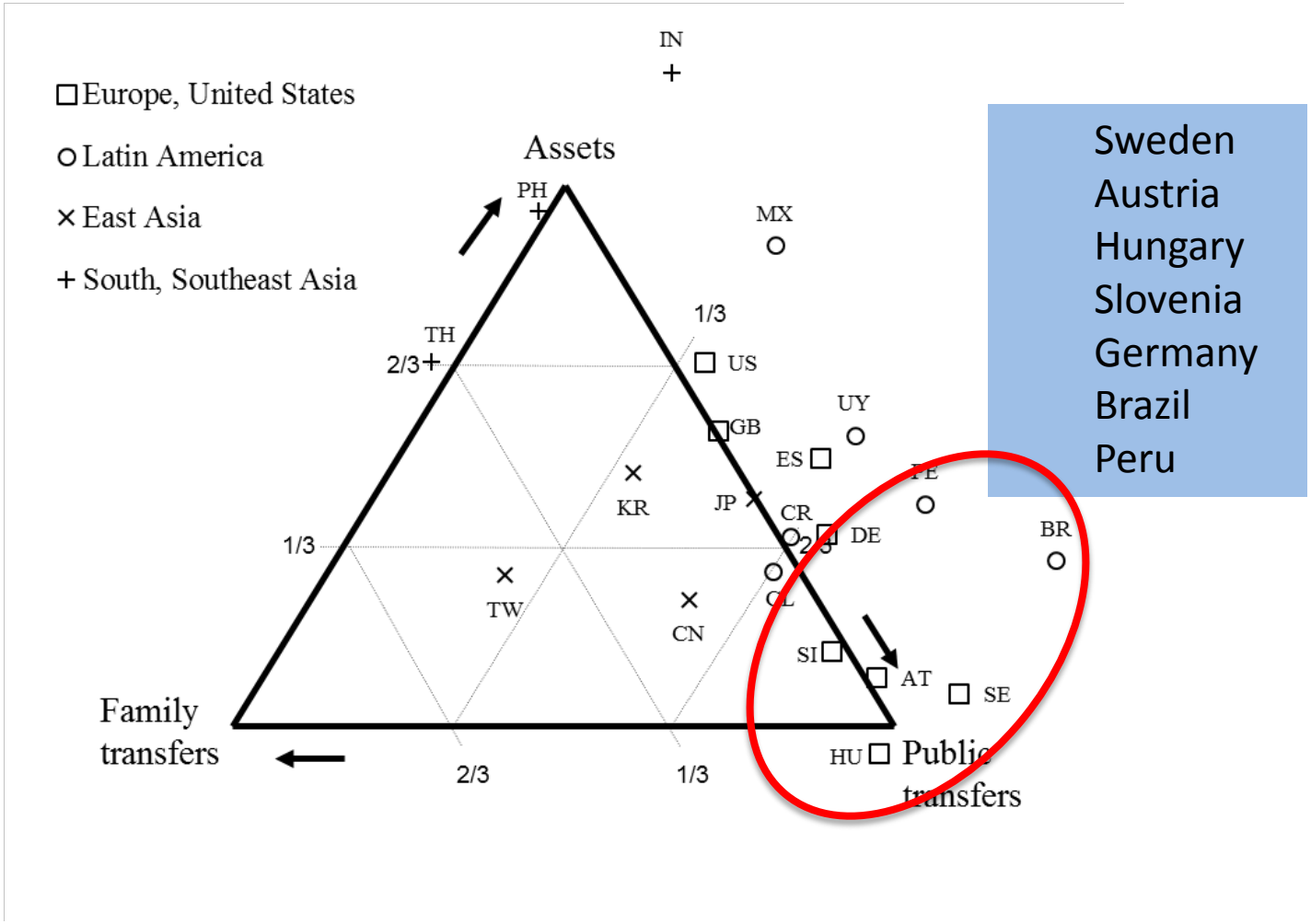
US Elderly rely very heavily on asset income to fund consumption, but European elderly do not – they save their asset income and live on public transfers.



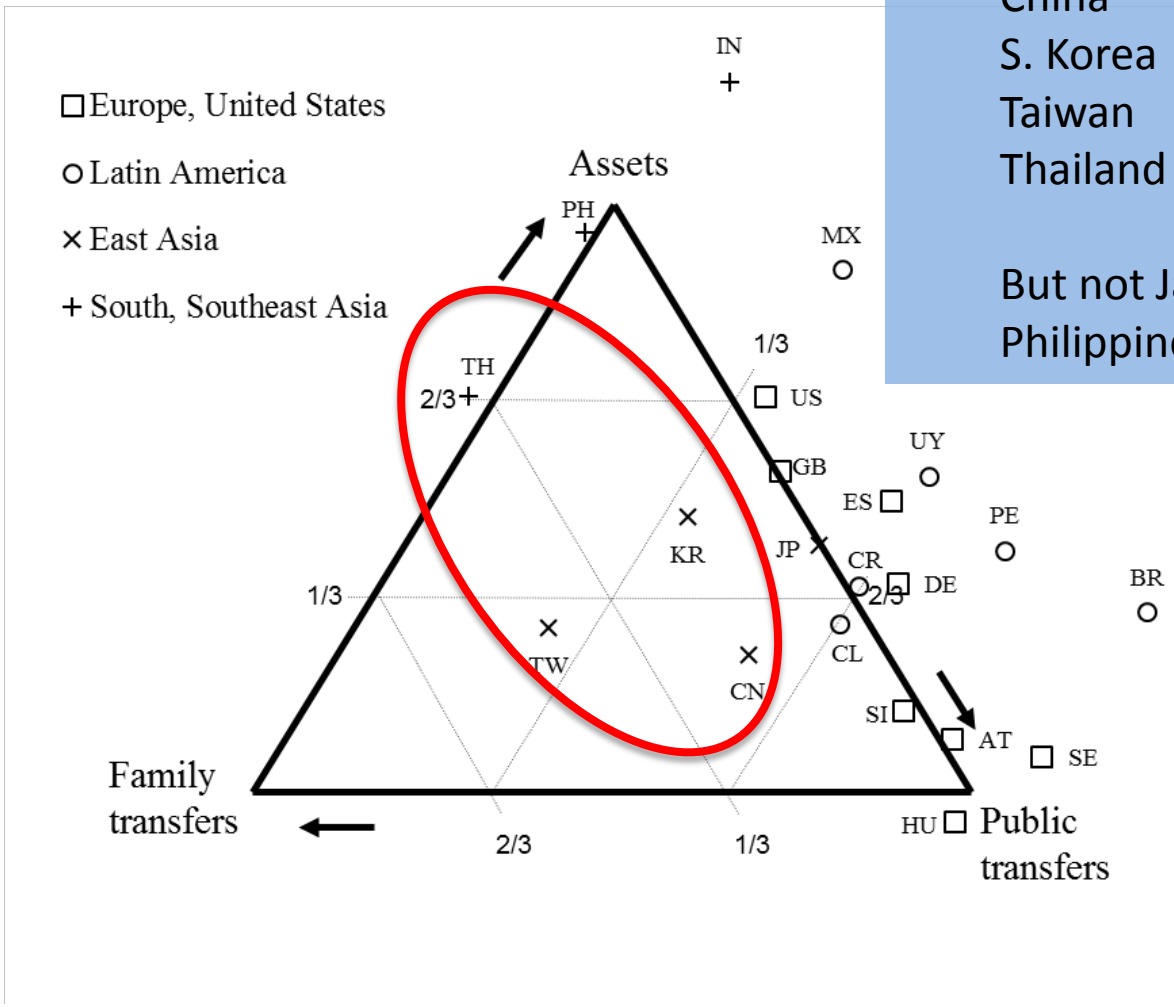
For Elderly (65+): How is consumption net of labor income funded? Shares of **Family Transfers, Public Transfers** and **Asset income** (part not saved) sum to 1.0



In some countries elderly rely very heavily on public transfers



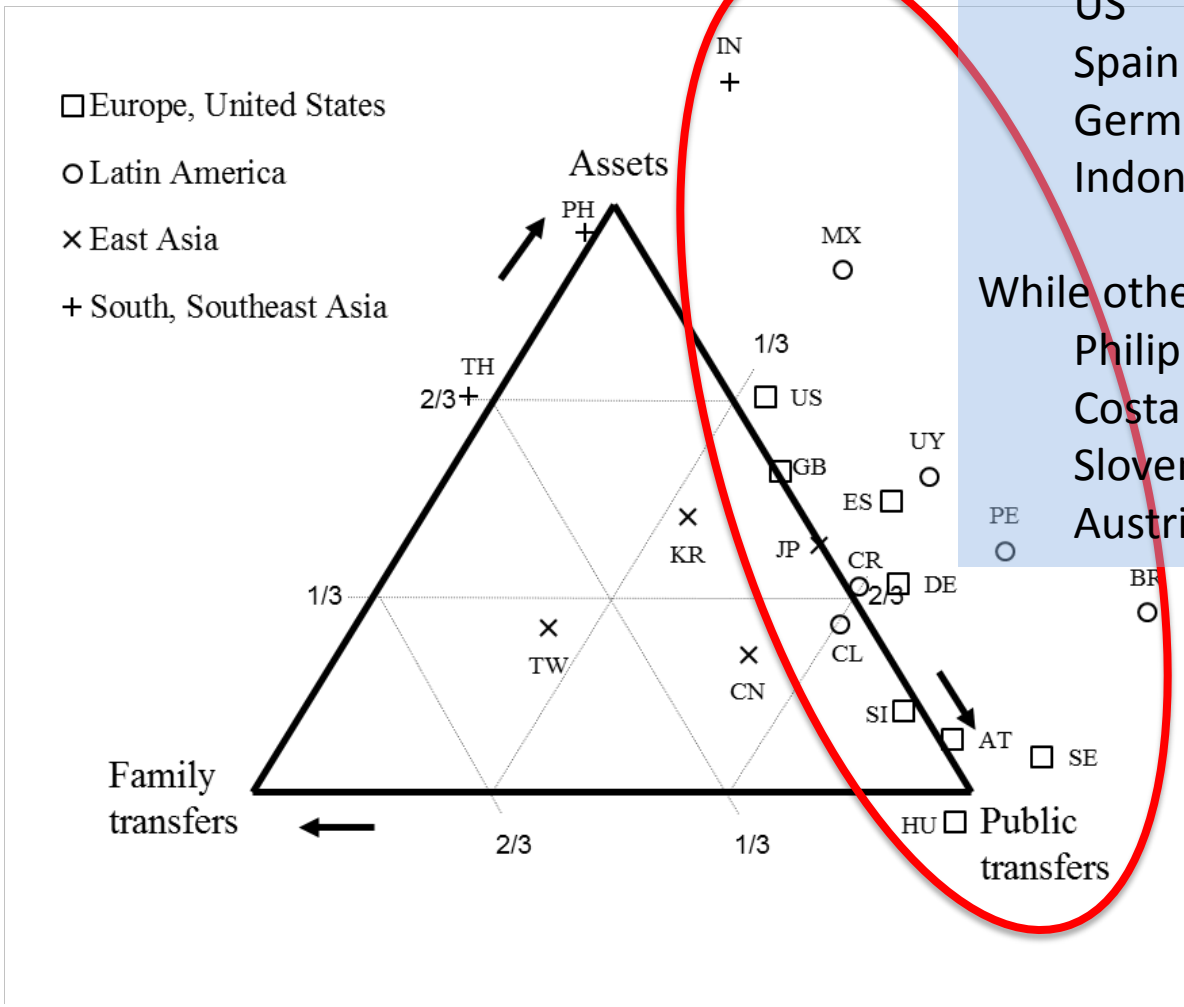
Elders In some Asian countries rely partly on family transfers.



China
S. Korea
Taiwan
Thailand

But not Japan, Philippines or India

But in more countries, elders actually make net transfers to their children

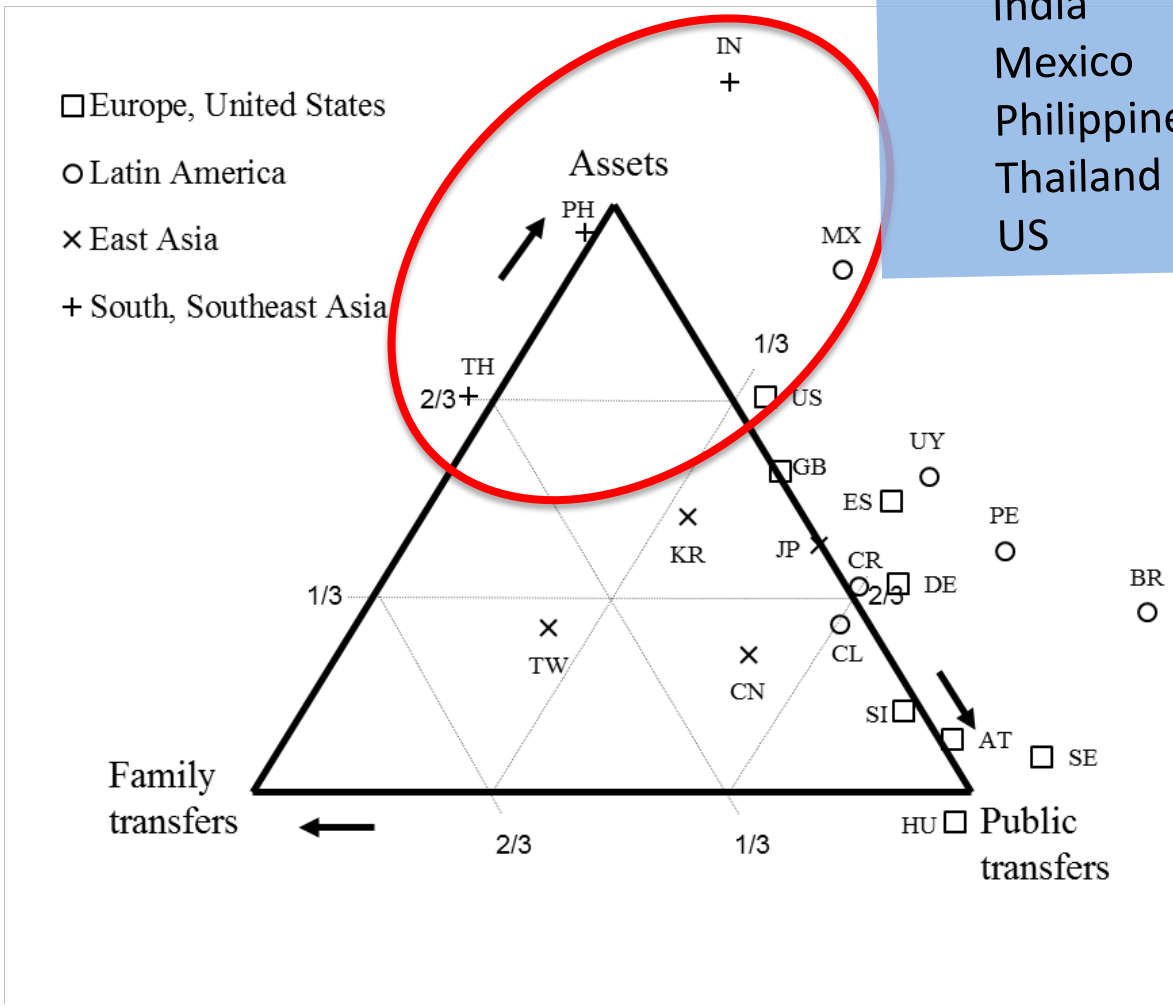


India	Austria
Mexico	Sweden
US	Uruguay
Spain	Brazil
Germany	Peru
Indonesia	

While others are near zero

Philippines	Japan
Costa Rica	Chile
Slovenia	Hungary
Austria	UK

In some countries, elders rely heavily on asset income.



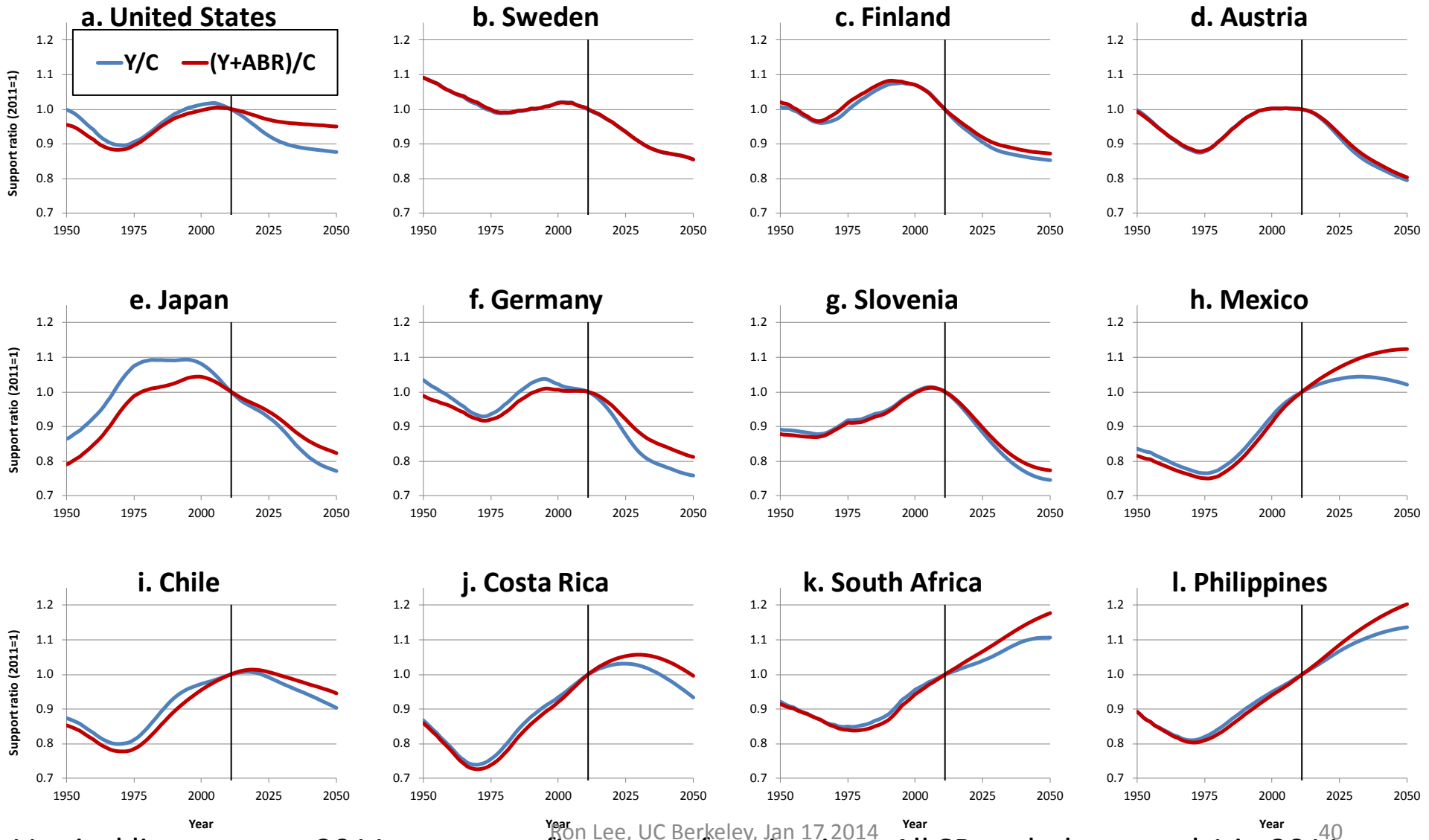
India
Mexico
Philippines
Thailand
US

- When consumption of the elderly is funded mainly out of public or private transfers, then population aging just raises the transfer burden on workers.
- When elder consumption is funded mainly out of assets then
  - Population aging imposes smaller costs on workers since elderly are not fully dependent.
  - Population aging raises assets and perhaps capital per capita and per worker

The “general support ratio” (GSR), a new NTA measure

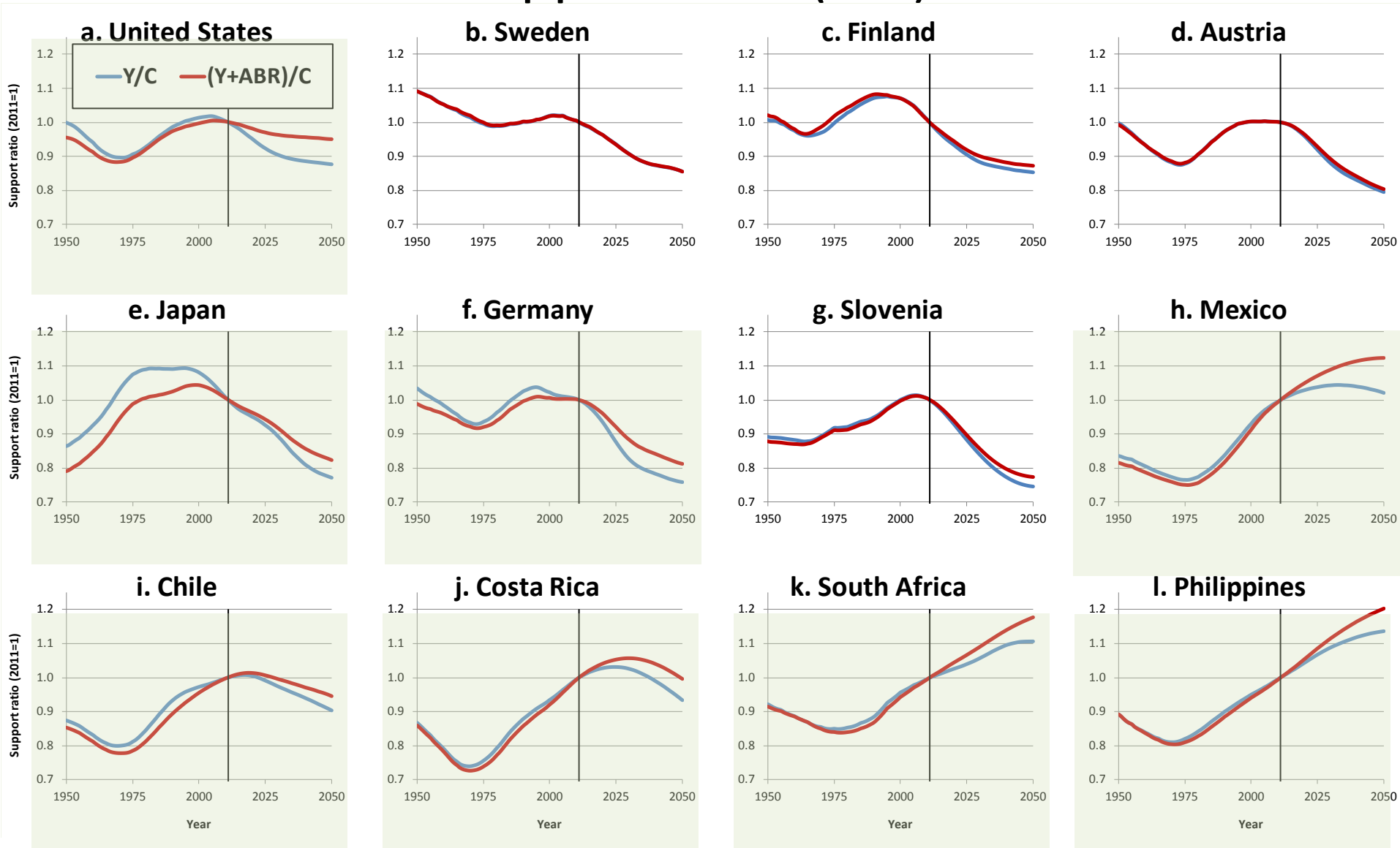
- Are the elderly actually dependent on workers to fund their consumption? Suppose elderly use their own savings for consumption?
- GSR reflects use of asset income by elderly to fund own consumption (asset inc – saving).
- GSR isolates the impact of population aging on transfers (public and private).
- GSR shows initial consequences of pop change for given age profiles of consumption, labor income, and asset income remain constant.

Standard support ratios (blue) and general support ratio (red)



Vertical lines at year 2011 represent first year of projection. All SR scaled to equal 1 in 2011.

Standard support ratios (blue) and general support ratio (red)



Vertical lines at year 2011 represent first year of projection. All SR scaled to equal 1 in 2011.

5. How does the economy actually change over time, and what is role of population?

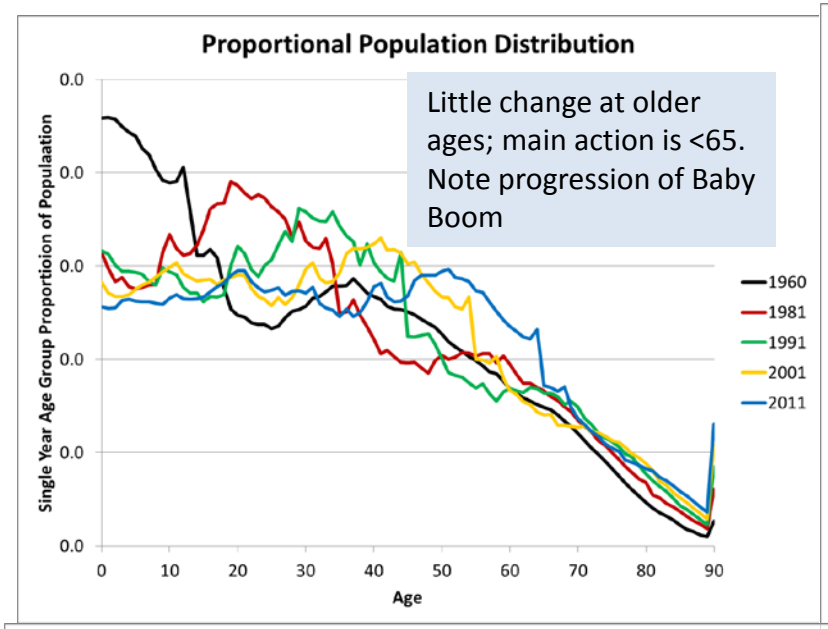
- Balancing equation holds for aggregates

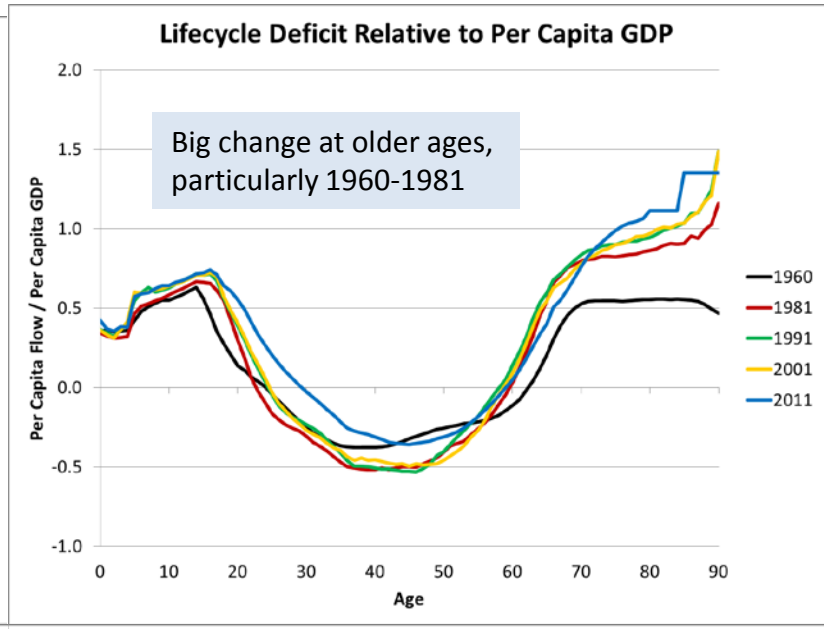
$$C - Y_l = \tau^+ - \tau^- + Y_A - S$$

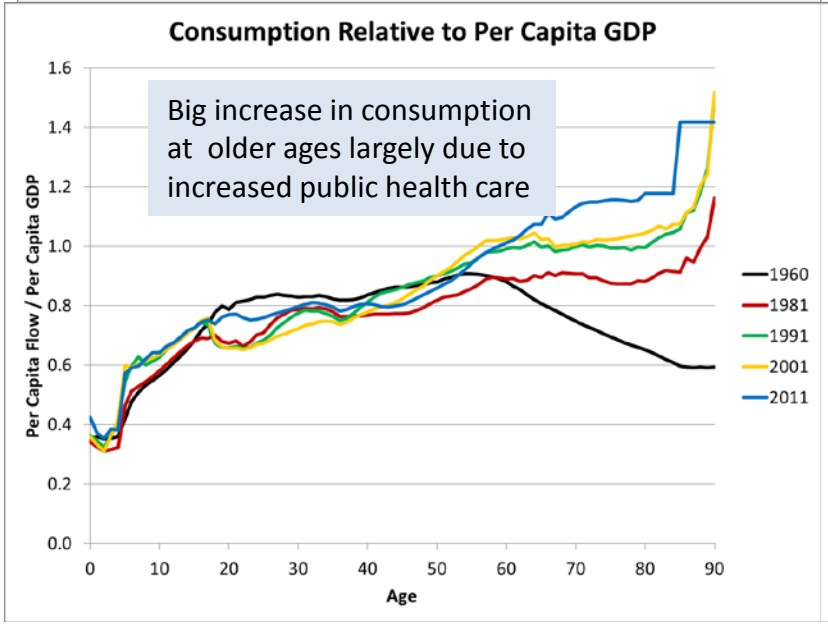
- Also holds for changes in aggregates
- Divide by GDP; it holds for ***changes in shares of GDP***.
- Changes in shares of GDP have to add to zero *ex post*.
- If Pop Aging raises share of C and reduces Yl, then other public and private changes must pay for this
  - Increased Asset income due to rise in rate of return? Drop in savings with increased borrowing?
  - Changes in gross transfers are offsetting, except for rest of world (migrant remittances), so they don't help here with aggregates.
- Can examine these changes empirically.

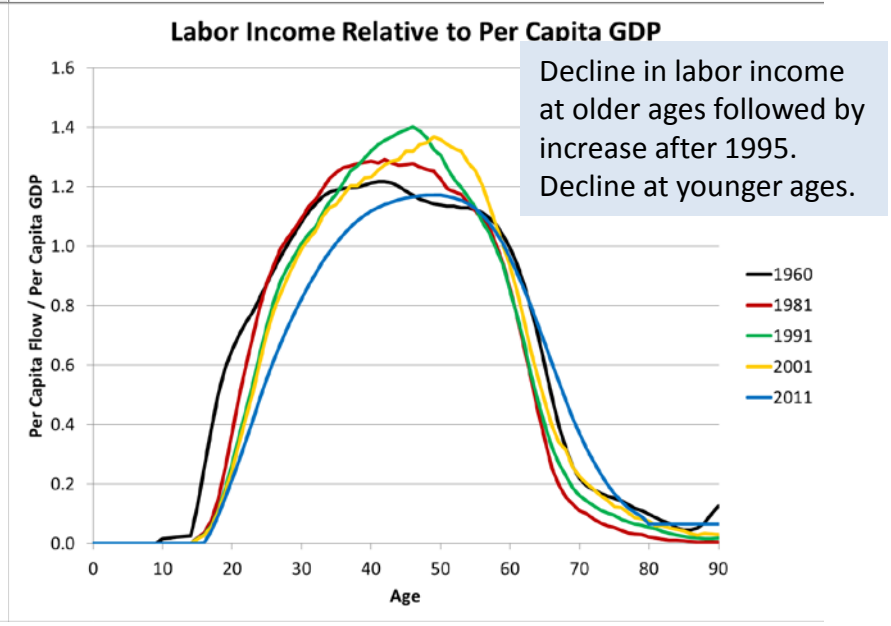
- New work, in progress, suggestions welcome
- We ask: How much of change is due to pop age distribution and how much to change in age profiles?
  - Profiles rise through productivity growth, which is not interesting
  - Standardize profiles relative to per capita gdp
  - Standardize pop age distr relative to total pop
- Amounts to examining the change over time in aggregates like total consumption or public transfer inflows as a share of GDP.
- What proportion of change in C/GDP is due to population age distribution change? How much is due to changes in the age profiles?
- Note: all interactions are allocated to changes in profiles in what follows.

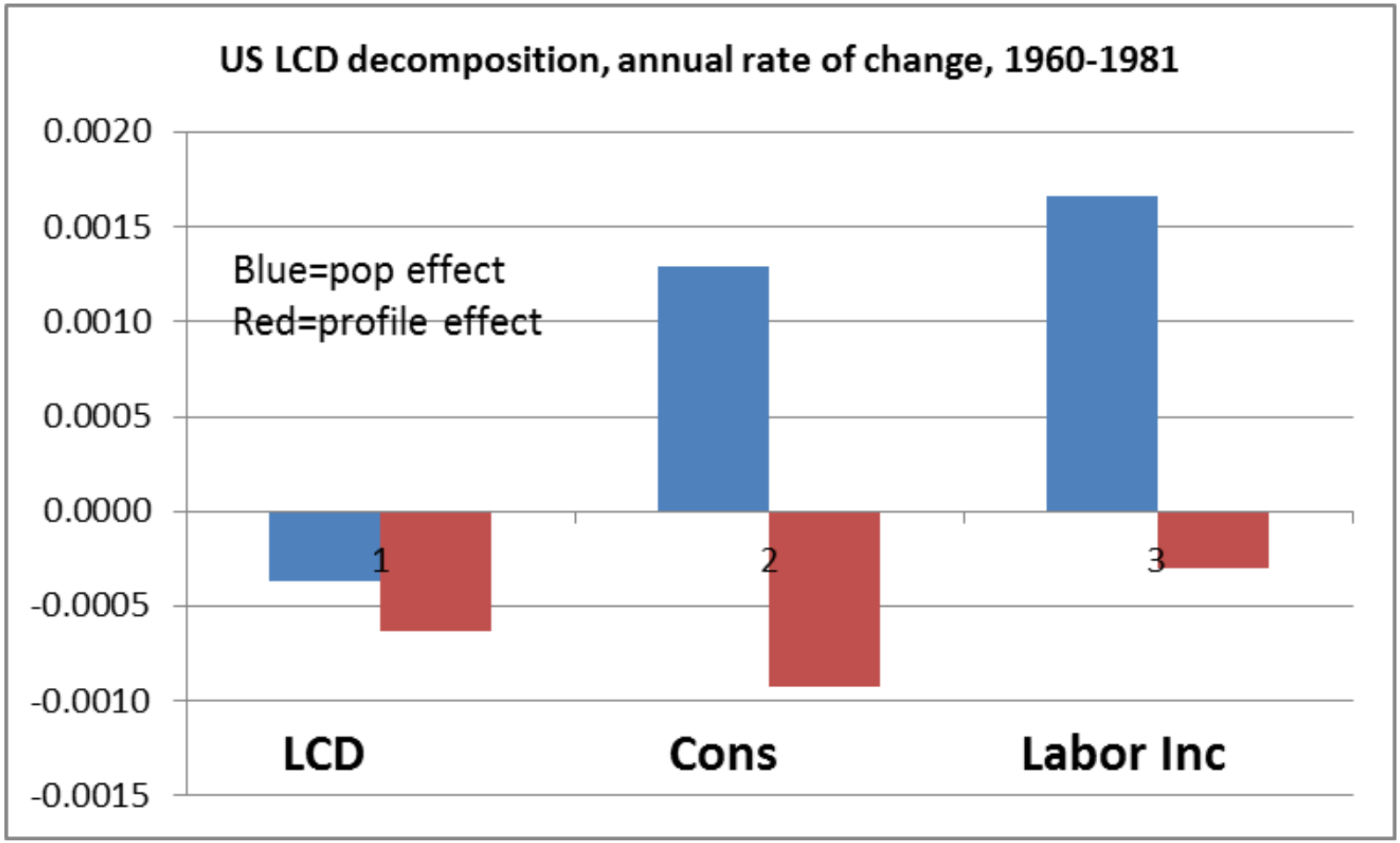
US : Population, Consumption, Labor Income, and LCD, 1960-2011.



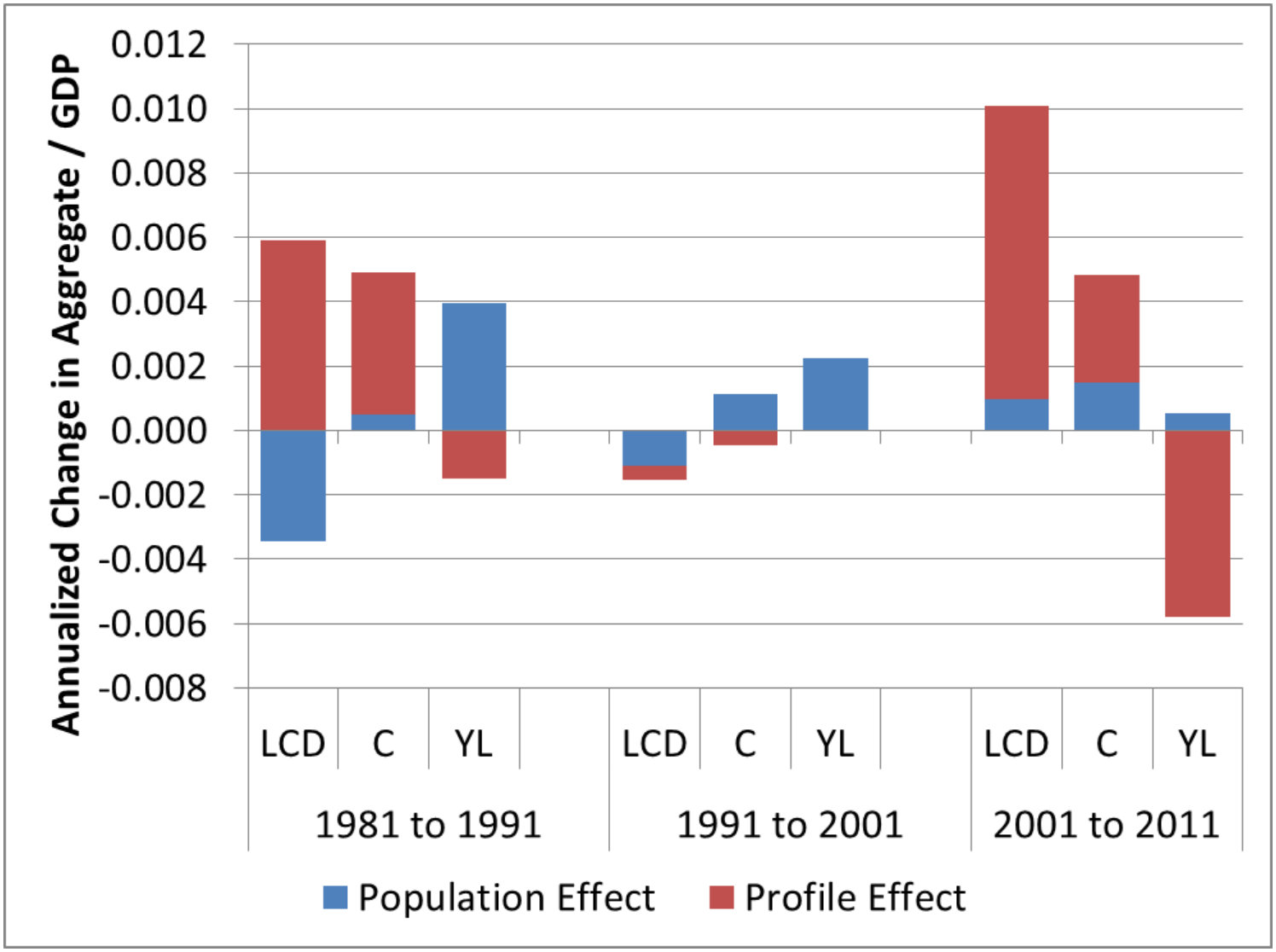




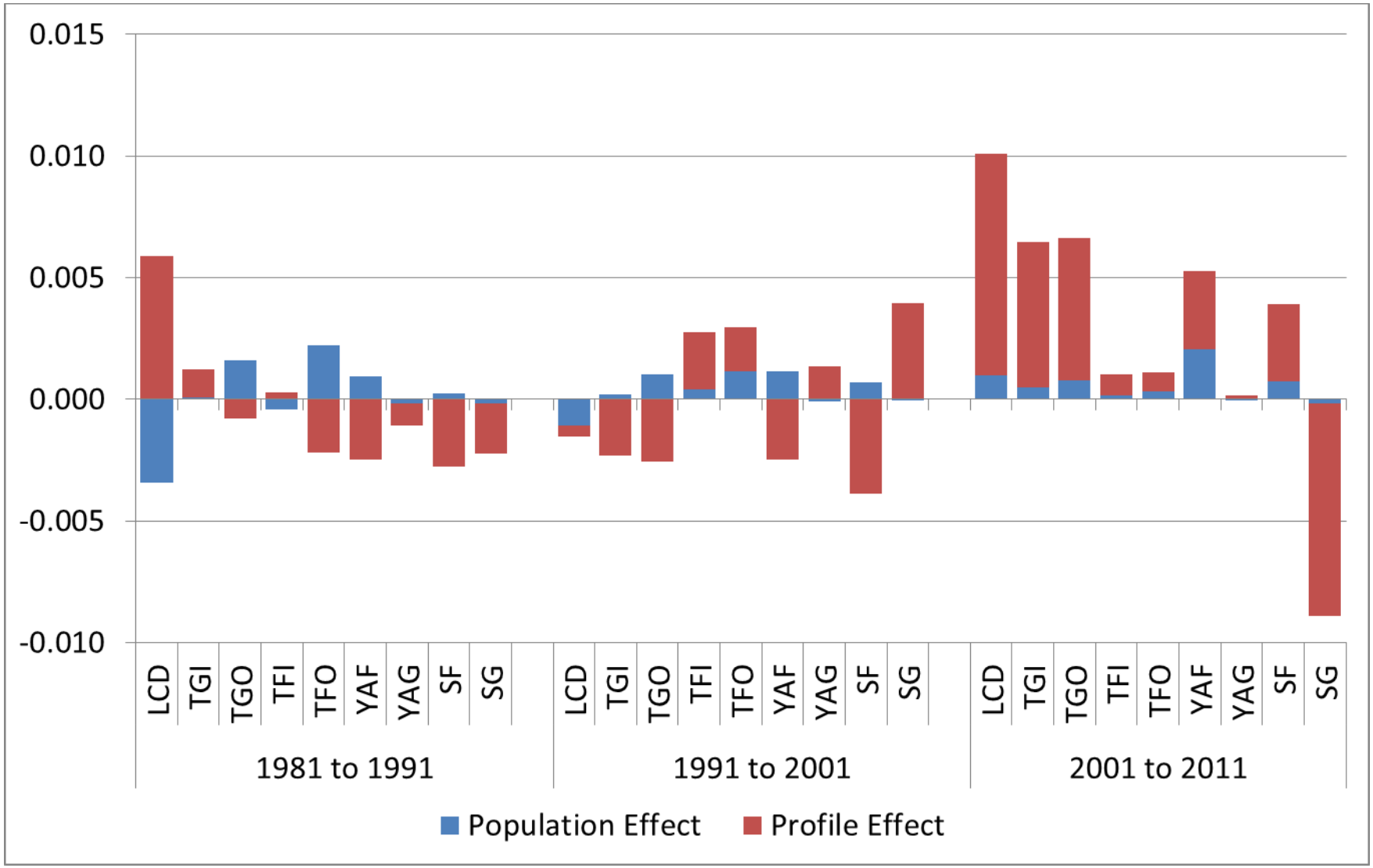



US LCD decomposition, annual rate of change, 1960-1981
0.0020
0.0015
0.0010
0.0005
0.0000
-0.0005
-0.0010
-0.0015
Blue=pop effect
Red=profile effect
1
2
3
LCD
Cons
Labor Inc

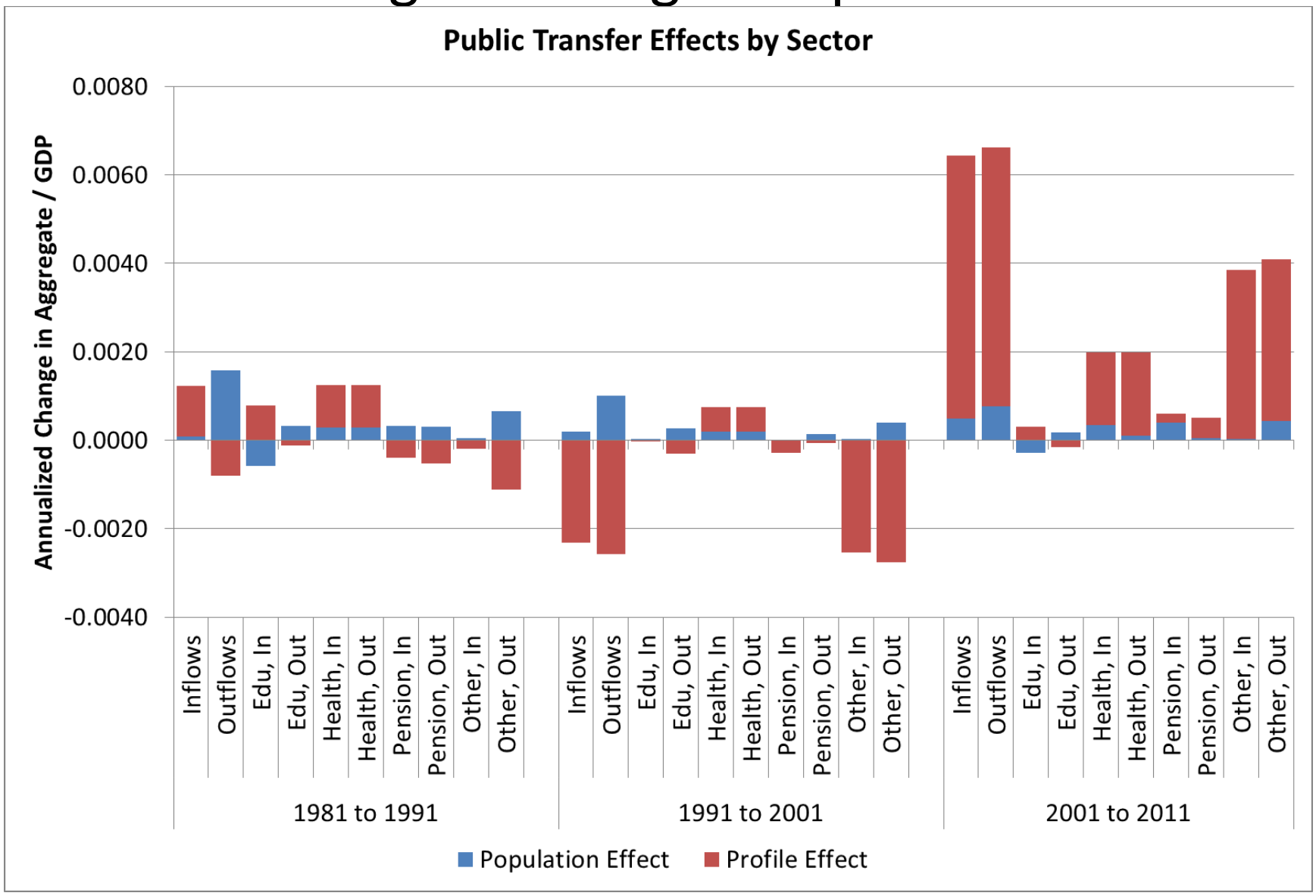
US LCD/GDP decomp, 1981-2011



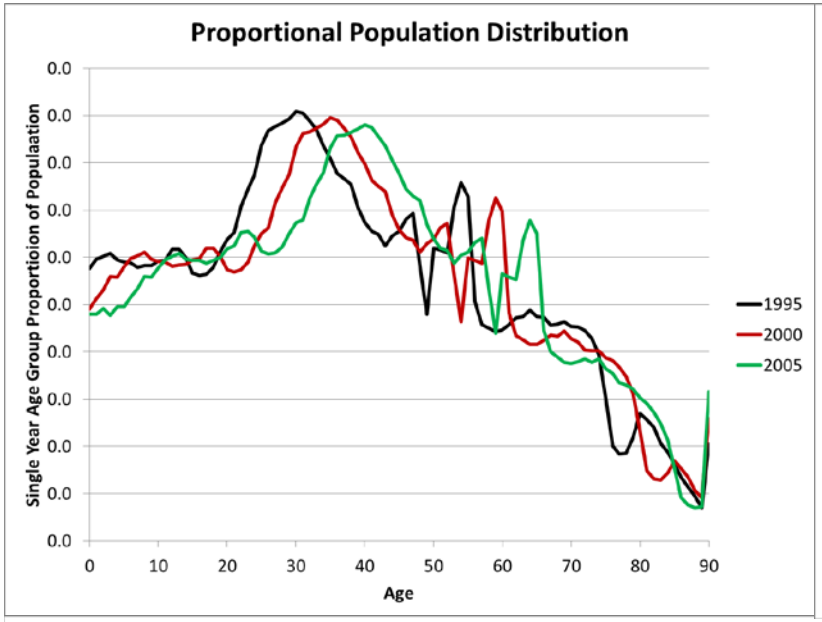
Accounting for change in the US, 1960-2011

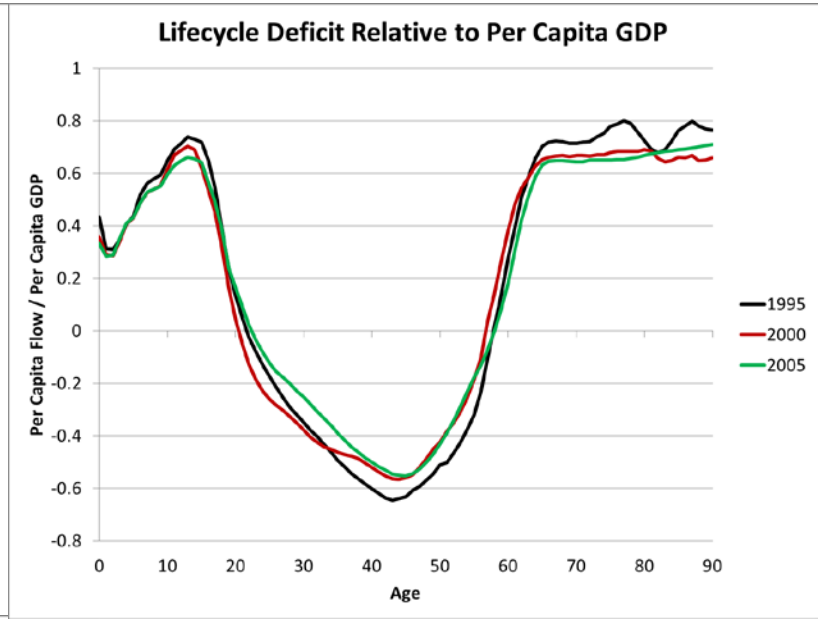


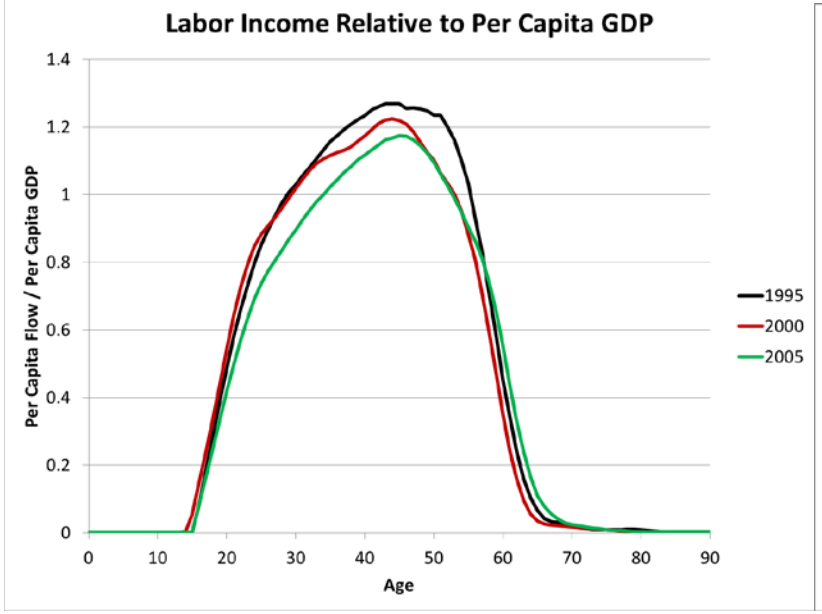
Accounting for change: US public sector

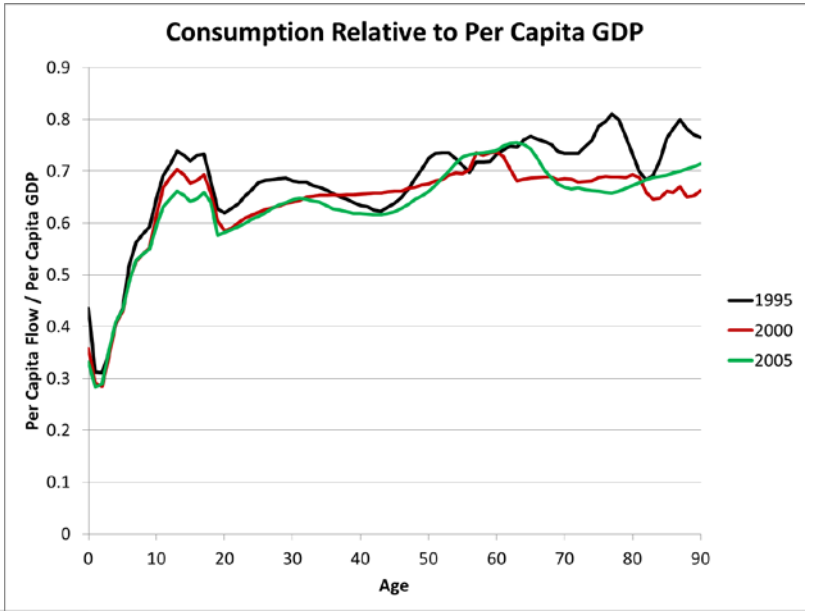


Austria: Population, Consumption, Labor Income, and LCD, 1960-2011.



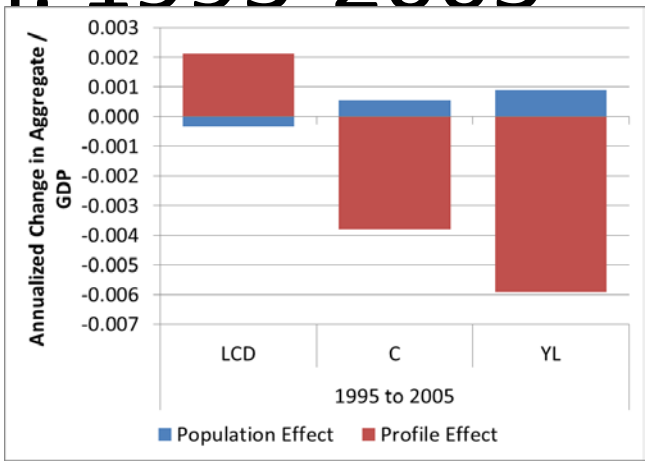






Austria decomposition: 1995-2005

Pop contributions are minor, raising C slightly and Yl a bit more. Profile changes dominate, reducing C a lot and Yl even more, so LDC rises.



Pop raises pub transfers and pub taxes a bit less, but big drop in pub trans in and out profiles is main story. Was there a reform of pub transfers and a drop in taxes?

Note that all transfer changes for in and out flows must be perfectly offsetting.

Pop raises private asset income (elderly hold more assets) and profile reenforces. Pop raises saving, but profile shift lowers it. Public saving is way up.