Macroeconomic implications of demographic change: A global perspective

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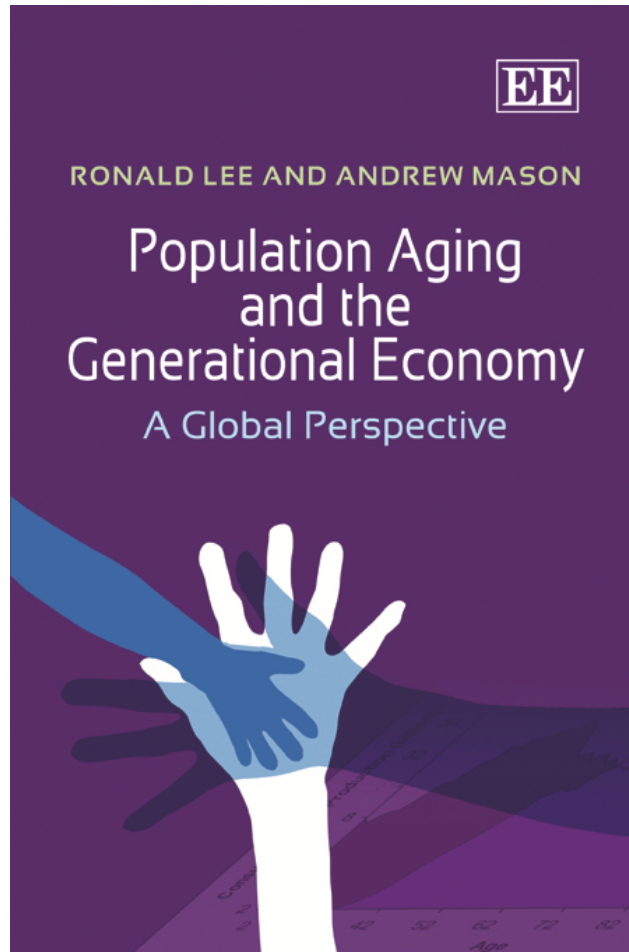
The global "demographic transition" from high fertility and mortality to low

- Profoundly changes the population age distribution
- First the population share in working ages rises as fertility declines in developing countries
  - Falling proportion of children reduces dependency
  - "first demographic dividend"
- Next the share of elderly rises as the growth rate of the labor force slows – population aging
  - Rising proportion of elderly raises dependency
  - Puts pressure on family support systems and public transfer programs (pensions, health care, long term care)

These age structure changes both weaken and strengthen macro-economic fundamentals

1. The rising share of dependent elderly in the population reduces consumption and per capita income growth.
   a) Transfer systems, both family and public sector, are disproportionately stressed.
2. Lower fertility and slower labor force growth raise human capital and assets per worker. This raises productivity and economic growth.

I use results from National Transfer Accounts (NTA) project: **NTAccounts.org**

RONALD LEE AND ANDREW MASON

Population Aging and the Generational Economy
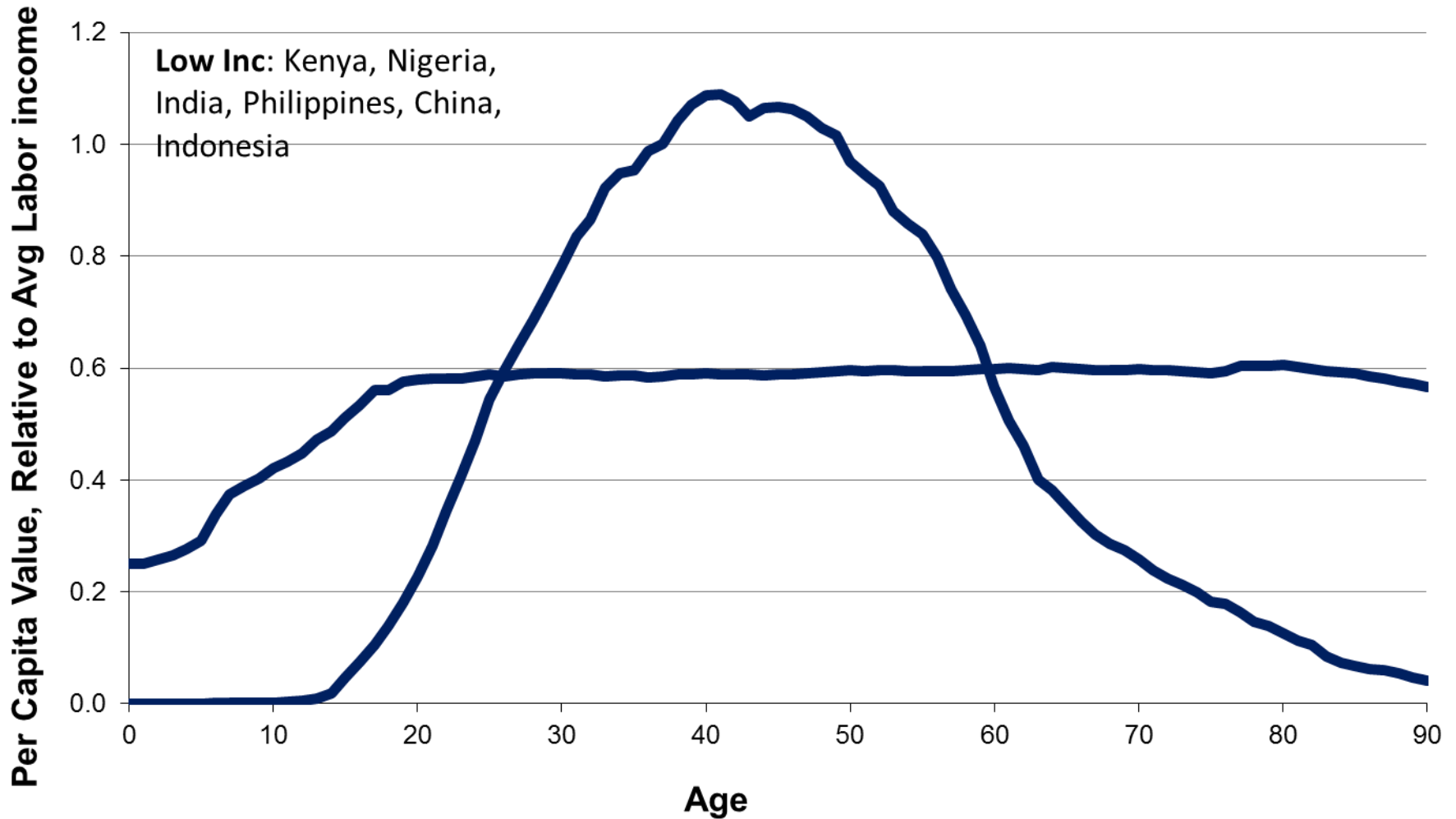
A Global Perspective

Free download of book – see NTA website
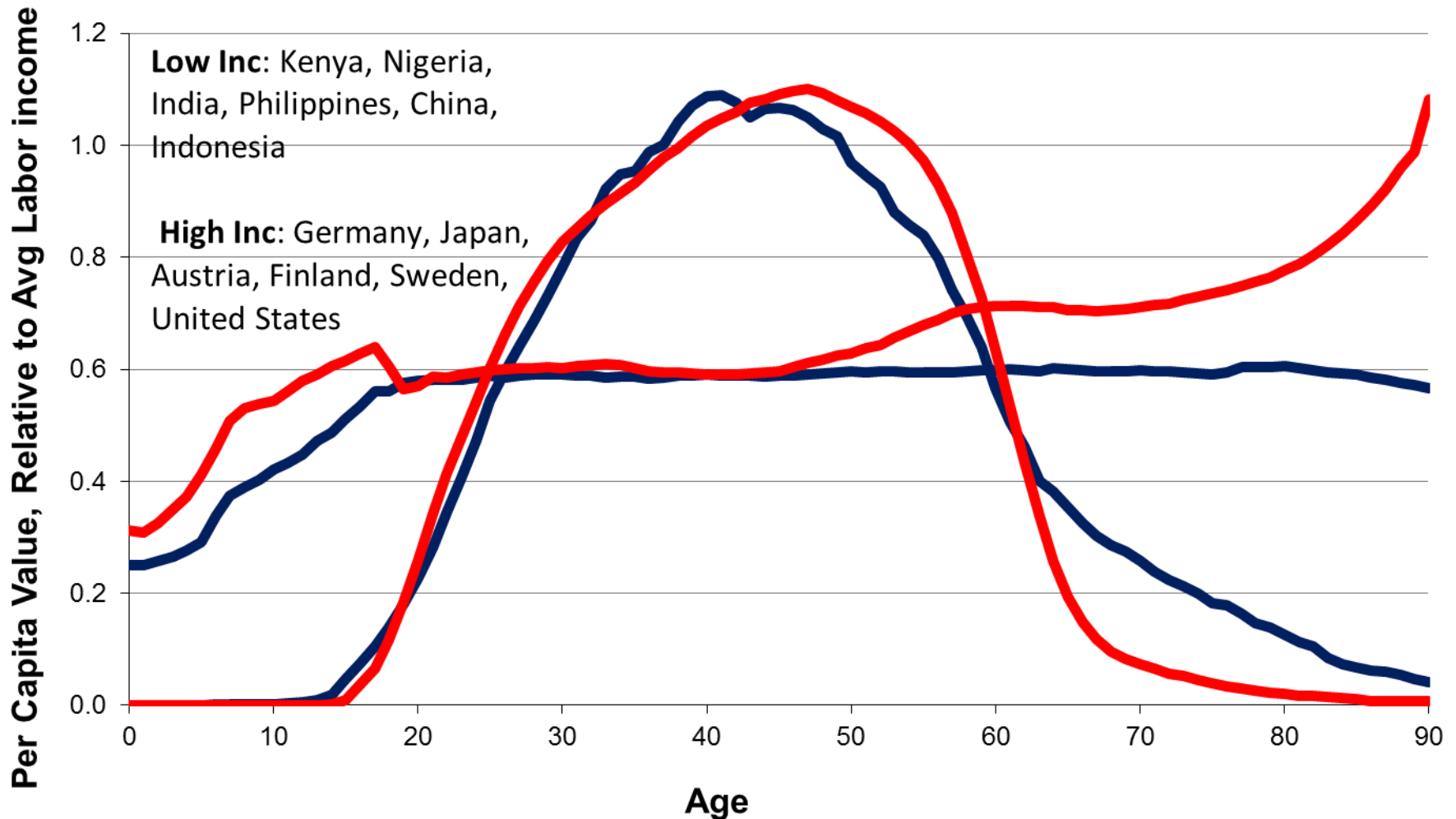
How consumption and labor income vary by age Estimates from National Transfer Accounts (NTA)

- Population averages of males and females at each age.
- Consumption includes
  - Private expenditures, imputed to individuals within each household
  - Public in-kind transfers (e.g. education, health care)
- Labor income includes
  - Wages, salaries, fringe benefits before tax
  - 2/3 of self employment income (rest is asset income)
  - Average includes 0's.
- For comparison, divide each economy's age profiles by average labor income ages 30-49.
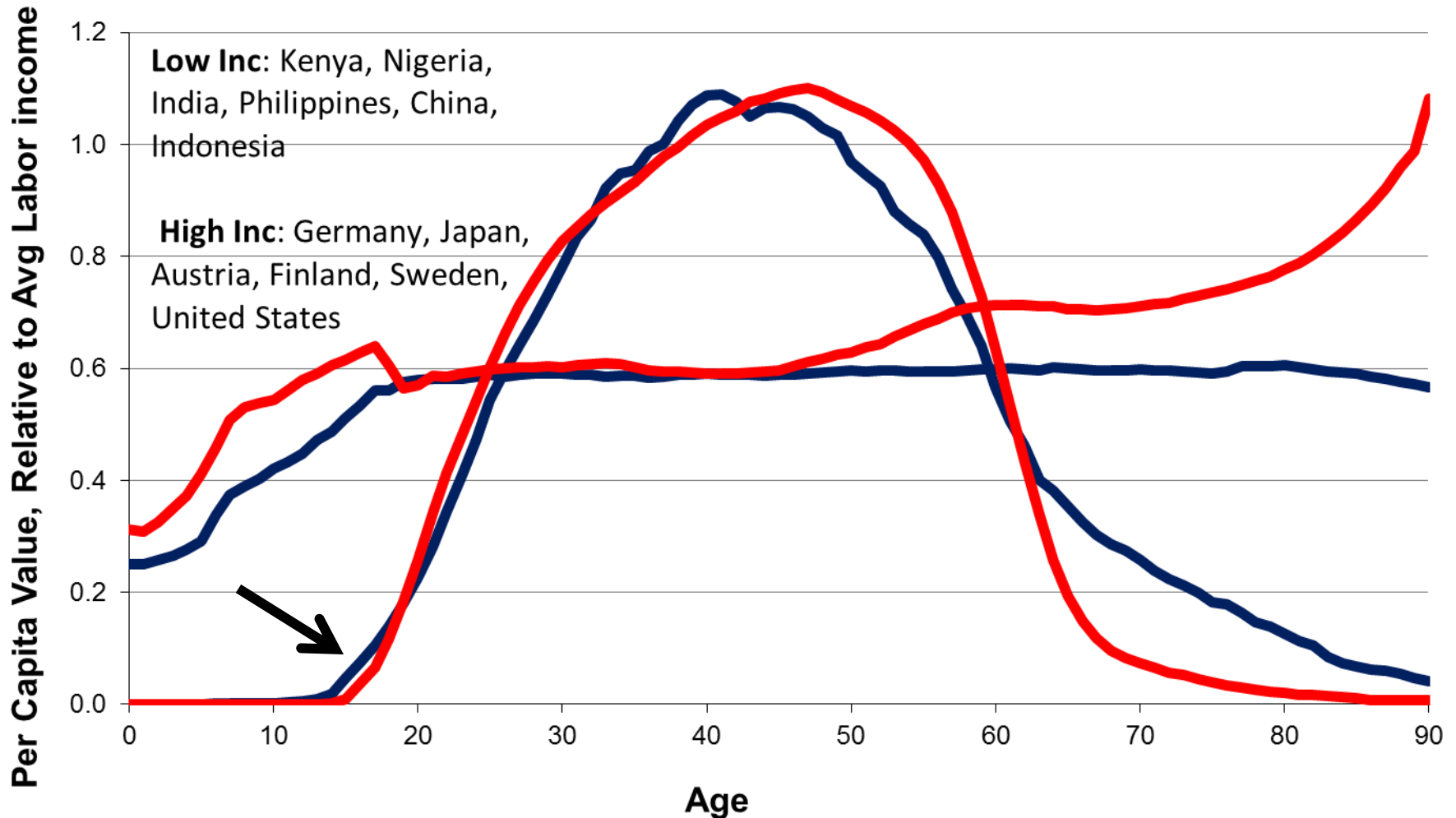
Consumption and Labor Income of Low Income Countries (average of the bottom income quartile of NTA countries)

Low Inc: Kenya, Nigeria, India, Philippines, China, Indonesia

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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High Inc: Germany, Japan, Austria, Finland, Sweden, United States
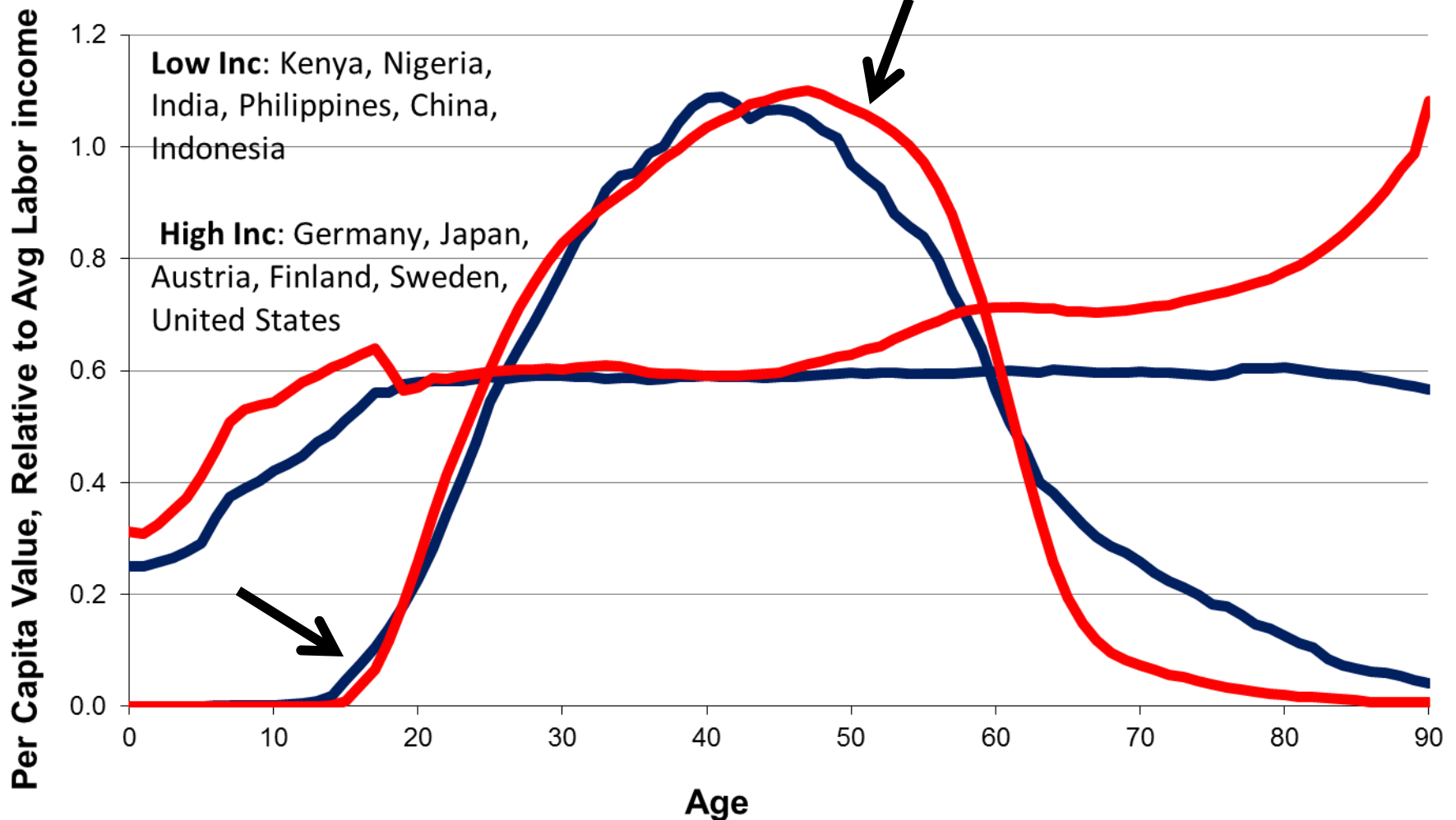
Per Capita Value, Relative to Avg Labor income

Age

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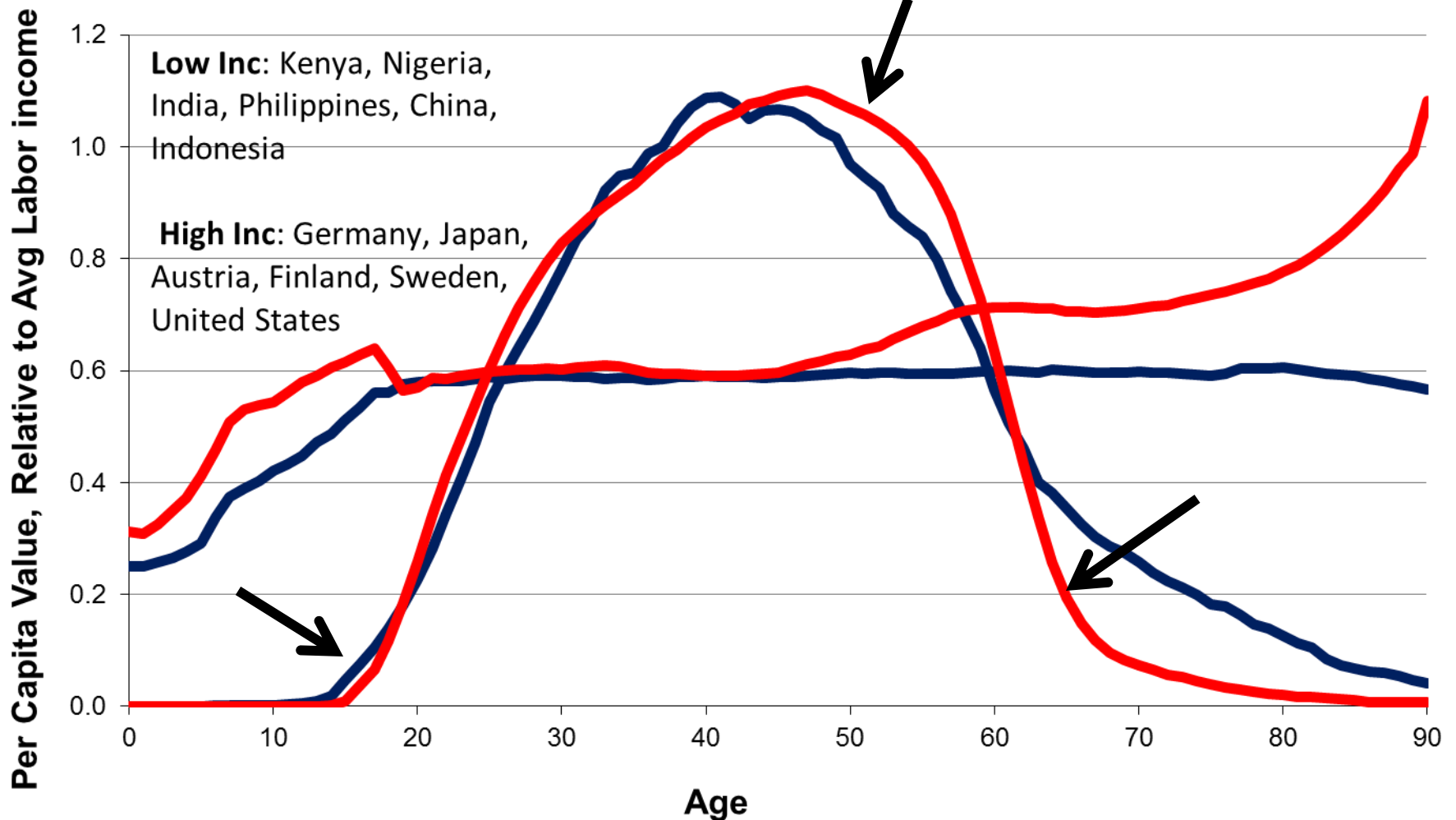
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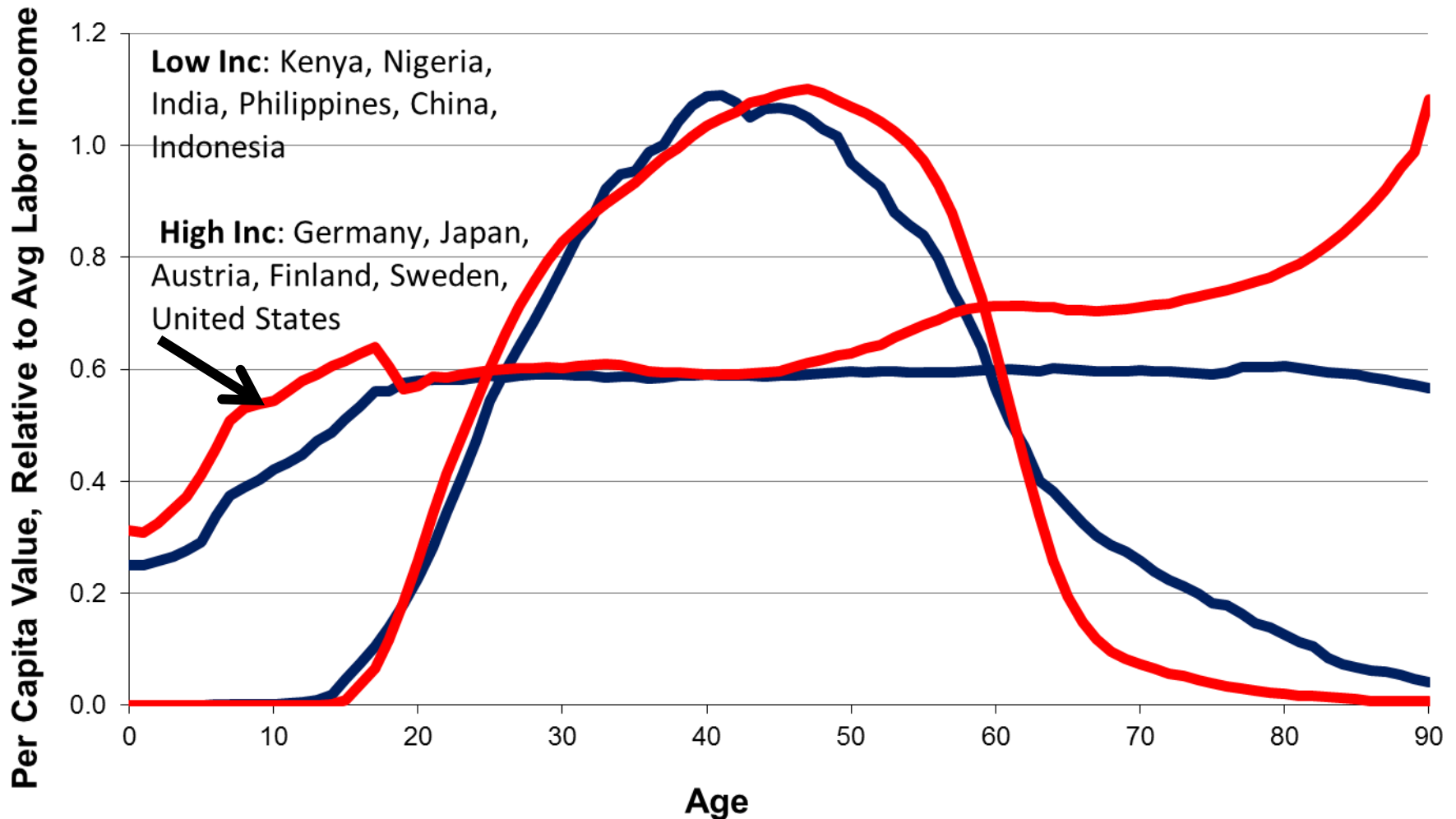

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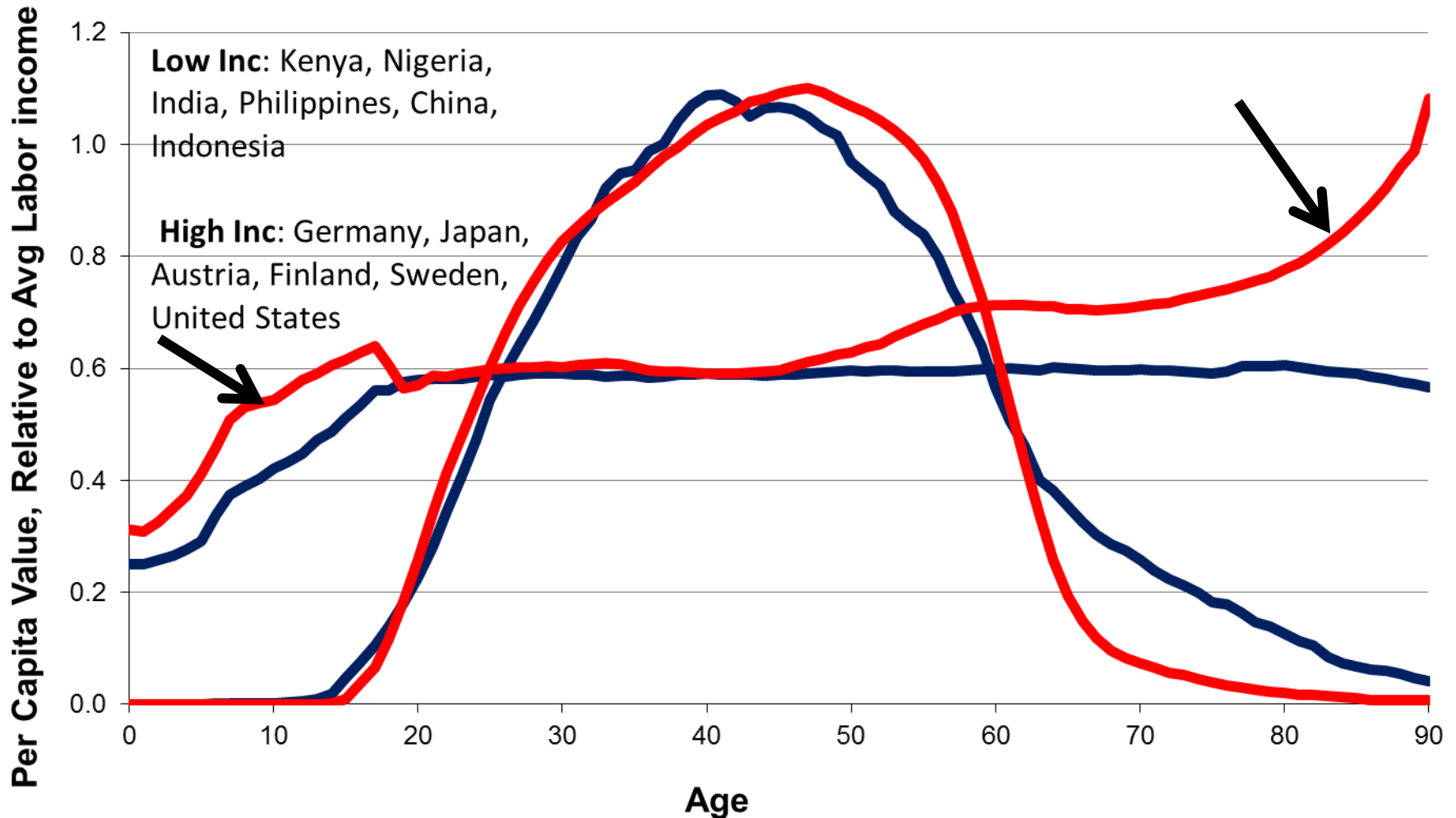**Low Inc**: Kenya, Nigeria, India, Philippines, China, Indonesia

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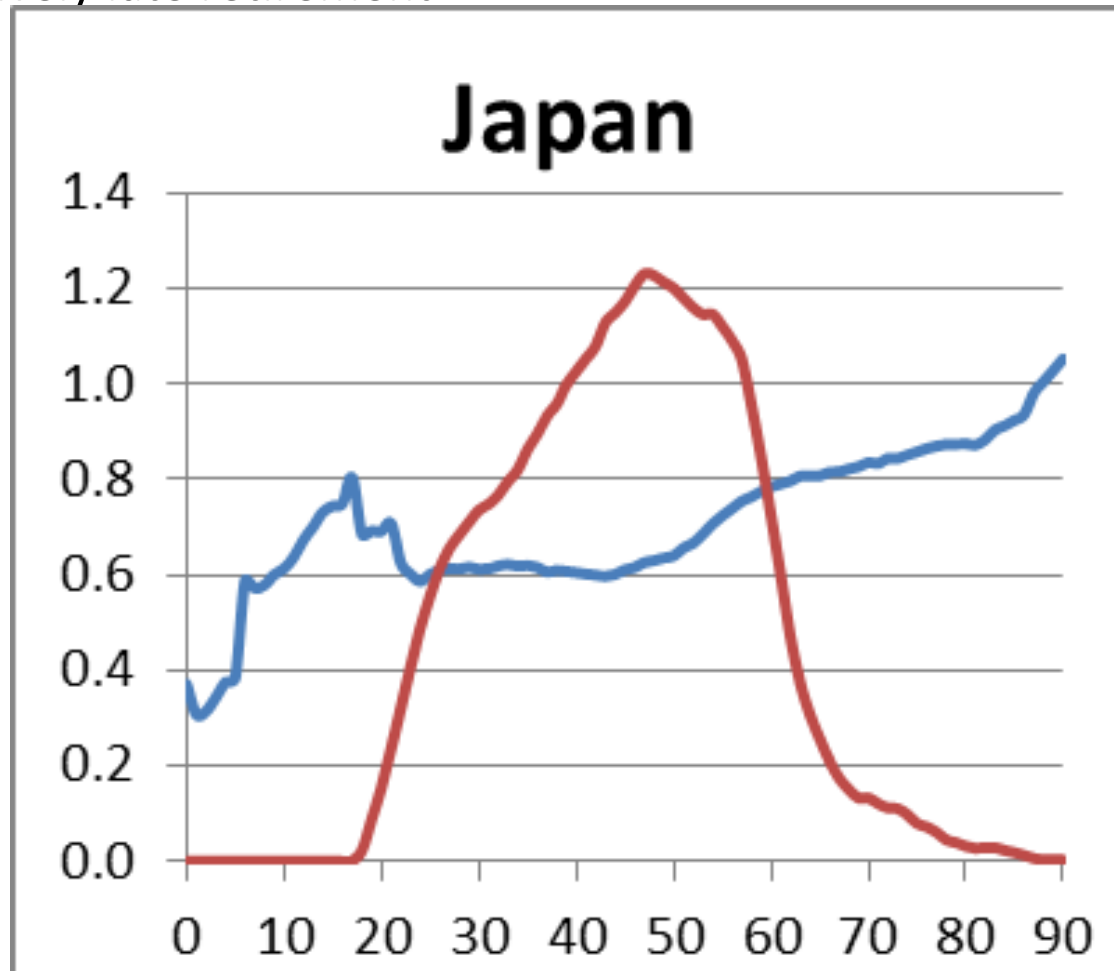Per Capita Value, Relative to Avg Labor income

Age

Japan (2004) (from Ogawa and Matsukura, 2011) has:
 Rising consumption in old age like other rich countries
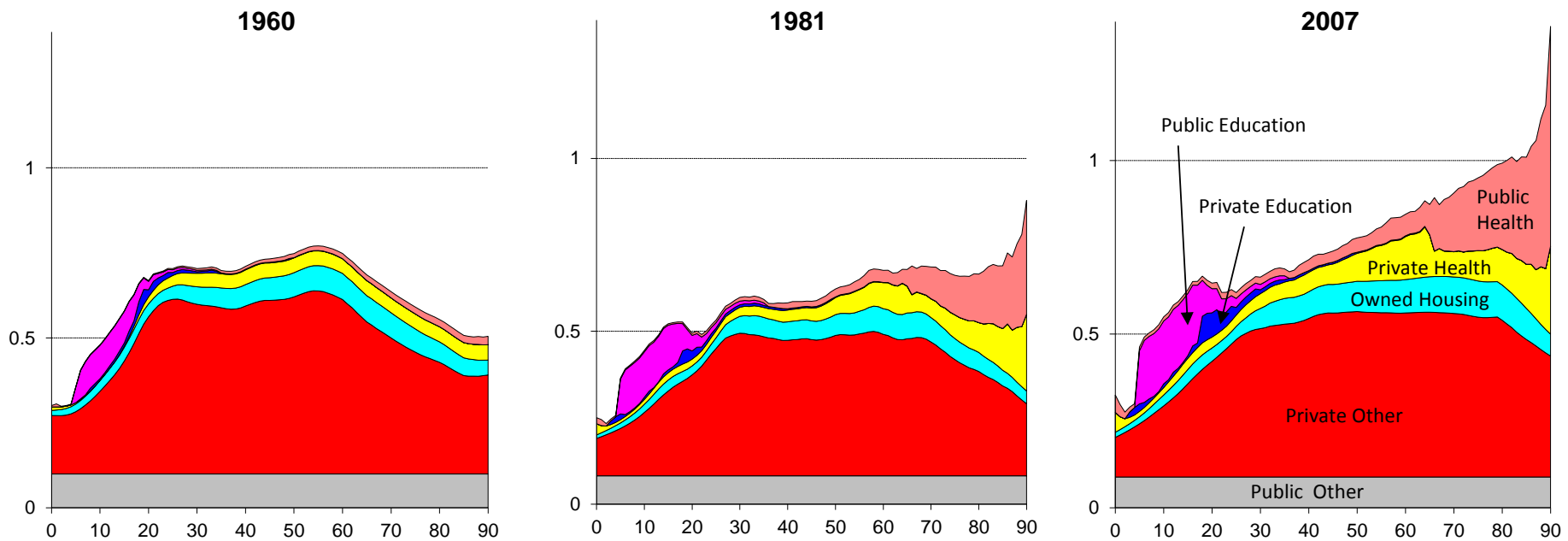 Higher investment in human capital
 Age-earnings skewed to older workers (seniority system)
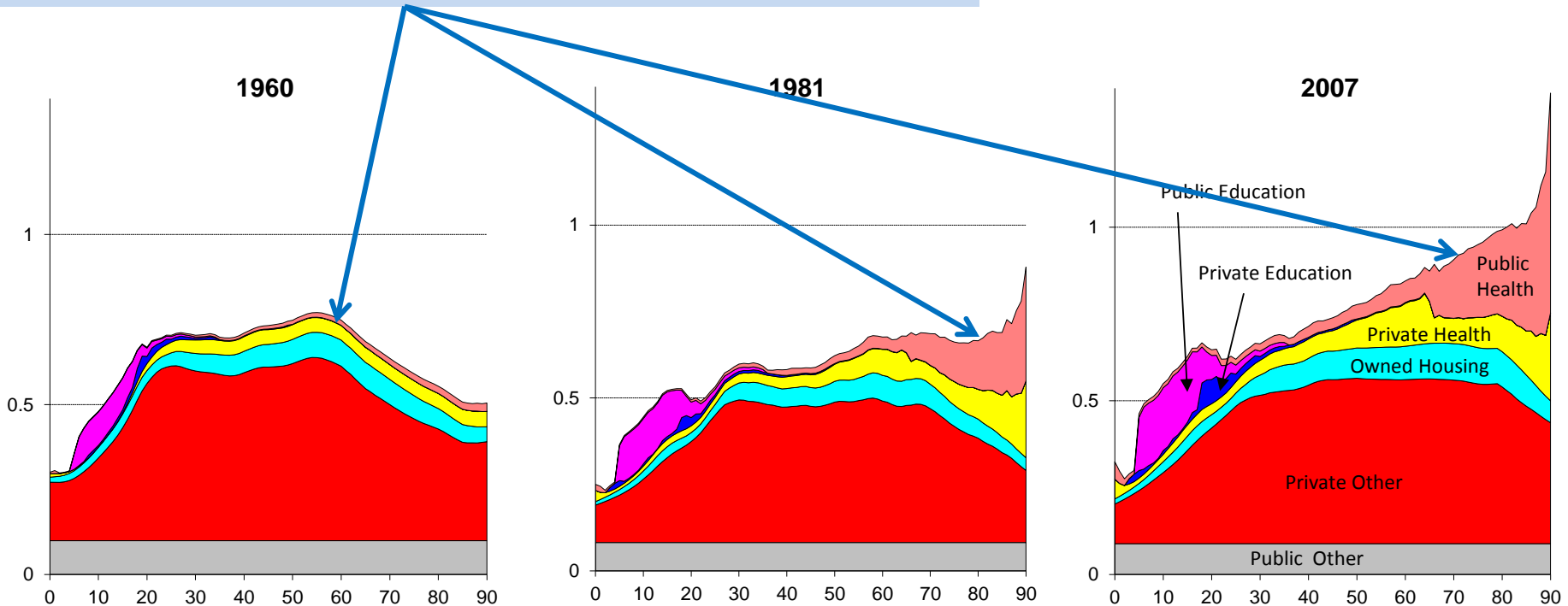 Relatively late retirement

Growth of the Welfare State: US consumption over past half century: 1960, 1981 and 2007 (Ratio to labor income ages 30-49).

1960

1981

2007

Public Education

Private Education

Public Health

Private Health

Owned Housing

Private Other

Public Other

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

Growth of the Welfare State: US consumption over past half century: 1960, 1981 and 2007 (Ratio to labor income ages 30-49).

Public spending on health care has risen greatly

1960   **1981**   **2007**

Public Education

Private Education

Public Health

Private Health

Owned Housing

Private Other

Public Other

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

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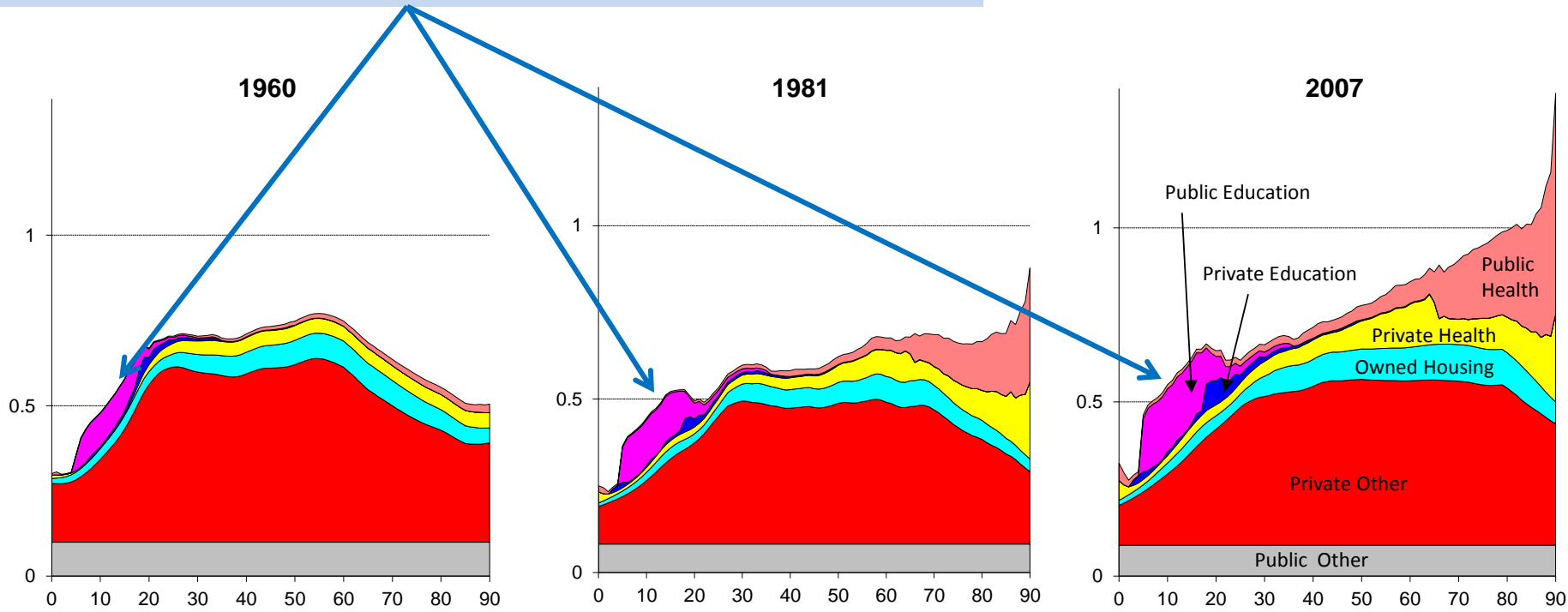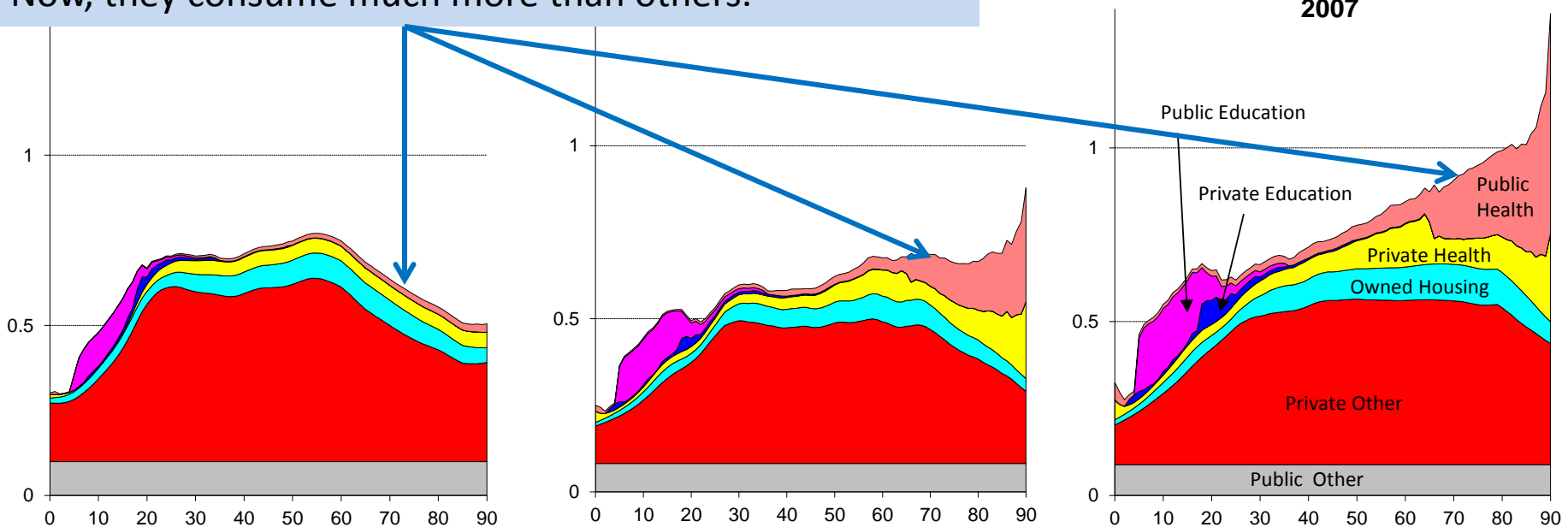
Public spending on education has risen also

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

Growth of the Welfare State: US consumption over past half century: 1960, 1981 and 2007
(Ratio to labor income ages 30-49).

Before, the elderly consumed much less than other adults.
Now, they consume much more than others.
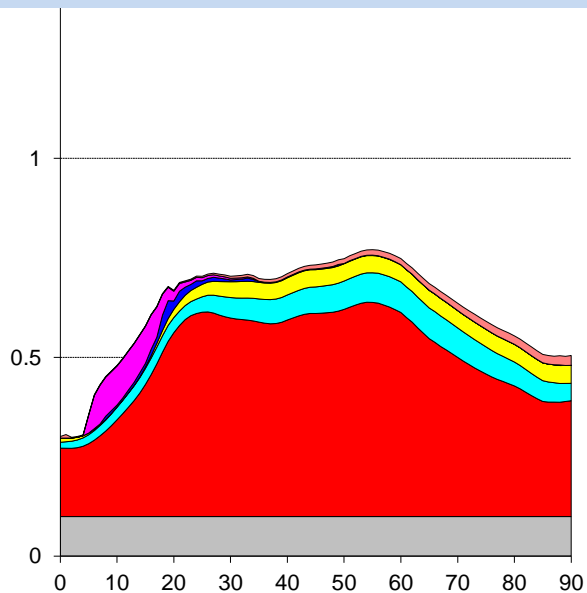

Source: US National Transfer Accounts, Lee, Donehower and Miller, 2011

Growth of the Welfare State: US consumption over past half century: 1960, 1981 and 2007 (Ratio to labor income ages 30-49).

This makes population aging more costly
Many other rich industrial nations are similar, probably including Japan.
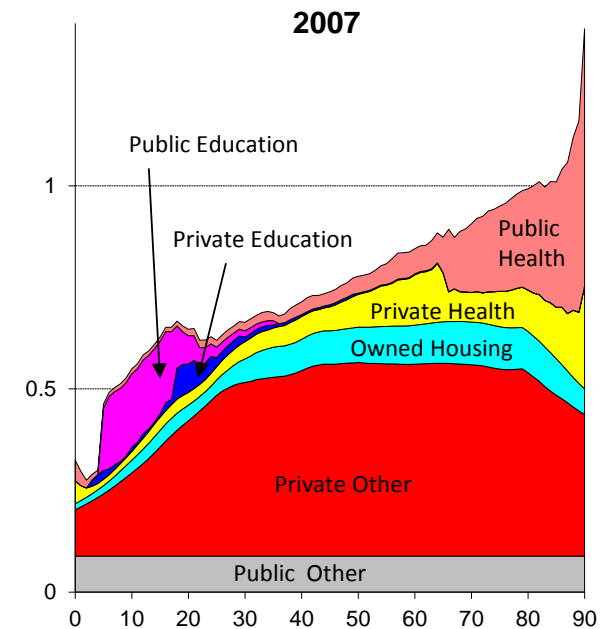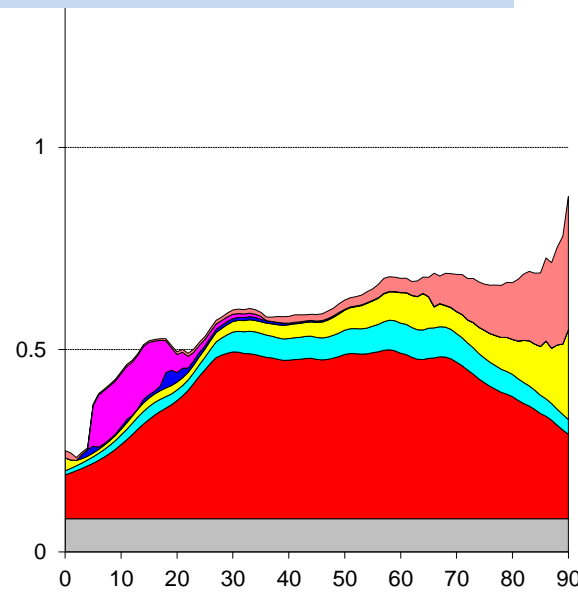
Source: US National Transfer Accounts, Lee, Donehower and Miller, 2011

The greatest worry about population aging is falling support ratios

- The support ratio is the population-weighted sum of labor income divided by the population weighted sum of consumption
  - Holding constant the age profiles I just showed
  - Calculate for changing population age distributions
- If productivity growth, saving rates and foreign borrowing are constant
  - consumption per capita will be proportional to this support ratio.
  - Rate of growth of support ratio is rate of change of consumption

Support ratios based on the average lower income profiles and United Nations population projections

A. Less Developed Countries
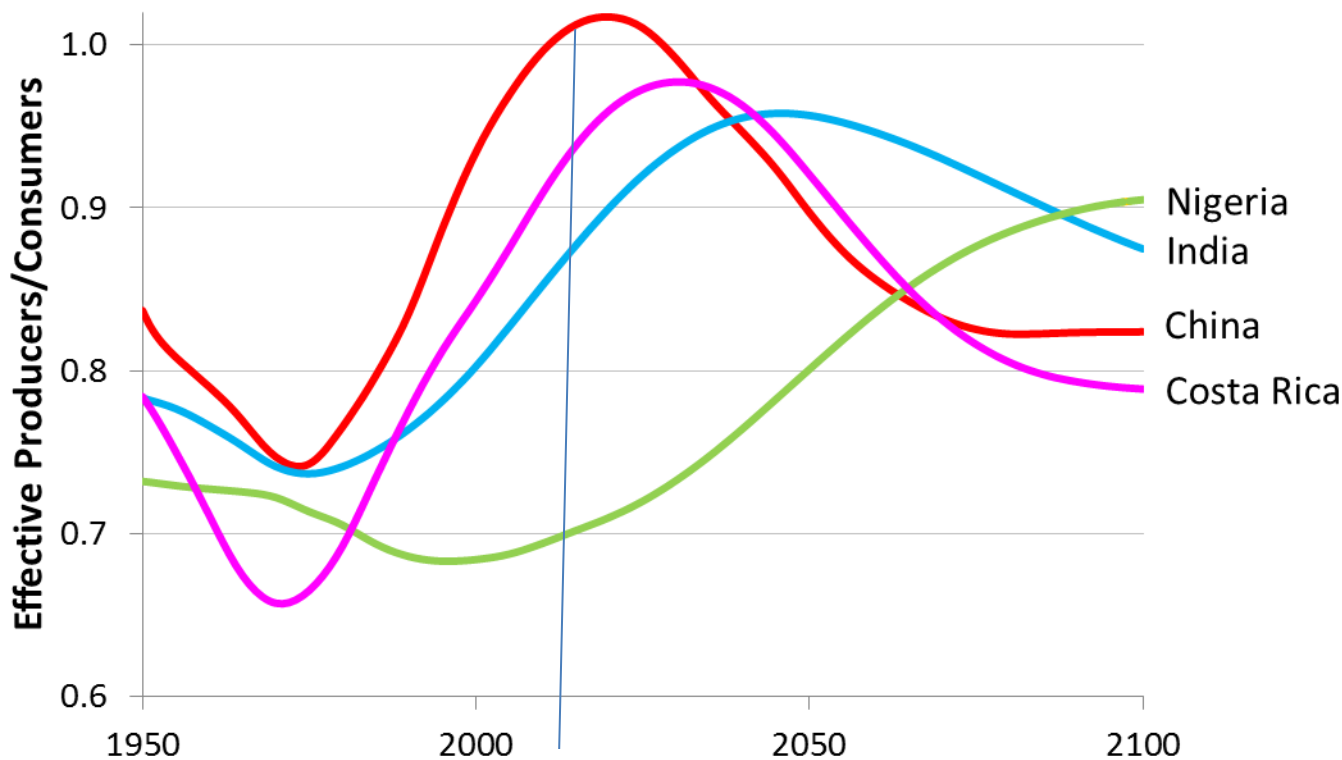
	Annual % Rate of change of support ratio			
	China	India	Nigeria	Costa Rica
Trough to Peak	0.67	0.37	0.27	0.67
Peak to 2100	-0.26	-0.17	na	-0.31

Support ratios based on the average rich country profiles and UN 2010 revision

B. More Developed Countries
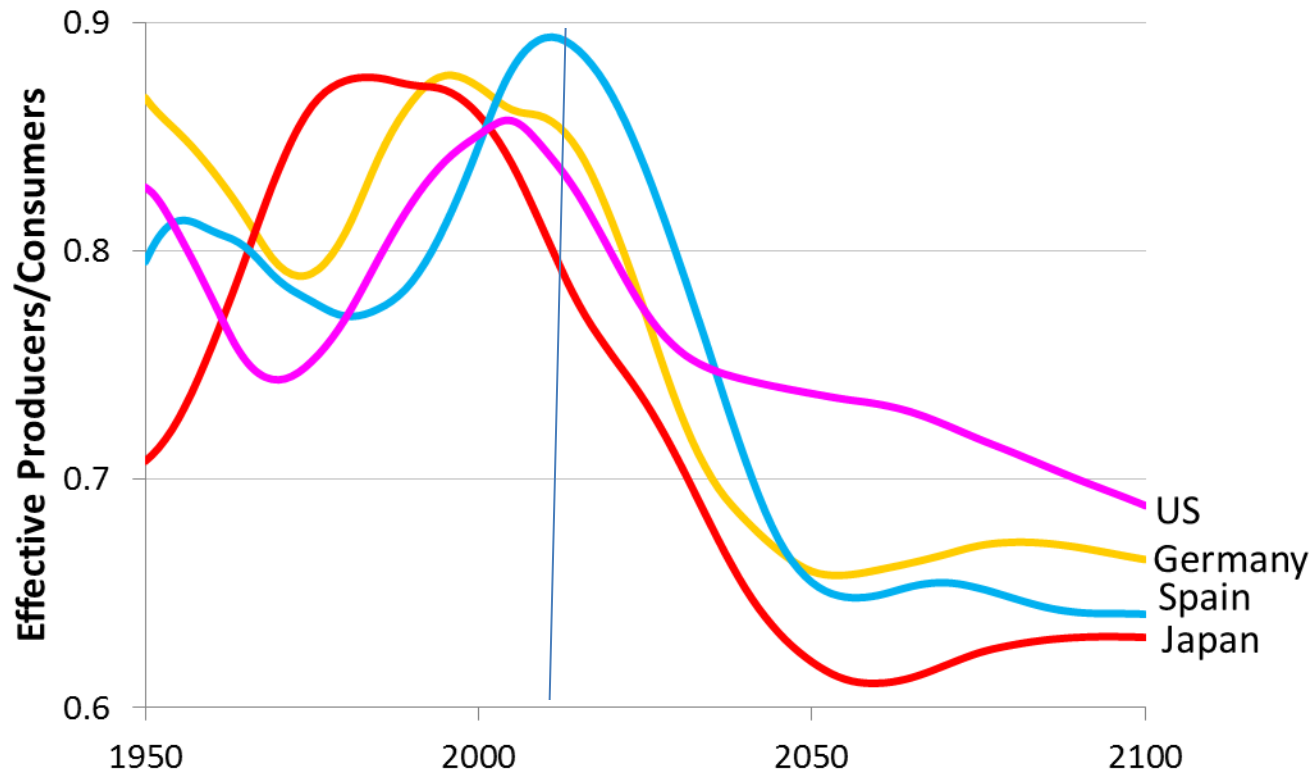
% Rate of change of support ratio				
	Germany	Japan	Spain	US
2010 to 2050	-0.66	-0.66	-0.78	-0.34

Conclusion from support ratios

Other things equal, population aging will lead to a substantial decline in consumption relative to current levels.

But will other things be equal?

The same forces that reduce the support ratio may also promote investment in **capital** and **human capital**.

Outcome depends on how old age consumption is funded, extent of reliance on assets vs transfers.

Population Aging and Investment in Human Capital

- Parents choose between number of children and amount to invest per child (Quantity-Quality tradeoff)

- As economies develop parents choose fewer children and spend more per child.

- Aging (low fertility) will mean more human capital.

Measuring HK

- NTA measures HK spending as sum of spending on health and education per child
  - at ages 0 to 17 for health
  - ages 0 to 26 for education
- Separately for public and private spending
- Express in years of labor income (30-49)

Figure 10. Total Human Capital Investment in 23 NTA Countries in Relation to Total Fertility Rate (log-log scales)

Low fertility countries are aging rapidly, but they also have very high investments in human capital of each child.

Legend:
◇ Western Industrial
△ Latin America
× Asia
● Africa

Y-axis: log (Human Capital Spending per Child, Relative to Average Labor Income 30-49)

X-axis: log (Total Fertility Rate)
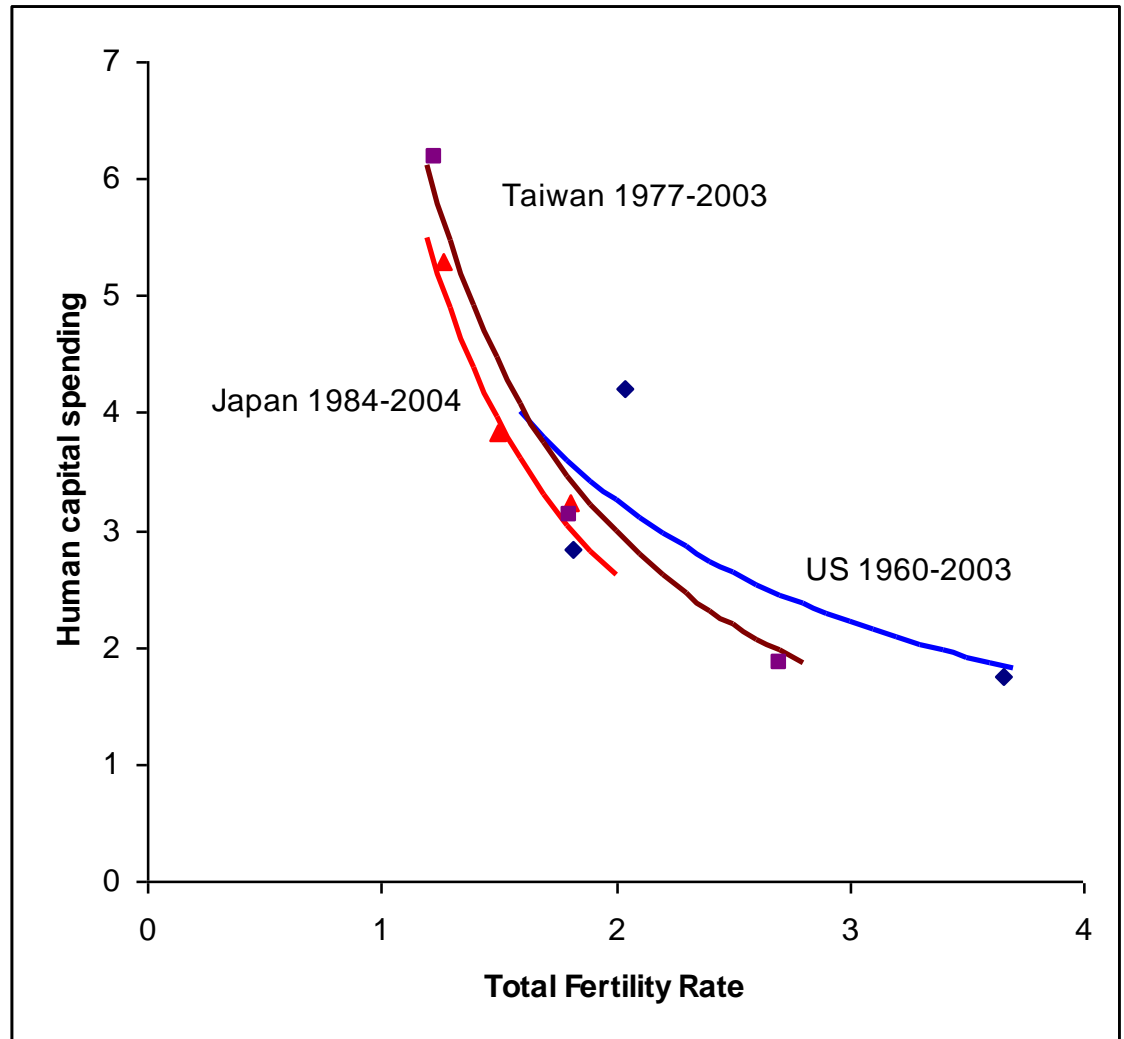
$y = -0.68x + 1.69$
$R^2 = 0.71$
$t = -7.23$
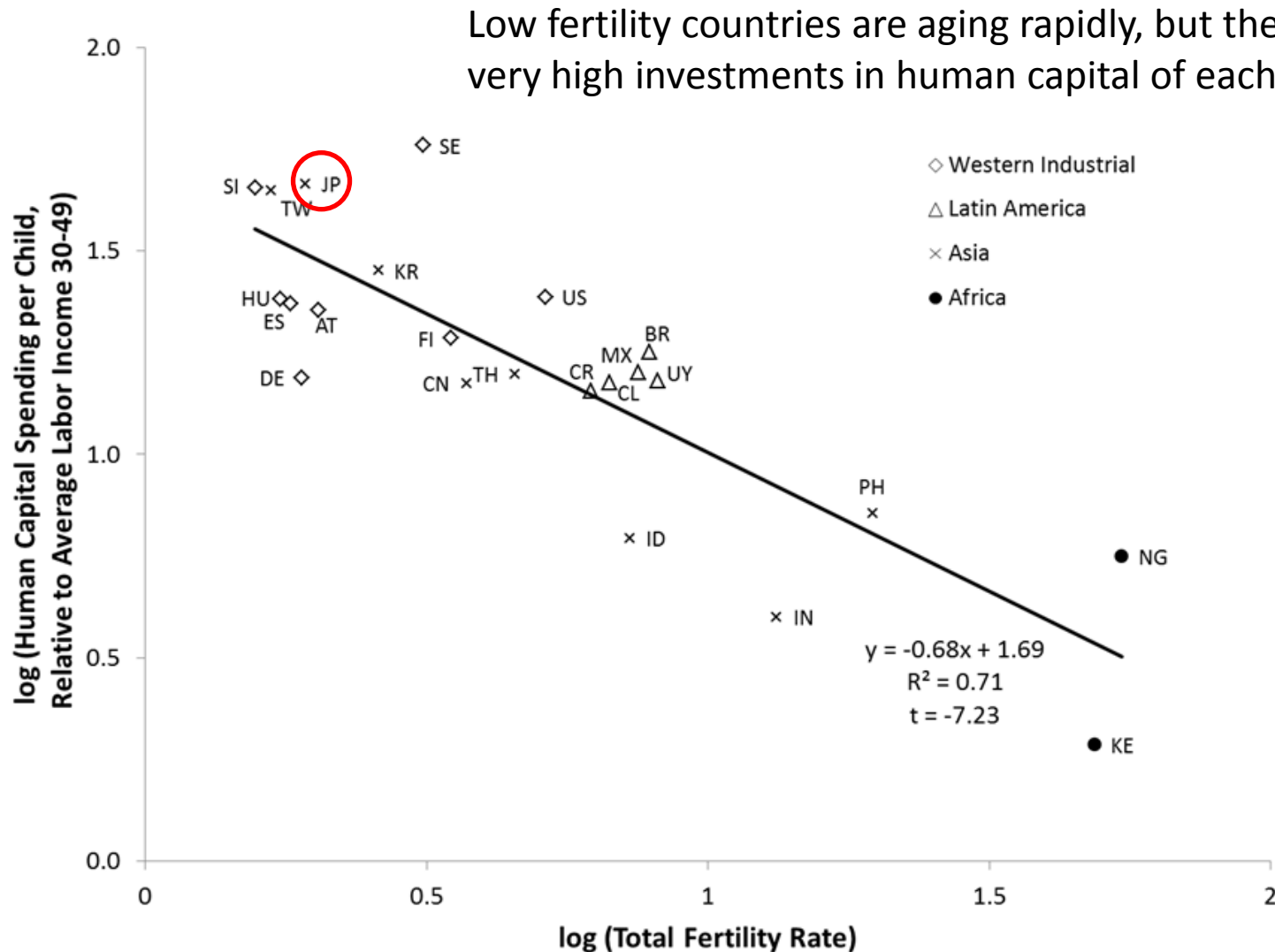
Changes over time within Japan, Taiwan, US (natural scale)

Estimated elasticities
Japan   -1.46
Taiwan   -1.40
United States   -0.72

Taiwan 1977-2003

Japan 1984-2004

US 1960-2003

Human capital spending (y-axis)

Total Fertility Rate (x-axis)

Conclude: Population aging is accompanied by increased investments in HK per child

- Raises productivity and earnings of future labor force

- Substitutes **quality** of worker for **number** of workers

- Higher productivity offsets falling support ratios.

Population aging and asset accumulation

- People accumulate assets over their adult lives so the elderly hold more assets than younger adults.

Net Worth by Age of Household Head in US, 2007, from Survey of Consumer Finance
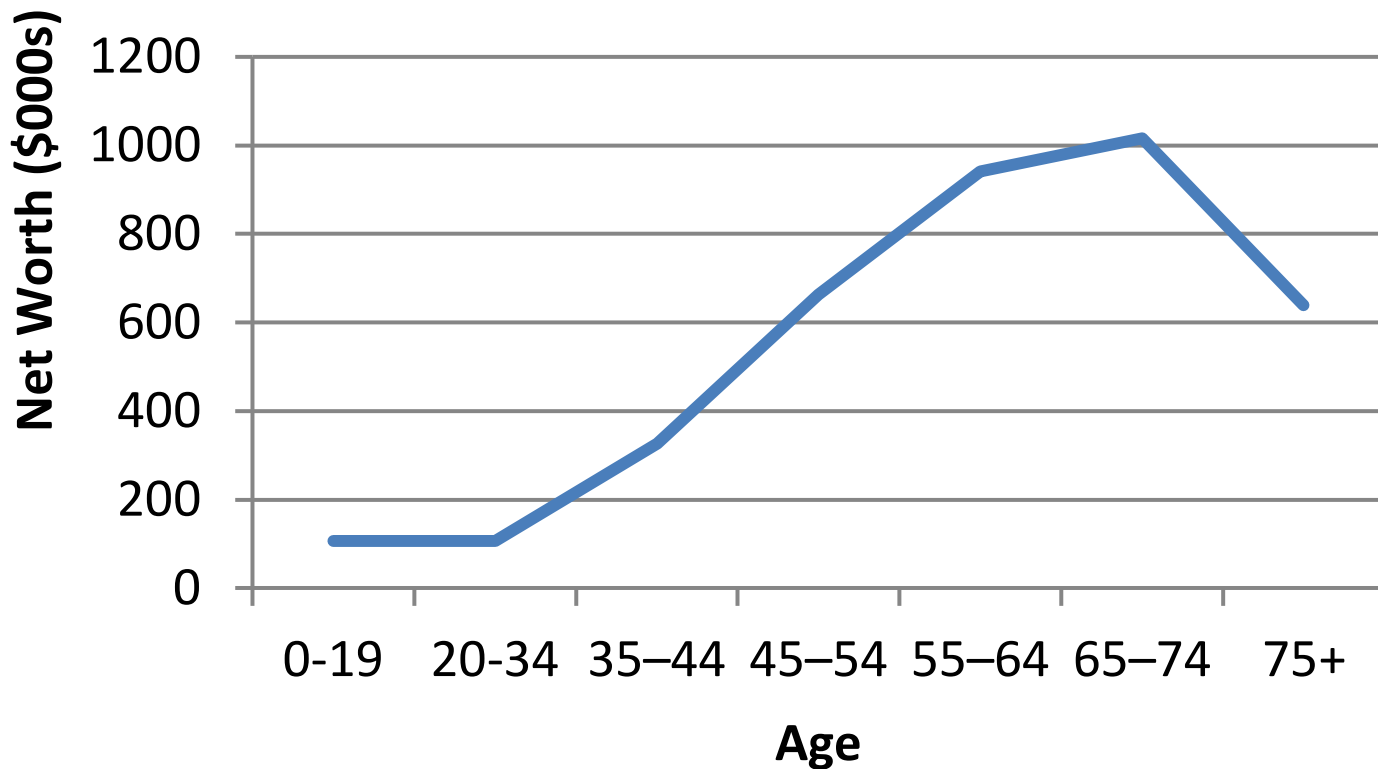
Source: Survey of Consumer Finance

- In aging populations the proportion of elderly is higher, so there are more assets per capita.
  - Assets generate income.
  - If assets are invested domestically they raise capital stocks and make labor more productive.
  - Raise wages, reduce profit rates
- However, if people expect to be supported by public or private transfers in old age, this happens less.

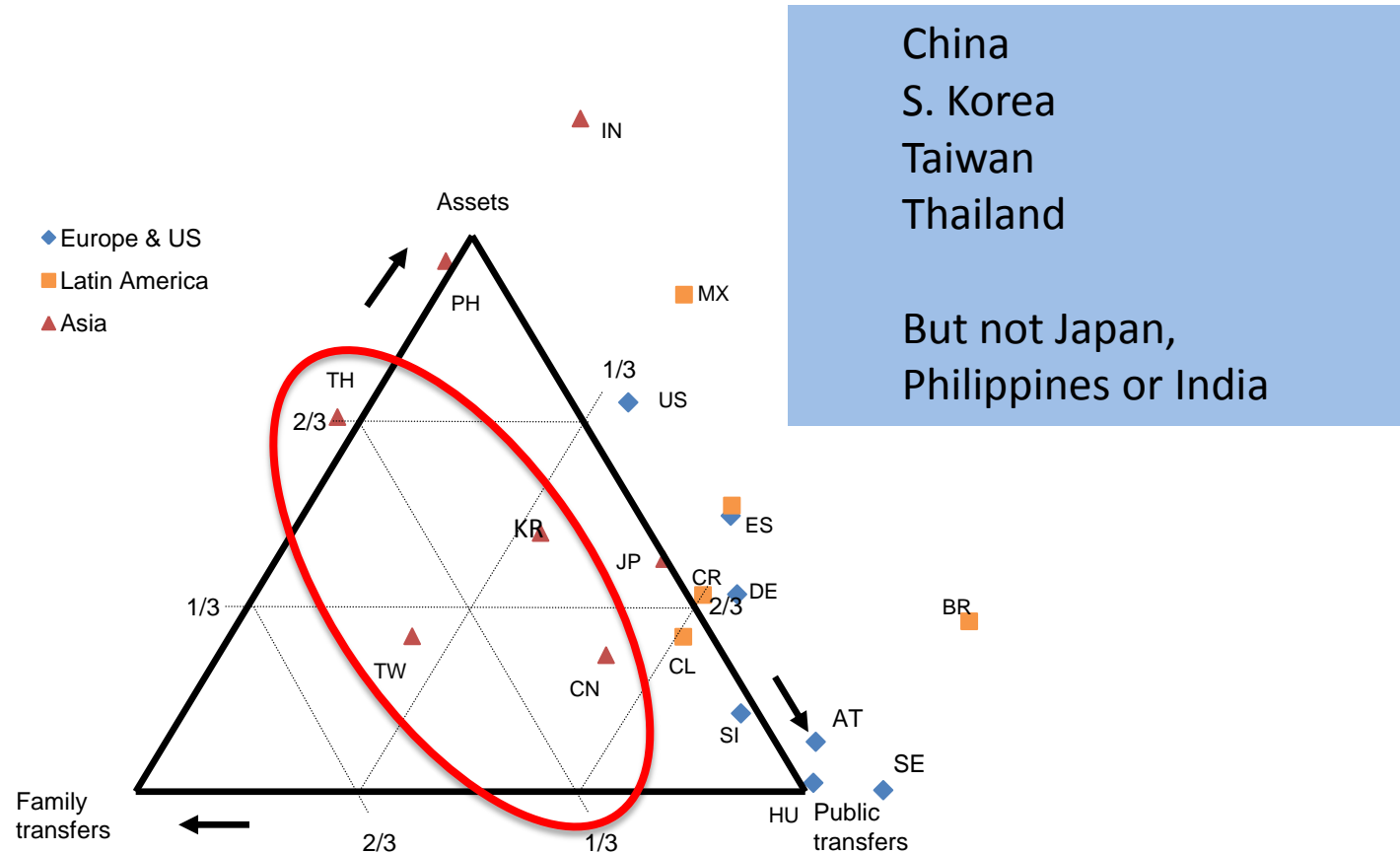# NTA shows how old-age consumption, net of labor income, is paid for. Triangle shows the shares of **Family Transfers, Public Transfers** and **Asset income** (part not saved).
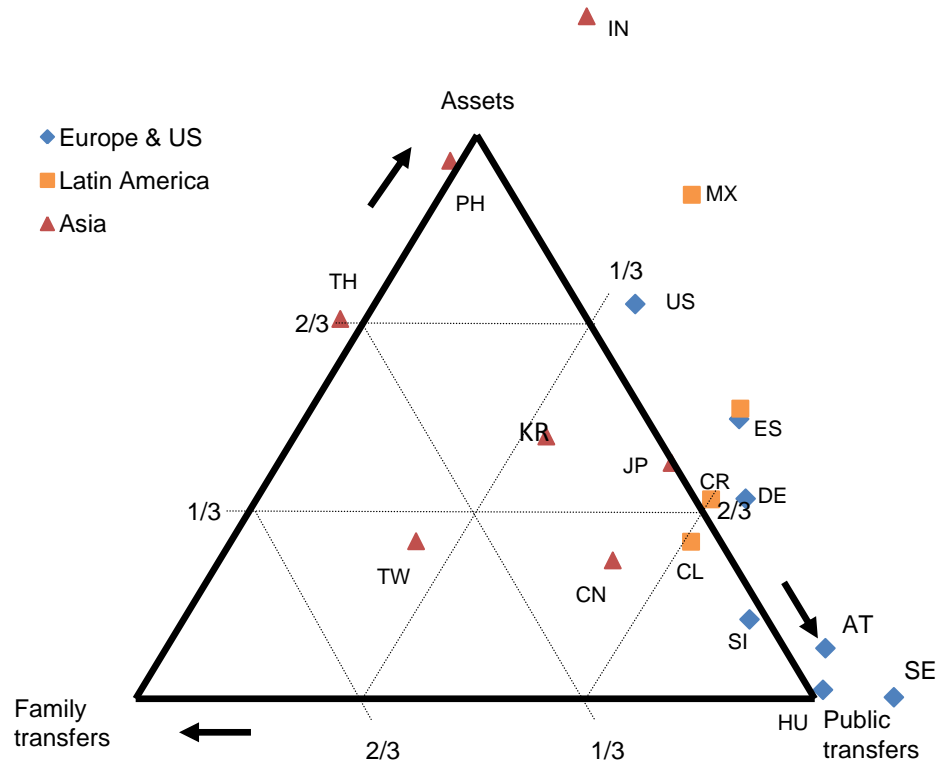
Elders In some countries rely 100% on public sector transfers.
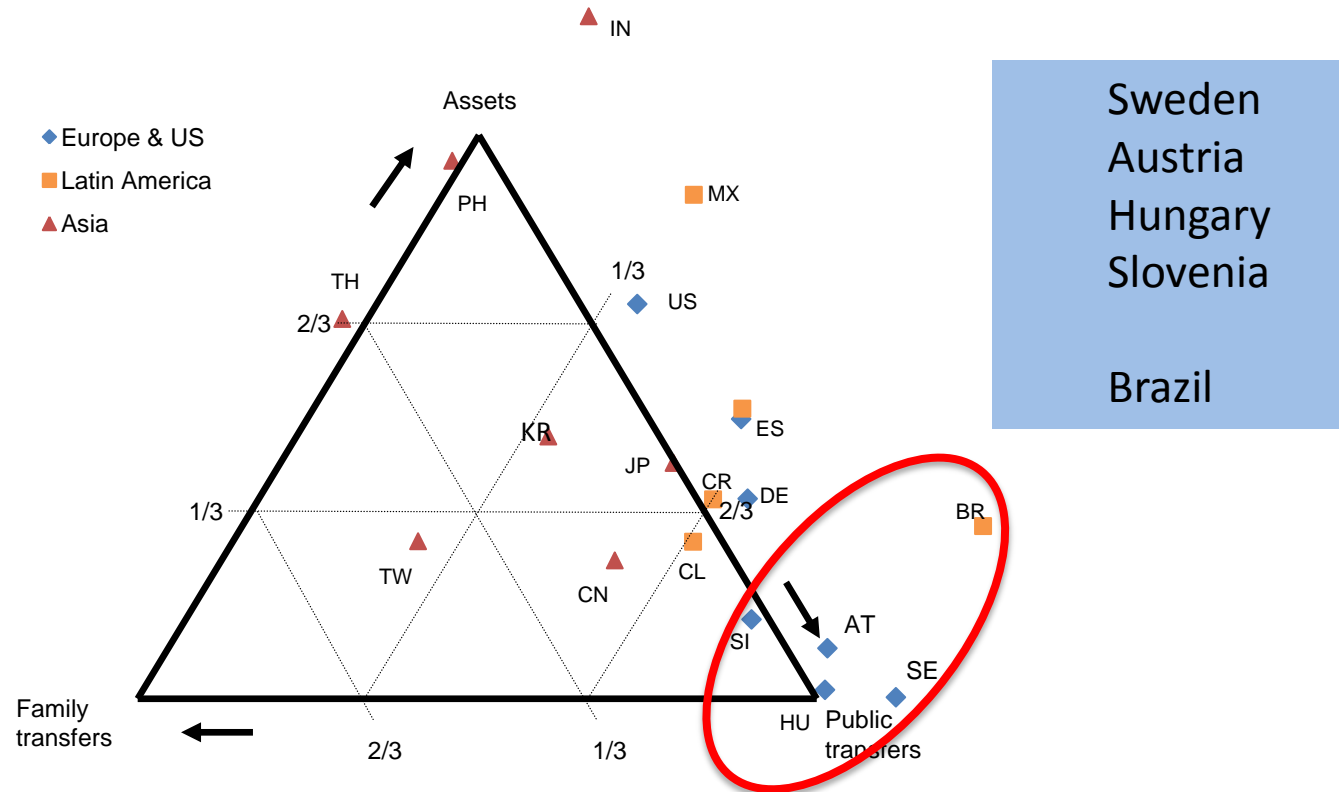
Elders In some Asian countries rely in part on family transfers.

China
S. Korea
Taiwan
Thailand

But not Japan, Philippines or India

But in more countries, elders actually make net transfers to their children
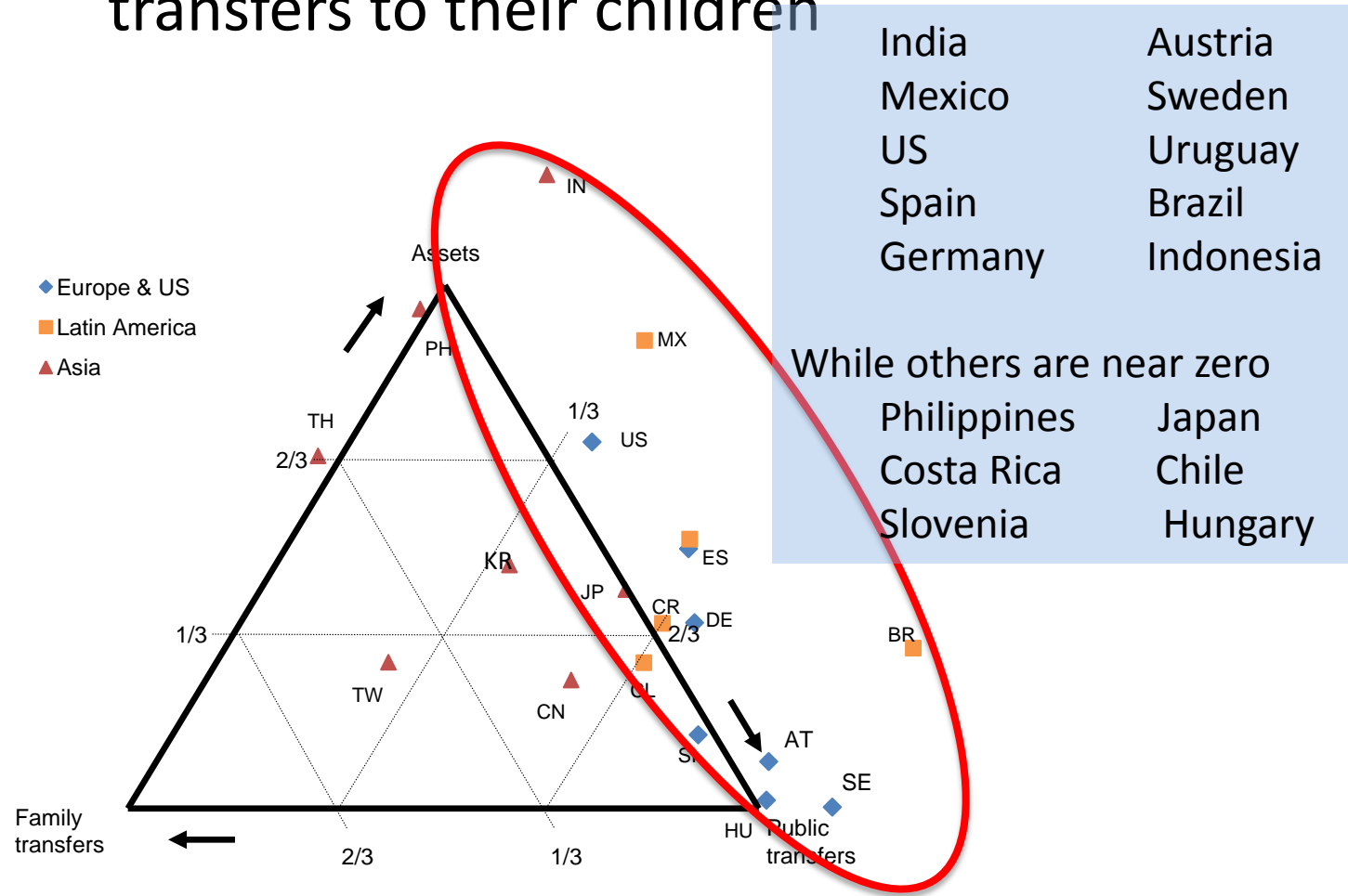
India   Austria
Mexico   Sweden
US   Uruguay
Spain   Brazil
Germany   Indonesia

While others are near zero
Philippines   Japan
Costa Rica   Chile
Slovenia   Hungary

◆ Europe & US
■ Latin America
▲ Asia

Assets

Family transfers

Public transfers

2/3   1/3

1/3   2/3

IN
PH
TH
MX
US
ES
KR
JP   CR   DE
BR
TW   CN   CL
AT
SI   SE
HU

In some countries, elders rely mainly on asset income.

India
Mexico
Philippines
Thailand
US
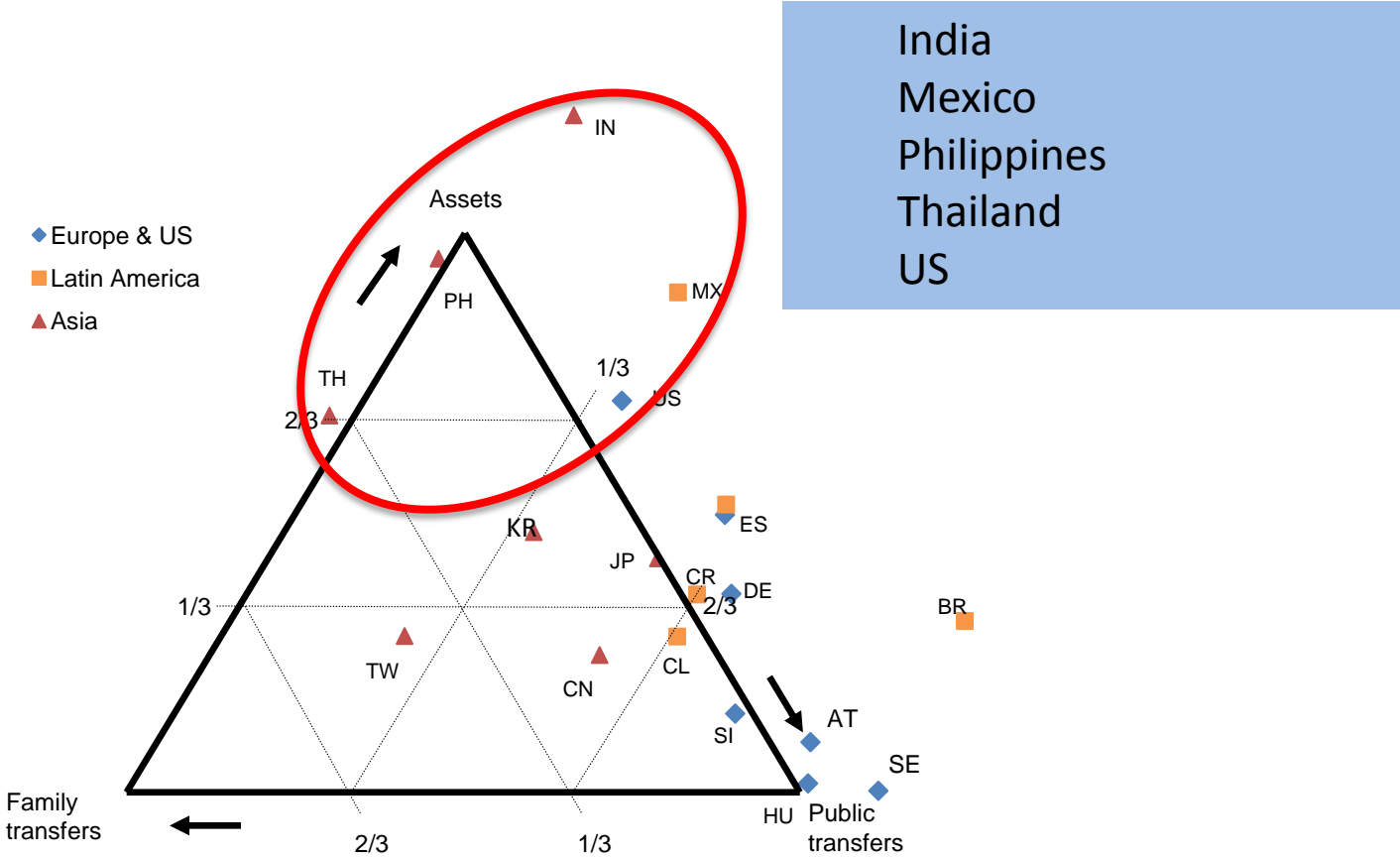
- When consumption of the elderly is funded mainly out of public or private transfers, then population aging just raises the transfer burden on workers.

- When consumption is funded to greater extent from assets, then population aging raises assets or capital per worker.

  – Then taxes and transfers are less needed to fund population aging.

Is fertility too low? (work with Andy Mason)

- What level of fertility would maximize the steady state level of:
  - The fiscal support ratio (looking just at taxes and benefits)?
  - The support ratio for the whole economy, public and private?
  - Consumption, considering both support ratio and the cost of maintaining the capital/income ratio = 3.0, as in rich countries today?
  - Consumption, considering both support ratio and choosing higher capital/labor ratio when fertility is lower (golden rule)?

Total fertility rate that maximizes alternative objectives in steady state.

Far right columns also reflect saving rates under two assumptions.

(For regions, current mortality. For individual Asian countries, current Japan mortality.)

Region/Country	Current TFR	Fiscal support ratio	Support ratio	Consumption	
				K/Y=3	Golden rule
Africa	4.3	na	1.5	1.1	0.8
East Asia	1.3	2.3	2.2	1.7	1.4
S and SE Asia	2.3	1.2	1.8	1.3	1.0
Latin America	2.2	3.9	2.1	1.6	1.3
West	1.7	3.1	2.4	1.9	1.5
Individual East Asian countries					
China	1.6	2.6	2.1	2.0	1.7
Japan	1.3	2.7	2.3	1.9	1.6
S. Korea	1.3	2.1	2.1	1.7	1.4

Source: Lee and Mason (2012) "Is Fertility Too Low? Capital, Transfers and Consumption" NTA Working Paper.

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Conclusions

1. Population aging raises dependency
   a) In rich countries, the elderly work little and consume a lot. This makes population aging even more costly.
   b) When old people still work, or use asset income to pay for consumption, the costs for younger people are reduced.
2. Population aging promotes capital deepening which raises productivity and income.
   a) Low fertility raises investment in human capital per child.
   b) Population aging and slower labor force growth raise assets per worker, and perhaps raise capital per worker and productivity
3. These positive changes offset the falling support ratios.
4. Population aging will require painful adjustments in support systems, but…
5. The economic challenges of population aging need not be overwhelming.