Population Aging and the Generational Economy

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Acknowledgments

Population Aging

- Global phenomenon
- Early stages
- Unprecedented
- Inevitable consequence of
  - Continuing gains in life expectancy
  - Low and very low fertility

Benefits of Population Aging

- Living longer and healthier lives is a great social achievement.
- By bearing fewer children, parents have been able to invest more in each child and raise standards of living for their children and for themselves.
- Slower population growth leads to capital deepening and higher wages.
- Smaller populations, possible only with low fertility and older populations, yields important environmental effects.

Population aging creates challenges

- Altruism, an intrinsic feature of our species, leads to enormous intergenerational transfers.
- Growth of the public sector has fueled the growth of public intergenerational transfers.
- When combined with population aging, the result may be an unprecedented claim on economic resources by the oldest generation.
- Threatens the social contract between generations and prospects for continued economic growth.

Presentation

- The economic lifecycle and how is it changing

- Generational support system

- The flow of intergenerational transfers is reversing

- Some implications of large transfers to the elderly

Economic Lifecycle

Economic Lifecycle
Per Capita, Japan, 2004

Source: Ogawa et al., forthcoming; www.ntaccounts.org.

Economic Lifecycle: Labor Income

- Labor income
  - Wages & salaries
  - Fringe benefits
  - Self-employment income
  - Pre-tax
- Profiles based on household surveys of wages and income
- Adjusted to match National Income and Product Accounts
- Reflects age variation in productivity, hours worked, unemployment, and labor force participation.
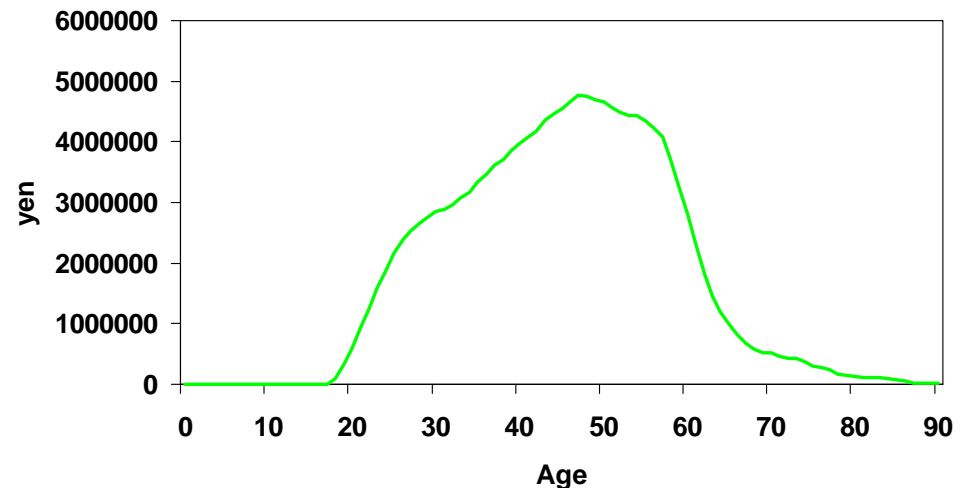
Economic Lifecycle: Consumption

- Consumption
  - Public and private
  - Education, health, and other
- Profiles based on surveys and administrative records
- Adjusted to match National Income and Product Accounts

- All estimates presented here are drawn from National Transfer Accounts
- Being constructed by research teams in 30 countries on six continents.
- Details available at www.ntaccounts.org.
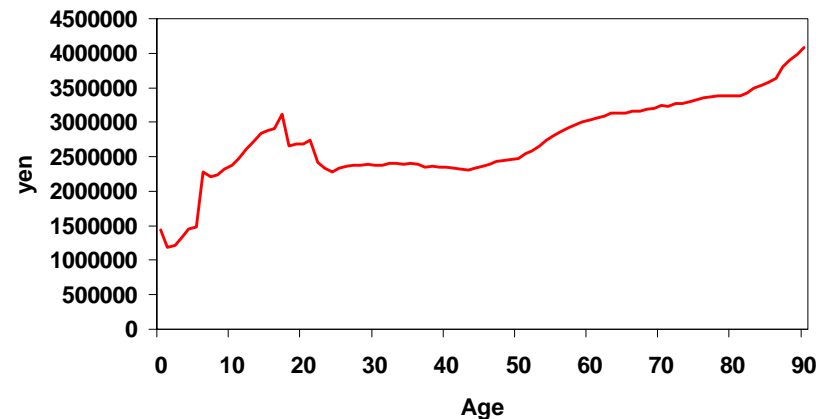
Important features of the economic lifecycle

- In all contemporary societies there are large per capita lifecycle deficits at both the young and old ages.
- The per capita child deficit is rising as fertility declines, more is invested in human capital, and entry into the labor force is delayed.
- The per capita old age deficit is rising as age at retirement has declined and spending on health care has increased.
- The aggregate economic lifecycle is dominated by changes in age structure.

Aggregate Economic Lifecycle, Philippines, 1999

Pesos (millions) (y-axis: 0, 10,000, 20,000, 30,000, 40,000, 50,000, 60,000, 70,000)

x-axis: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90+

Consumption

Labor income

Huge lifecycle deficit for children primarily because Philippines has a relatively young age structure.

+331 billion

-960 billion or 61% of labor income

-65.5 billion; 4% of labor income
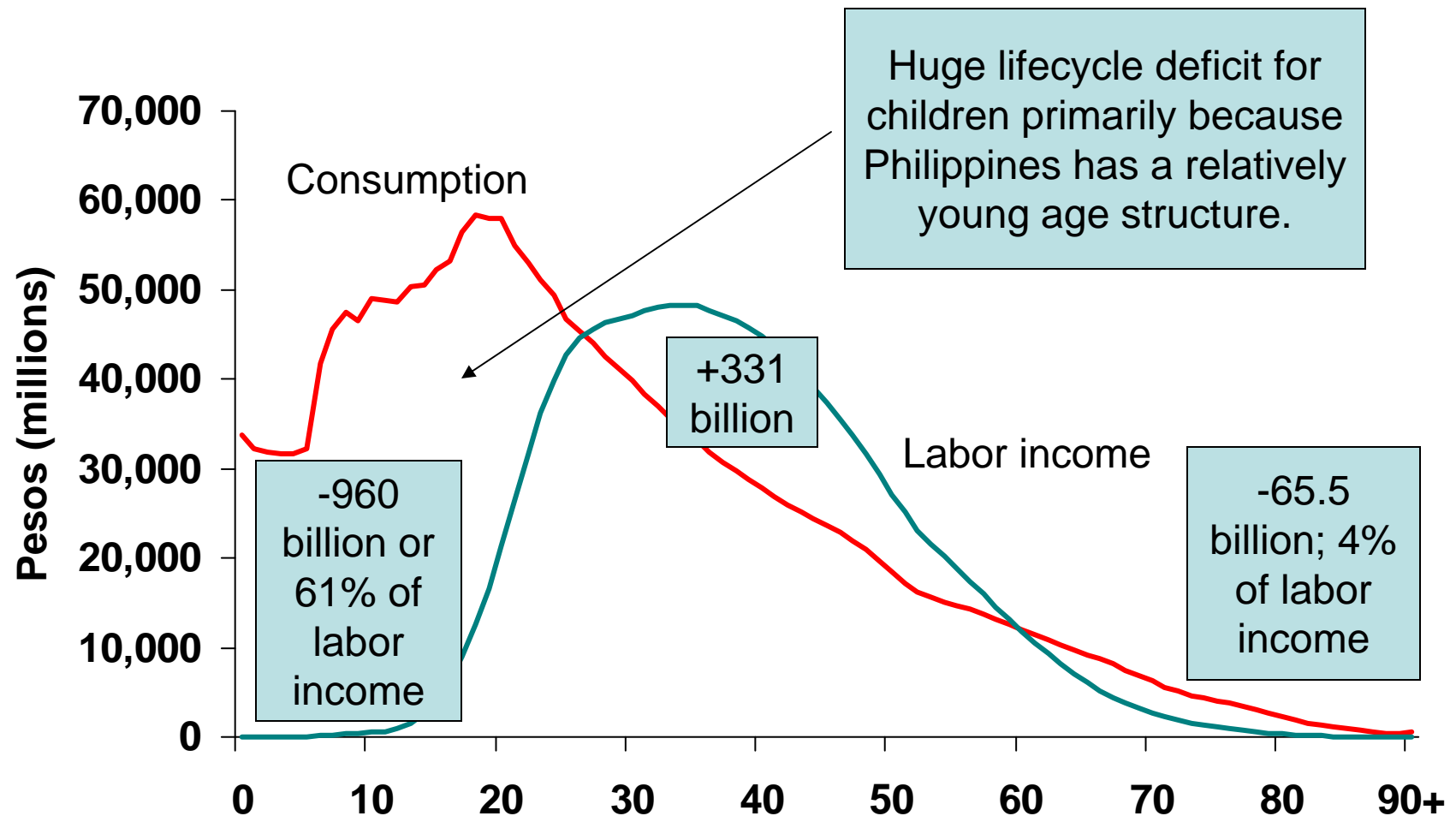
Source: Racelis and Salas. 2007.

Aggregate Economic Lifecycle, US, 2003

In the US, the lifecycle deficits of the young and the old are similar, primarily reflecting US age structure.

Dollars (billions)

250

200

150

100

50

0

Consumption

+1.4 trillion

Labor income

-2.1 trillion; 30% of labor income

-1.5 trillion; 21% of labor income

0 10 20 30 40 50 60 70 80 90+
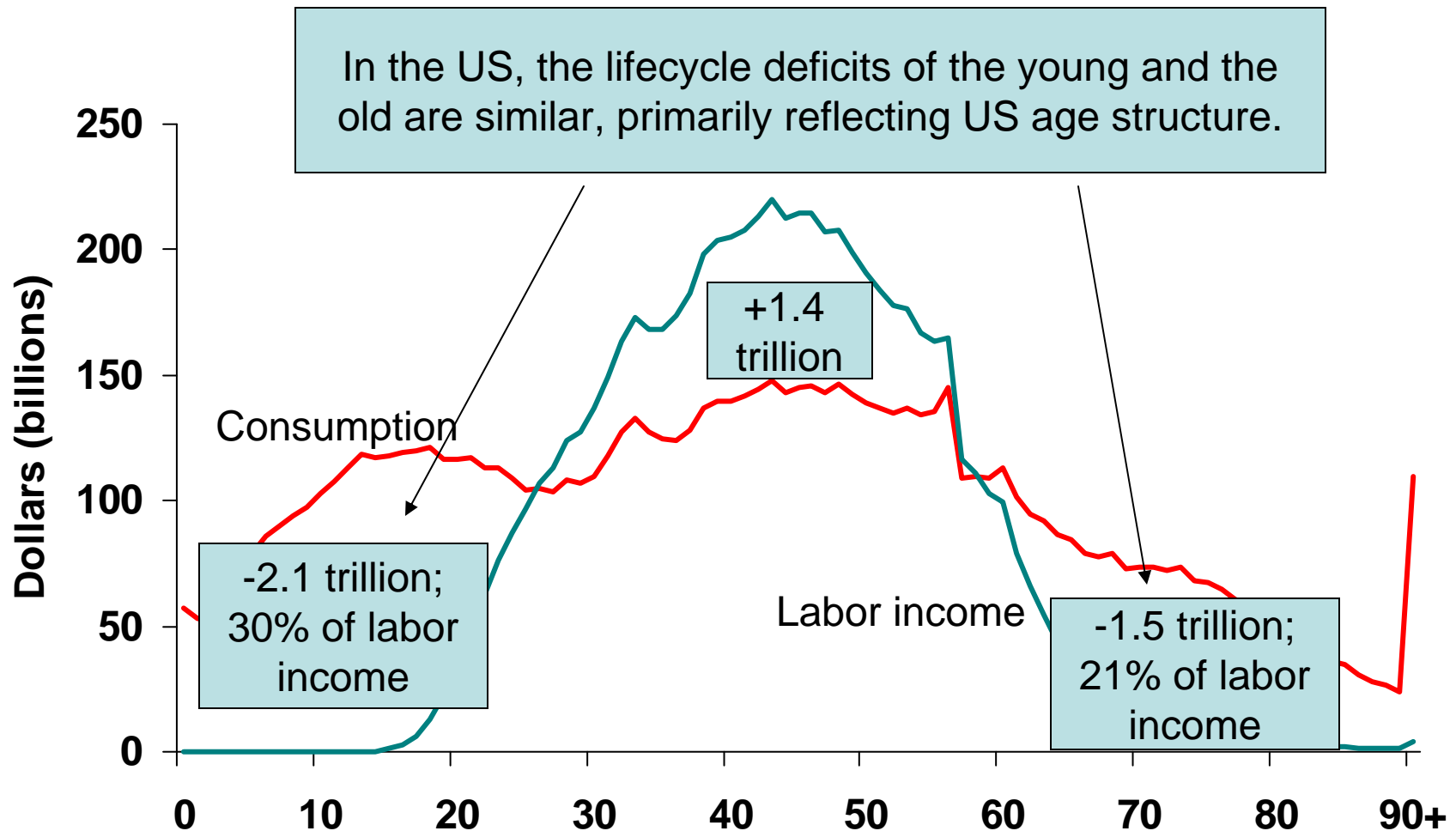
Source: Lee, et al. 2007; Lee, Mason, and Lee. 2008.

Aggregate Lifecycle Deficits, Circa 2000
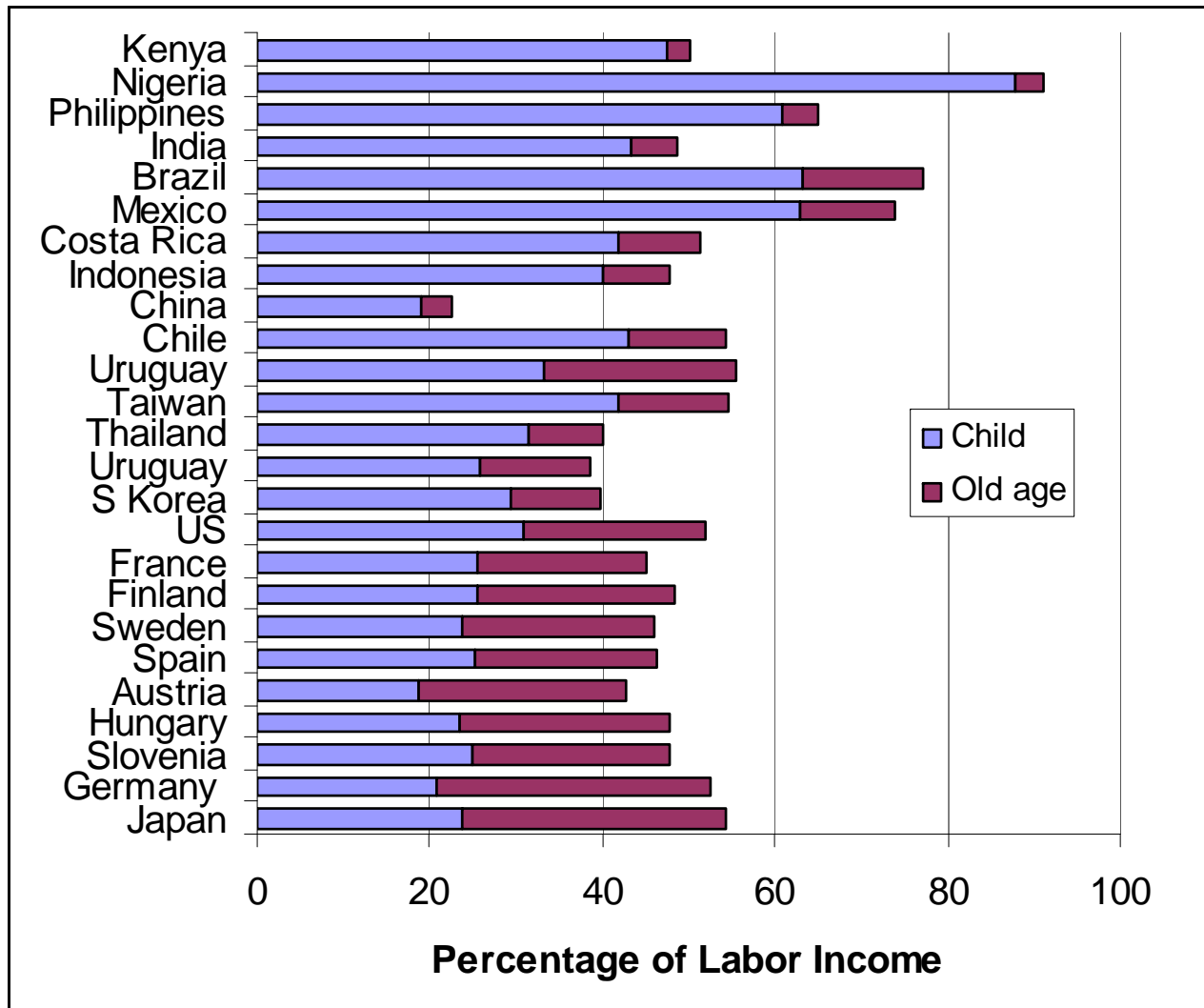
Aggregate Lifecycle Deficits, 2050

Youngest

Oldest

Legend: Child, Old age

Percent of labor income

Countries (top to bottom): Kenya, Nigeria, Philippine, India, Indonesia, Thailand, USA, CostaRica, Uruguay, Chile, Sweden, Mexico, France, Finland, China, Brazil, Hungary, Spain, Austria, Slovenia, Germany, S Korea, Japan, Taiwan

X-axis: 0, 20, 40, 60, 80, 100
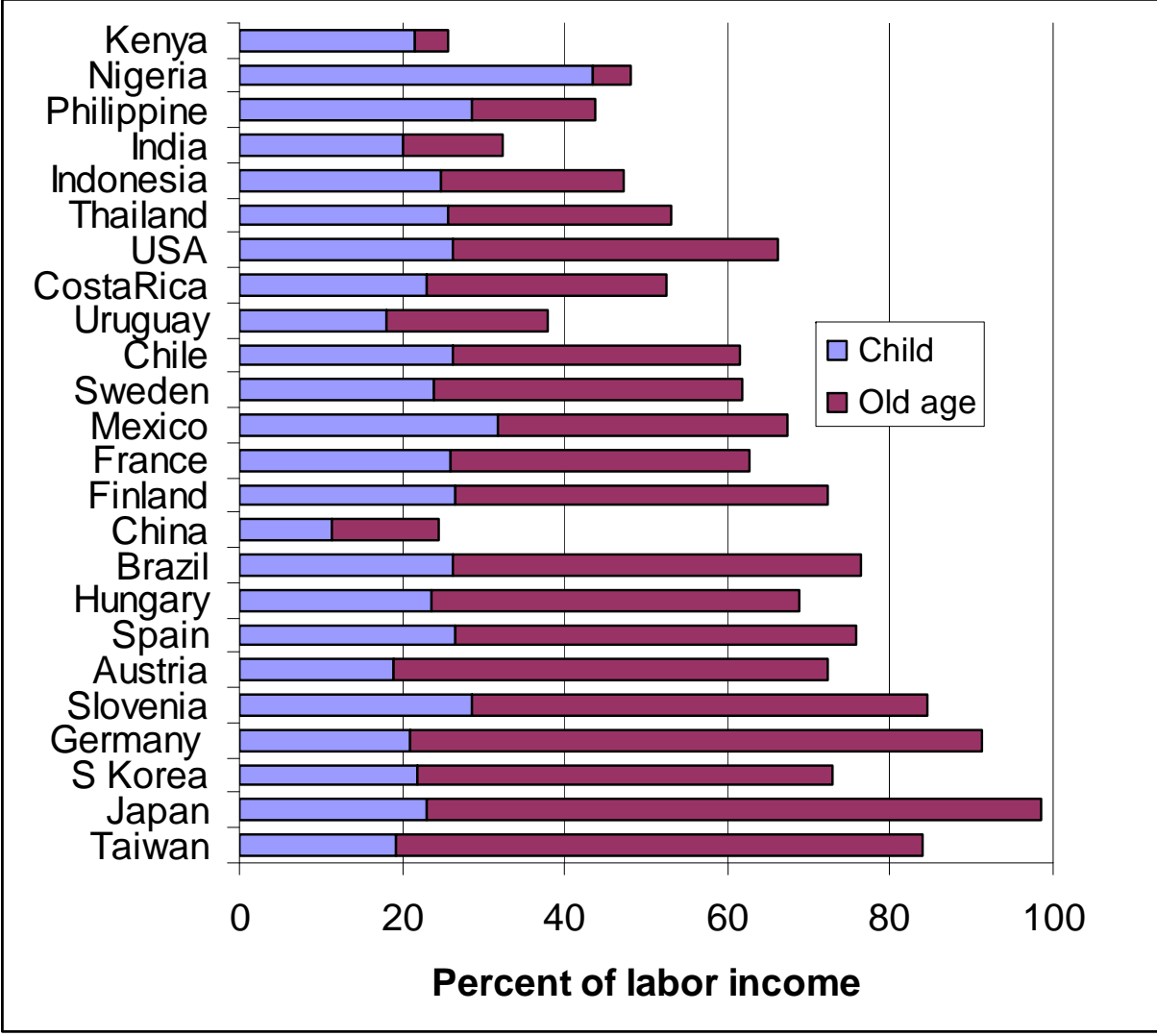
Projected holding per capita profiles constant.

Is the per capita economic lifecycle changing?

- Key features are persistent, but
- Labor income has become more heavily concentrated in the prime working ages with later school departure and earlier retirement.
- Per capita human capital spending on children has increased as fertility has declined.
- Consumption at old ages – particularly health consumption – has increased.

Normalized Labor Income, Taiwan, 1978-2004
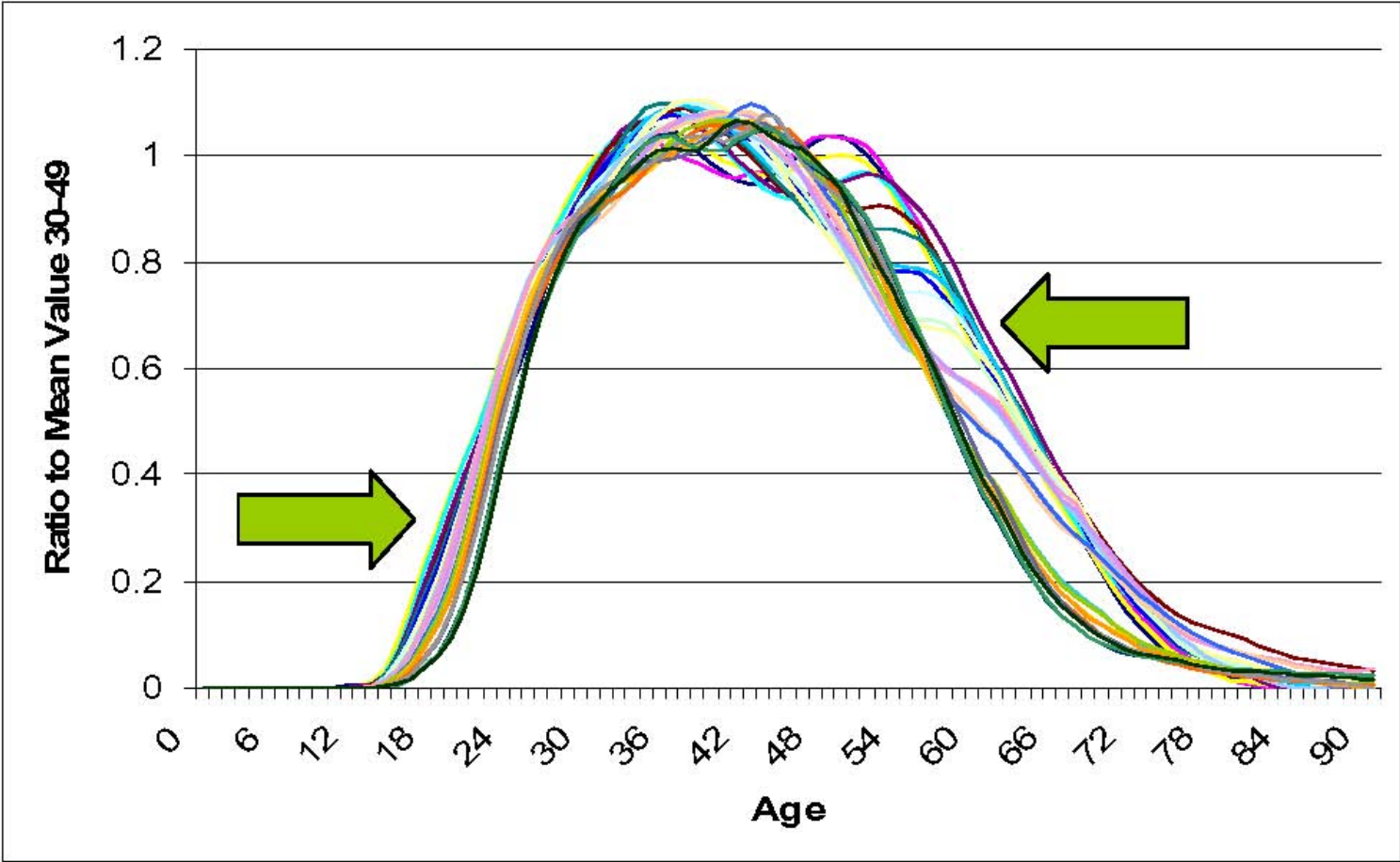
Source: SH Lee 2010.

Measuring Human Capital Investment

- Synthetic cohort estimated based on per capita consumption of health and education.
- Both private and public consumption included.
- Education is sum of per capita values over the 0 – 26 age range.
- Health is sum of per capita values over the 0 – 17 age range.
- All values are normalized on average per capita labor income controlling for differences in income and labor costs across countries.

Components of US Consumption, 2003

HK spending

Dollars (US, 2000)

40000

Private Edu

Public Edu

Public Health

Private Health

Private Durables

20000

Private Other

Public Other

0

0   10   20   30   40   50   60   70   80   90

Age
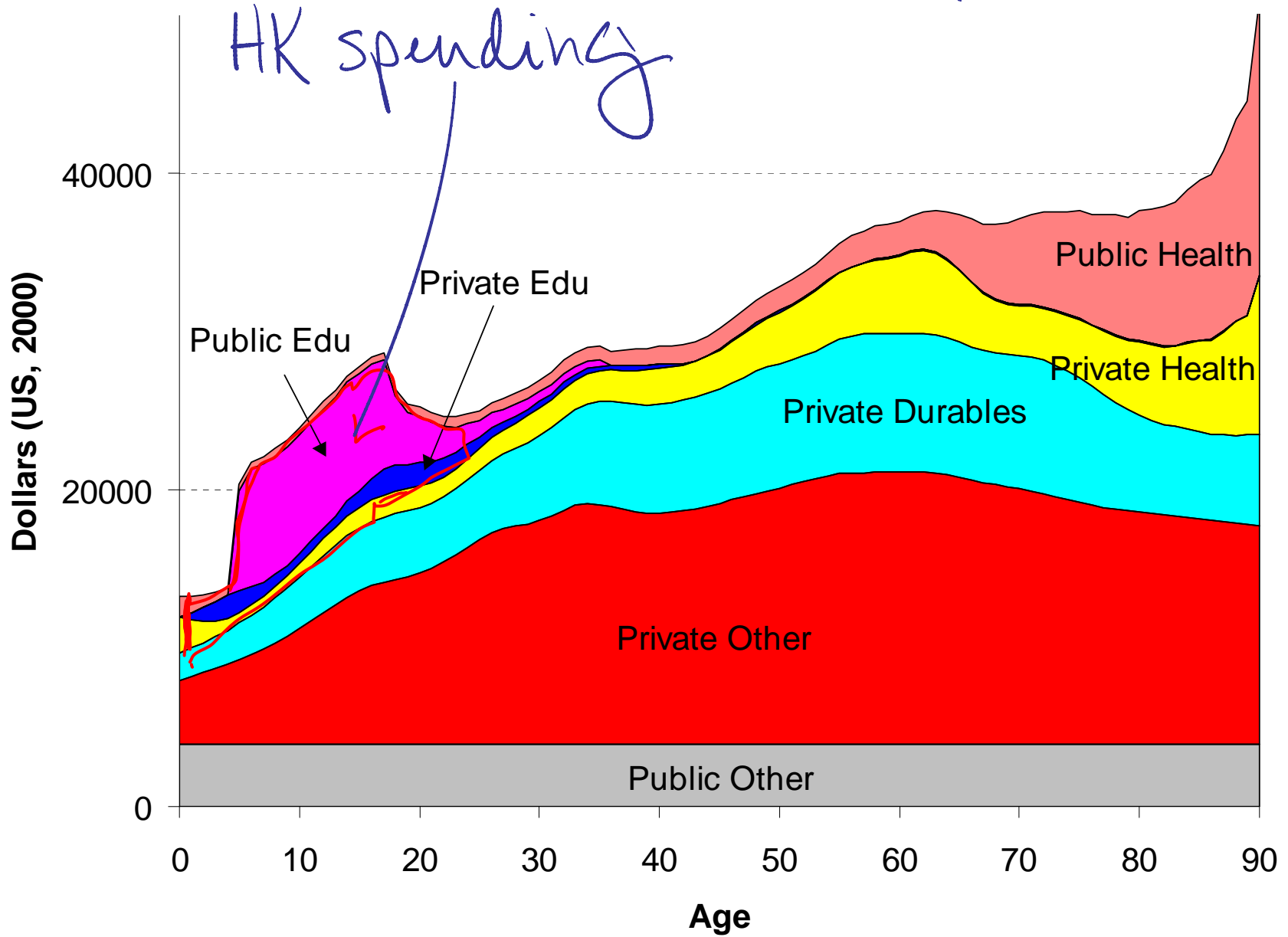
Quantity-Quality Tradeoff: Cross-sectional Relationship

Estimated elasticity
$d \ln HK / d \ln TFR$
is -0.913
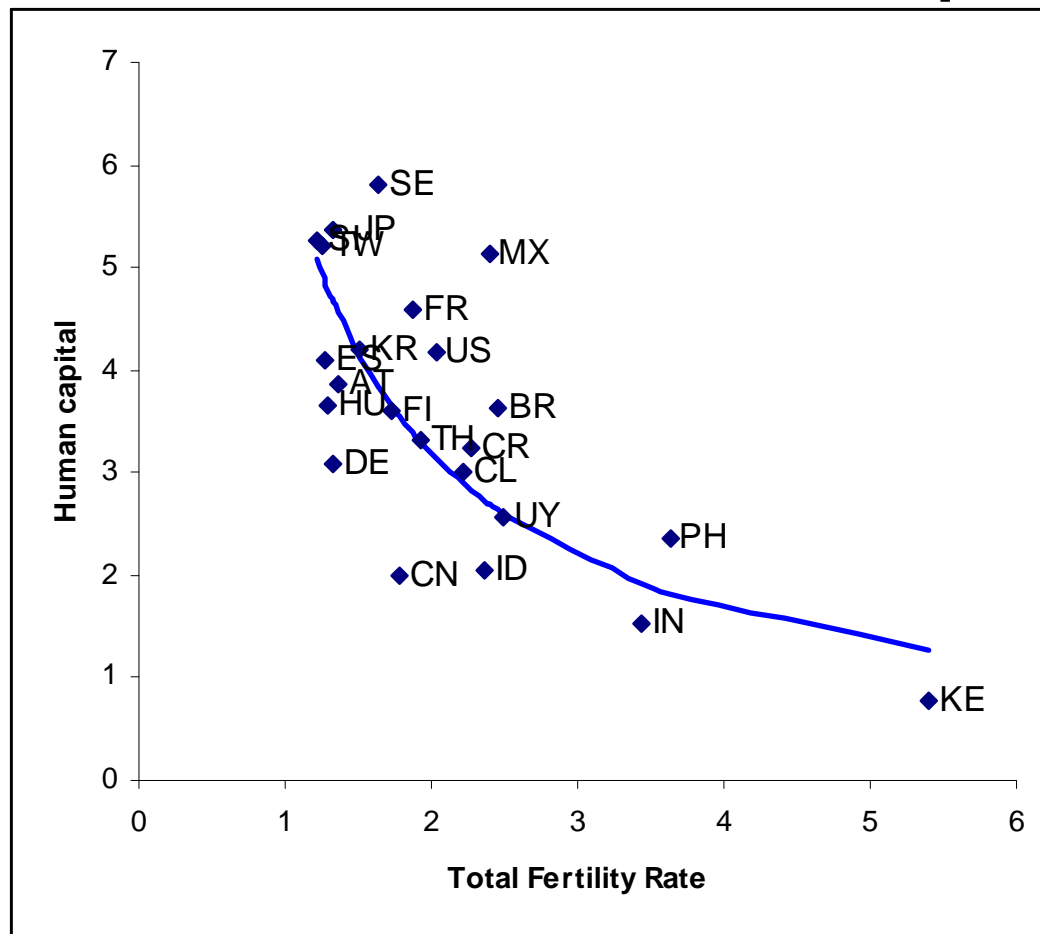
Source: Lee and Mason, 2009,
European Journal of Population (updated).

Human Capital and TFR: Time Series Relationship

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

Number of Observations	
Japan	5
Taiwan	27
United States	23
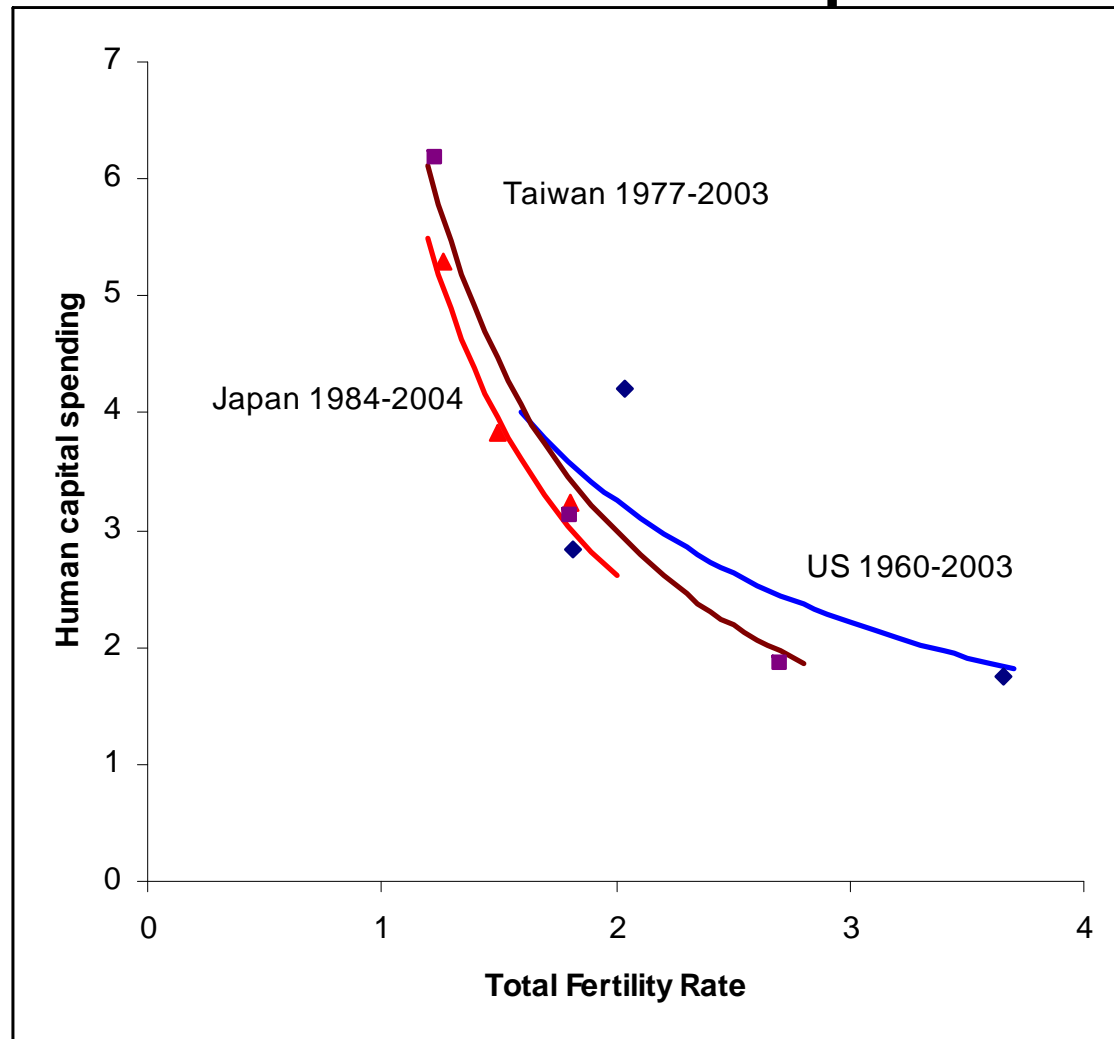
Source: Ogawa, Mason et al., 2009.

The changing shape and composition of US consumption, 1960, 1981 and 2003, and the role of the public sector.
(Ratio to average labor income ages 30-49).
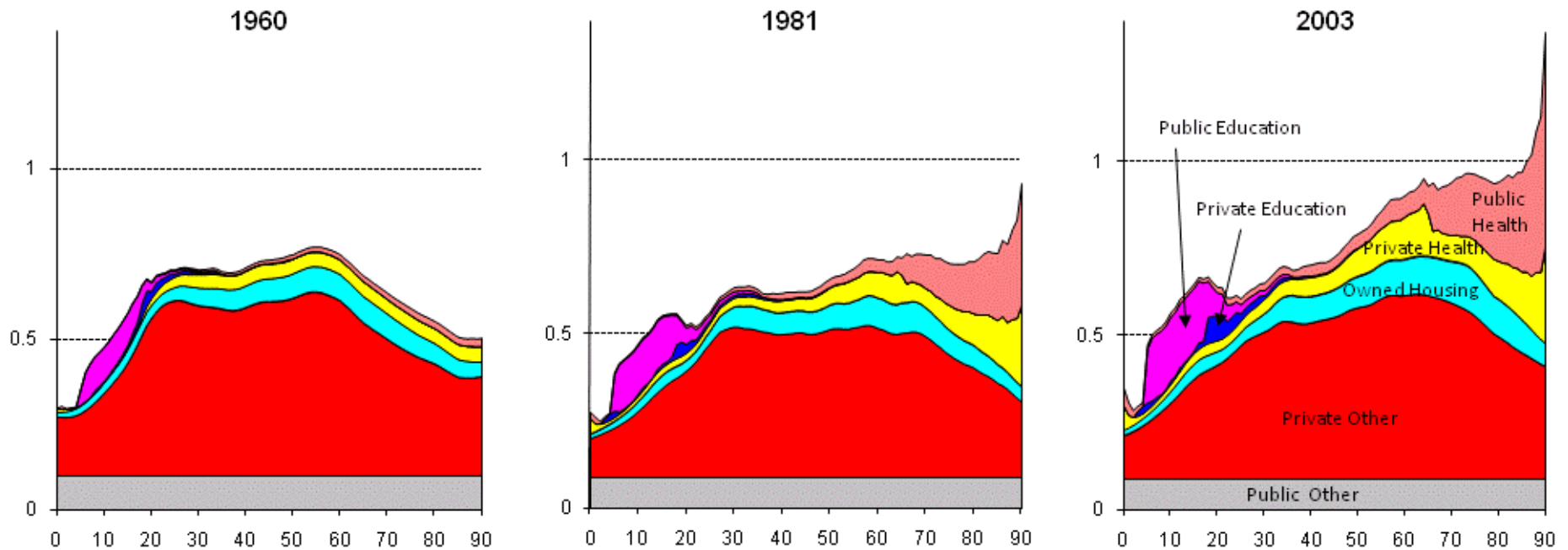
Source: Lee, 2010.

Summary

- Currently, the oldest populations have the smallest child deficits and the largest old-age deficits.
- While the youngest populations have the largest combined deficits.
- By 2050 the old-age deficits may become so large that the oldest populations will have very large old-age and combined deficits.
- Changes in per capita profiles suggest that child deficit declines more slowly and old-age deficit more rapidly over time.

The Generational Support System

The NTA Flow Account Identity

- Inflows
  - Labor Income
  - Asset Income
  - Transfer Inflows

- Outflows
  - Consumption
  - Saving
  - Transfer Outflows

$$\underbrace{Y^l(x) + Y^a(x) + \tau^+(x)}_{\text{Inflows}} = \underbrace{C(x) + S(x) + \tau^-(x)}_{\text{Outflows}}$$

$$\underbrace{C(x) - Y^l(x)}_{\text{Lifecycle Deficit}} = \underbrace{\underbrace{\tau^+(x) - \tau^-(x)}_{\text{Net Transfers}} + \underbrace{Y^a(x) - S(x)}_{\text{Asset-based Reallocations}}}_{\text{Age Reallocations}}$$

where *x* is age.

Age Reallocation System

- Economic system that shifts resources from one age group to another.
- Accounting: Fills the gap between consumption and labor income (flow constraint).
- Transfers
  - Public transfers (cash and in-kind)
  - Private transfers (familial including intra-household)
- Asset-based reallocations
  - Asset income
  - Saving

Funding the Child Deficit

Components of Lifecycle Deficit, US 2003

Net public transfers – public schools, value of public goods allocated to children.

Public Asset-Based Reallocations
Private Asset-Based Reallocations
Public Trans...
Private Tran...

Asset-based flows – none for children, small for young adults (mostly credit).

Net private transfers – intra-household transfers to children; largest in all countries studied.

US $

Age
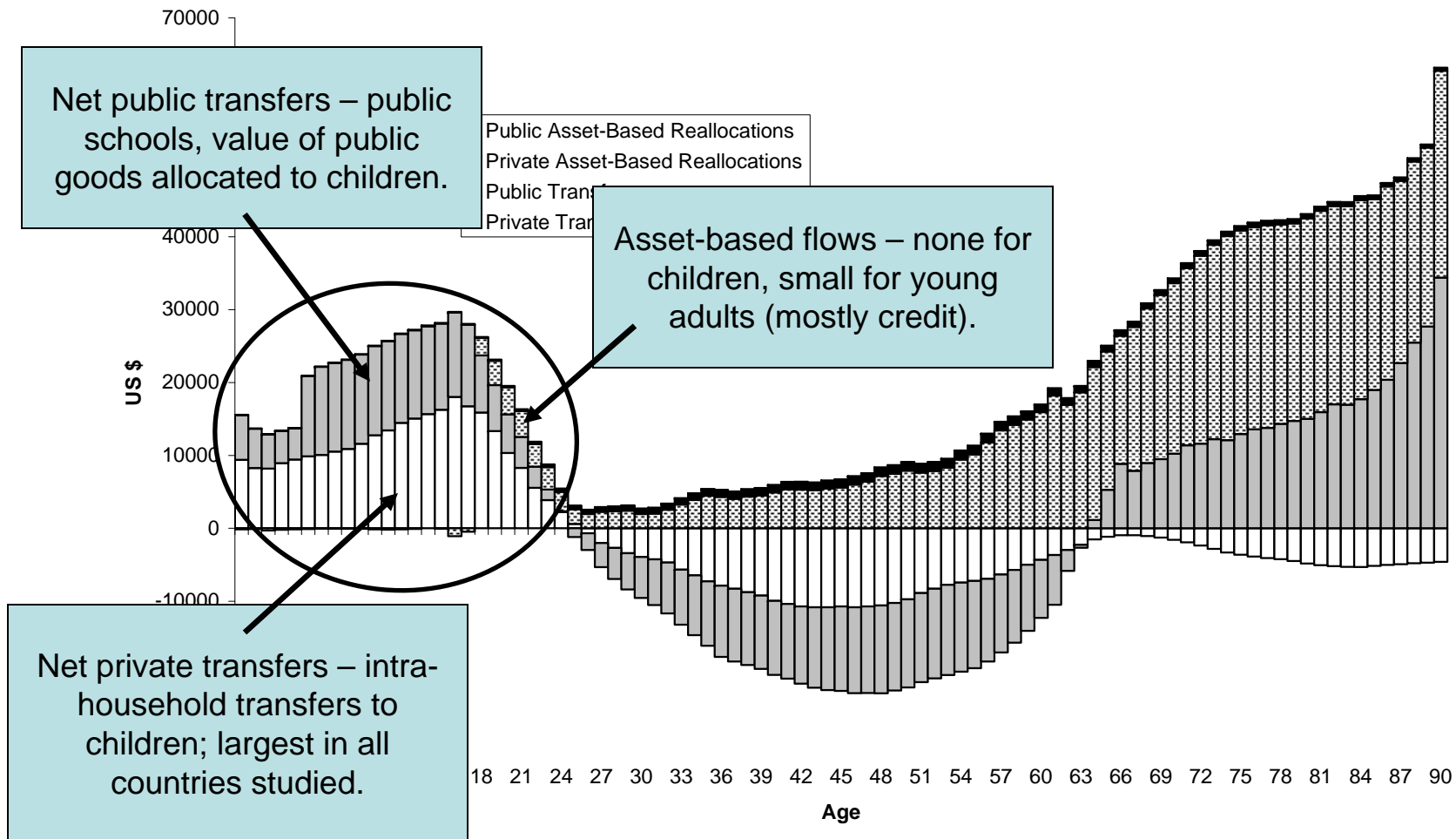
Funding the Old-age Deficit

Components of Lifecycle Deficit, US 2003

Legend:
- Public Asset-Based
- Private Asset-Based
- Public Transfers
- Private Transfers

Asset-based reallocations – asset income and dis-saving from owner-occupied housing, private pension funds, personal saving, etc.

Net public transfers – social programs (public pensions, health care, etc.), benefits from general programs, less taxes paid.

Net private transfers – inter- and intra-household transfers.

Y-axis: US $

X-axis: Age

Child Support System
Percent of LCD(<25)
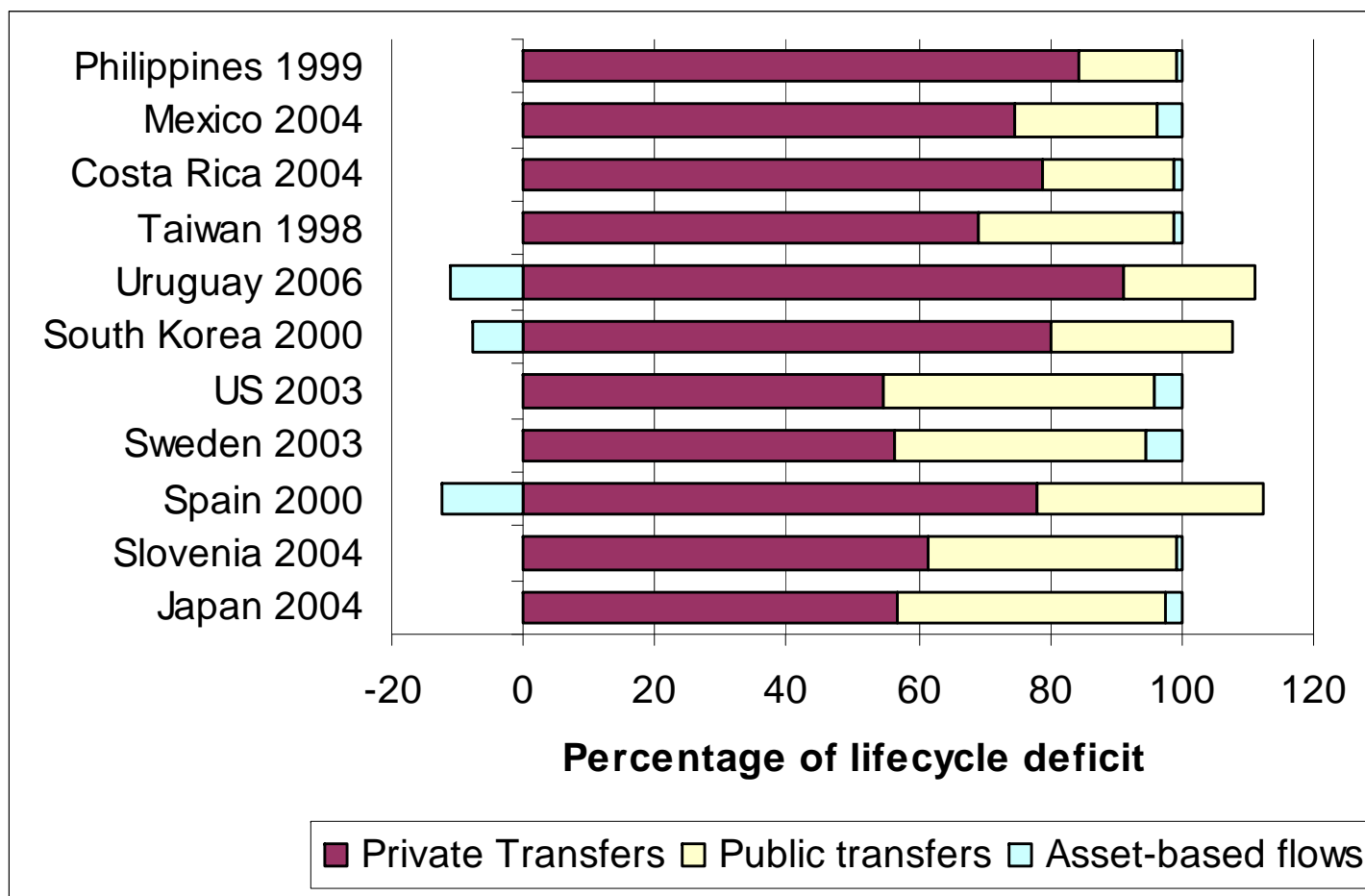
Note: Synthetic cohort estimates.

Funding the Lifecycle Deficit, 65 and older, NTA countries, recent year

Asset-based flows:
Exceed 2/3 in four countries including US; Under 1/3 in Taiwan, Germany, Finland, and Austria.
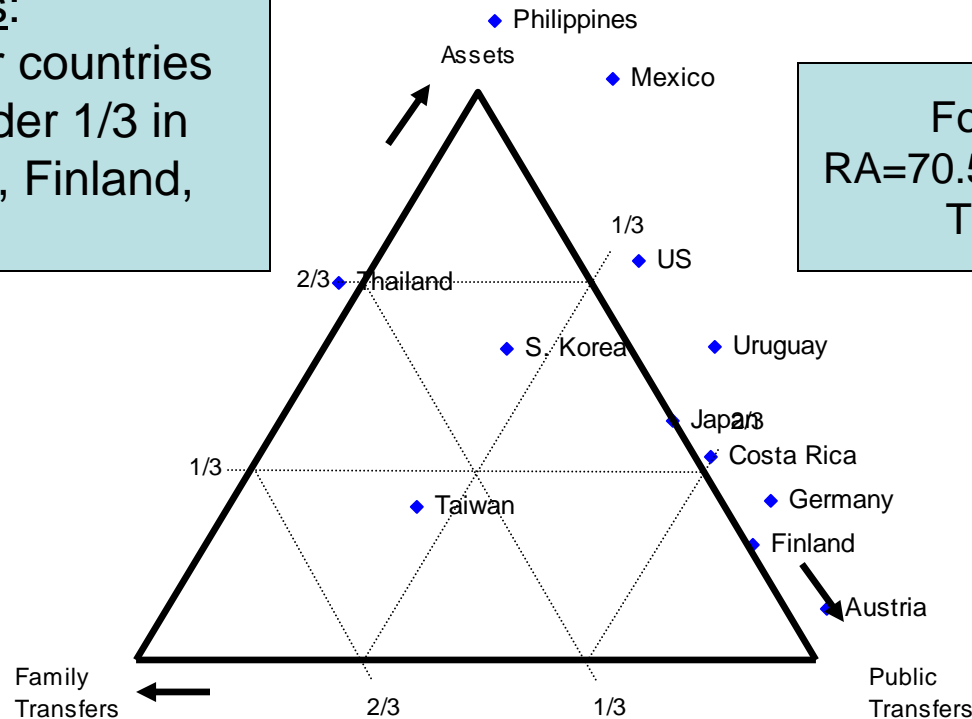
For US 65+, RA=70.5%; TG=38.3%; TF=-8.8%.

Net private transfers:
Positive only for 3 Asian economies; zero in Japan; negative elsewhere.

Net public transfers:
Range from zero in Thailand and Philippines to over 2/3 in Germany, Finland, and Austria.

The reversal in transfers

1. Private Transfers

- Private transfers are downward in ALL countries; private transfers to children dominate upward private transfers especially in countries with young age structures.

- Importance:
  - Understanding the fertility transition – no economic payoff to having children.
  - Economic role of the family in aging societies – parents can count on little FINANCIAL support.

Aggregate Net Private Transfers by Age, Oldest Country in the World (Japan 2004)
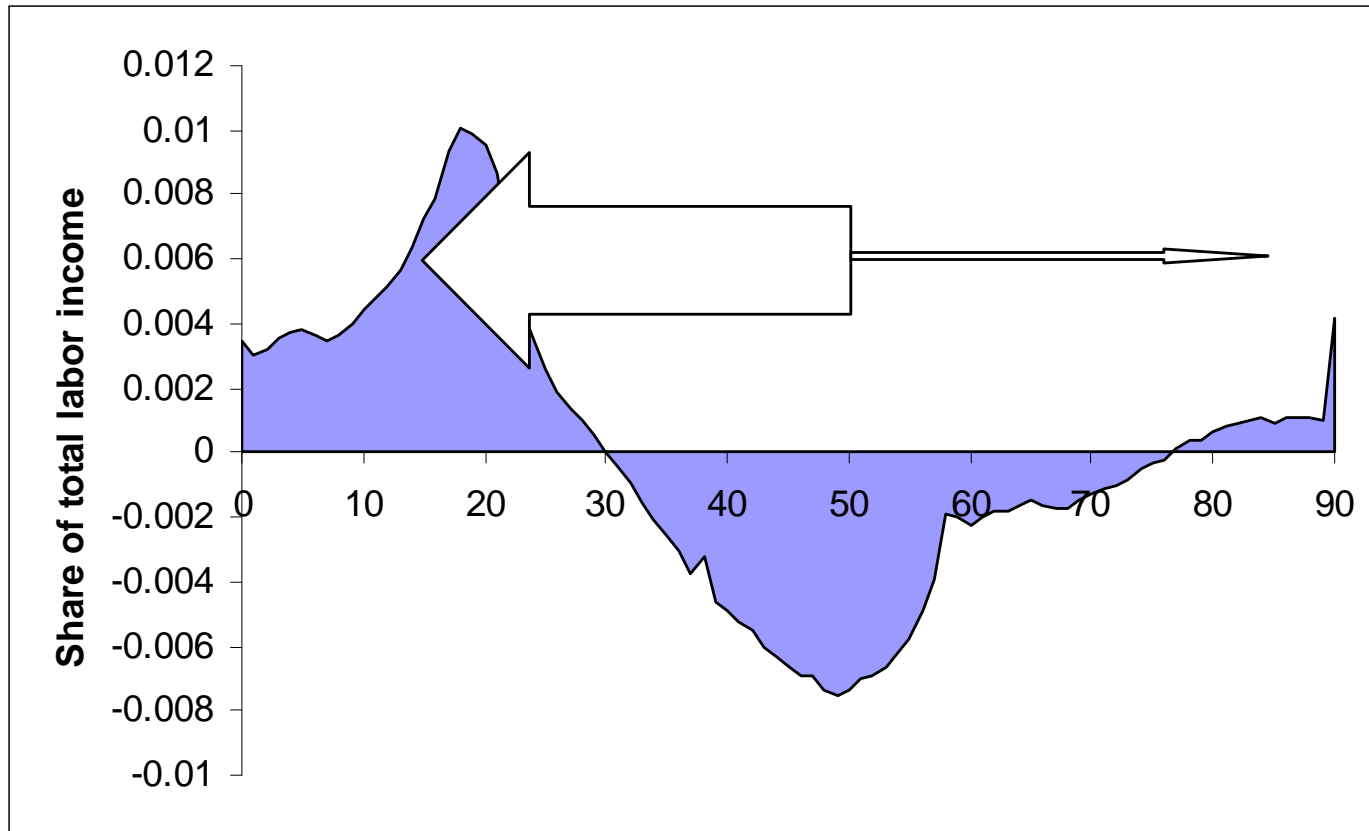
Mean age of outflows: 50.0; mean age of child inflows: 15.2; mean age of old-age inflows: 86.4. Private child transfers as a share of total labor income: 0.146; private old-age transfers as a share of total labor income: 0.012.

Summarizing Transfers with Arrow Diagrams

- Width of the arrow summarizes per capita or annual transfers
- Why is age gap important?
  - If age gap is large and the flow is upward, large portion of inflows to current population will be paid by future generations.
  - If age gap is large and the flow is downward, current generations will make large transfers to future generations.
- Under special conditions (golden rule growth), the area of the arrow (T) is equal to implicit debt imposed on future generations or implicit wealth if transfers are downward

$$T = Flow \times \left(A^{\tau^+} - A^{\tau^-} \right)$$

For Japan

Downward transfers:

T = (15.2 – 50) X 0.146 = -5.09 times annual aggregate labor income

Upward transfers:

T = (86.4 – 50) X 0.012 = 0.54 times annual aggregate labor income.

Combined transfer wealth equals -4.55 times annual aggregate labor income. Expected private transfers to future generations substantially exceed the expected private transfers from future generations.

Table xx. Private transfer summary, with own and standard population age distributions.

Country (from richest to poorest)	Average age of inflows	Average age of outflows	Transfers/ Normalized labor income	Wealth	Adjusted Wealth
United States	34.2	46.9	0.25	-3.17	-3.47
Austria	36.4	46.2	0.17	-1.67	-2.34
Japan	42.1	50.6	0.29	-2.46	-4.03
Slovenia	32.6	43.4	0.19	-2.05	-3.17
Taiwan	31.3	40.3	0.35	-3.15	-3.31
South Korea	33.8	44.2	0.45	-4.68	-5.13
Mexico	28.1	42.6	0.47	-6.81	-5.86
Chile*	30.3	45.2	0.33	-4.92	-4.46
Costa Rica	28.6	42.4	0.35	-4.83	-4.11
Thailand	33.3	43.7	0.33	-3.43	-3.26
Brazil*	28.9	44.0	0.39	-5.89	-4.72
Indonesia*	24.8	43.8	0.29	-5.51	-5.07
China*	32.9	43.9	0.2	-2.20	-2.25
Philippines	27.6	42.9	0.42	-6.43	-4.23

Private transfers are normalized on the labor income of those in the 30-49 age group.

Adjusted wealth uses a standard population age distribution to calculate private transfers.

Source: Lee and Mason 2009.

(handwritten annotations:)

$T < 0$ always

$T < 0$ in low income countries (except China)

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Adjusted wealth uses a standard population age distribution to calculate private transfers.

Source: Lee and Mason 2009.

[handwritten annotations:] Uses average age structure

Variance ↓

Δs across countries mostly age structure.

2. Public Transfers

- Public transfers are downward in low-income countries (education)
- Public transfers are upward in high-income countries (health care and pensions)
- Implications
  - As populations age public transfer wealth will grow and, hence, implicit debt on future generations will increase.
  - Public transfer systems can not be sustained in their current form and may lead to generational conflict.

Public transfers given and received for countries and regions (with **actual** population age distribution)

|		width=	wealth=
EUR & US	43.7 — 46.5	0.33	0.94
US	42.6 — 46.4	0.24	−0.93
SE	45.7 — 49.9	0.42	1.77
DE		–	–
AT	45.1 — 50.3	0.35	1.85
FR		–	–
FI	42.7 — 45.8	0.39	1.24
SI	41 — 46.6	0.30	1.70
ES	44.4 — 47.1	0.26	0.69
HU	42 — 43.8	0.36	0.57
E ASIA	37.6 — 41	0.20	−0.69
JP	47.8 — 51.4	0.30	1.09
TW	33.5 — 39.8	0.21	−1.34
KR	33.3 — 37.5	0.19	−0.80
CN	33.6 — 36.5	0.13	−0.37
LAT AMER	38.2 — 39.5	0.20	0.28
CL	39.2 — 39.3	0.17	0.03
UY	39.9 — 46.4	0.19	1.22
CR	36.5 — 36.7	0.18	−0.04
MX	29.5 — 38.1	0.17	−1.43
BR	36.9 — 40.9	0.29	1.16
SE ASIA	26.5 — 37.7	0.11	−1.28
TH	28.5 — 40.3	0.13	−1.56
PH	25.8 — 38.8	0.12	−1.27
ID	24.4 — 38.2	0.08	−0.93
IN	25.6 — 35.7	0.12	−1.24

Average Age (20 30 40 50)

Source: Lee and Mason 2009.

Public transfers given and received for countries and regions (with standard population age distribution)

- Europe & US: public transfers are upward because of pop aging.

- E Asia: Given age structure public systems favor young more and elderly less than in Europe.

- Latin America: Public systems build in large upward transfers – Brazil in particular.

- SE Asia: Public systems strongly favor the young.
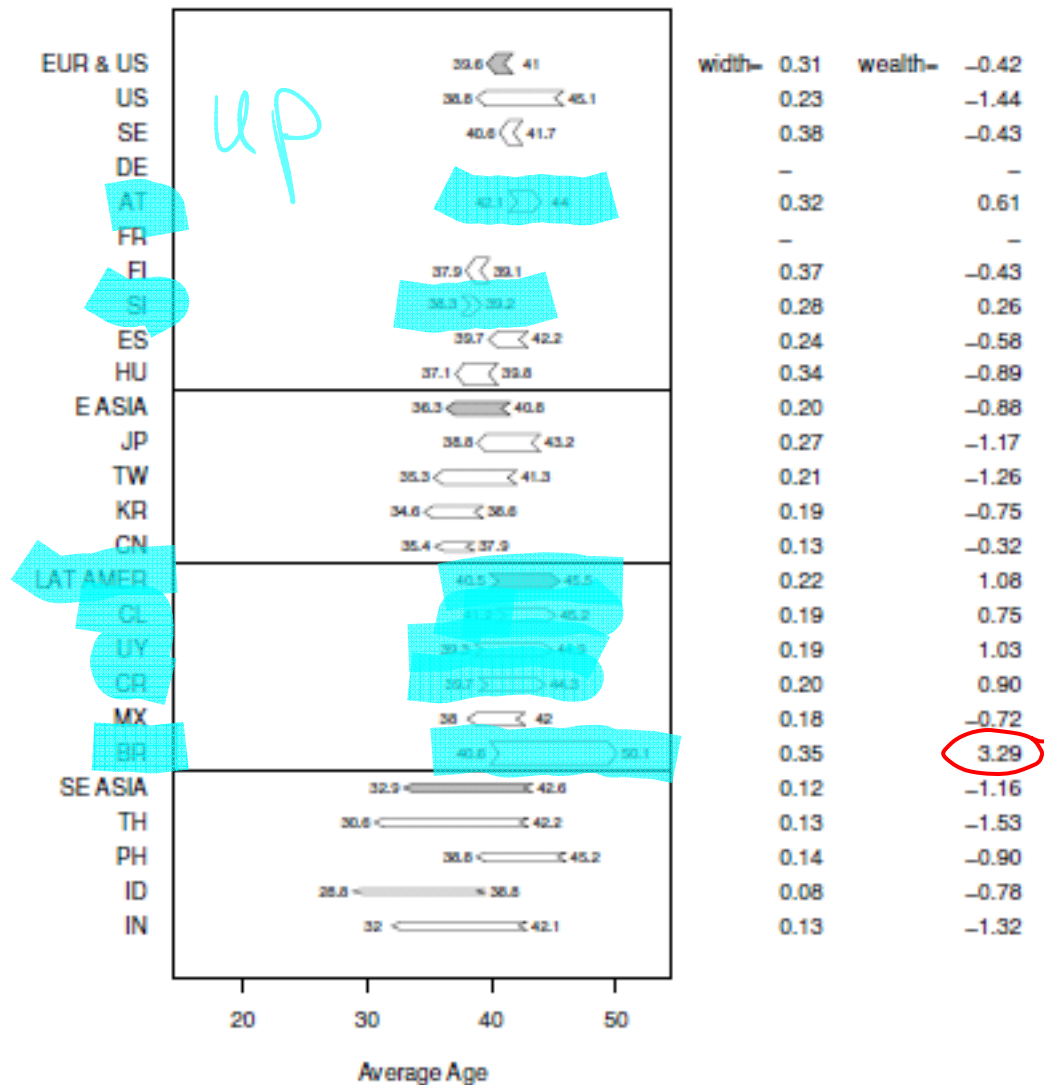
Source: Lee and Mason 2009.

Bottom Line

- If current transfer systems are not reformed, upward transfers (mostly public) will come to dominate downward transfers (mostly private) in many countries.
- The net effect will be to indebt future generations and reduce their standard of living relative to our own.
- This has probably never occurred before in human history.
- An increase in bequests could counteract this development (for those who receive the bequests).

Relationship between transfers and other variables

Funding Old-age Consumption: A Cross-country Comparison

- Great variation in the importance of transfers and assets-flows to those 65 and older.

- Key tradeoff
  - Transfers and asset-based flows
  - Unclear whether an increase in transfers to the elderly crowds out lifecycle saving (Feldstein) or crowds in bequests (Barro).

Funding consumption, 65+, synthetic cohort estimates.

Tradeoff is primarily between transfers and asset-based flows.

Tradeoff between transfers and labor income is modest.
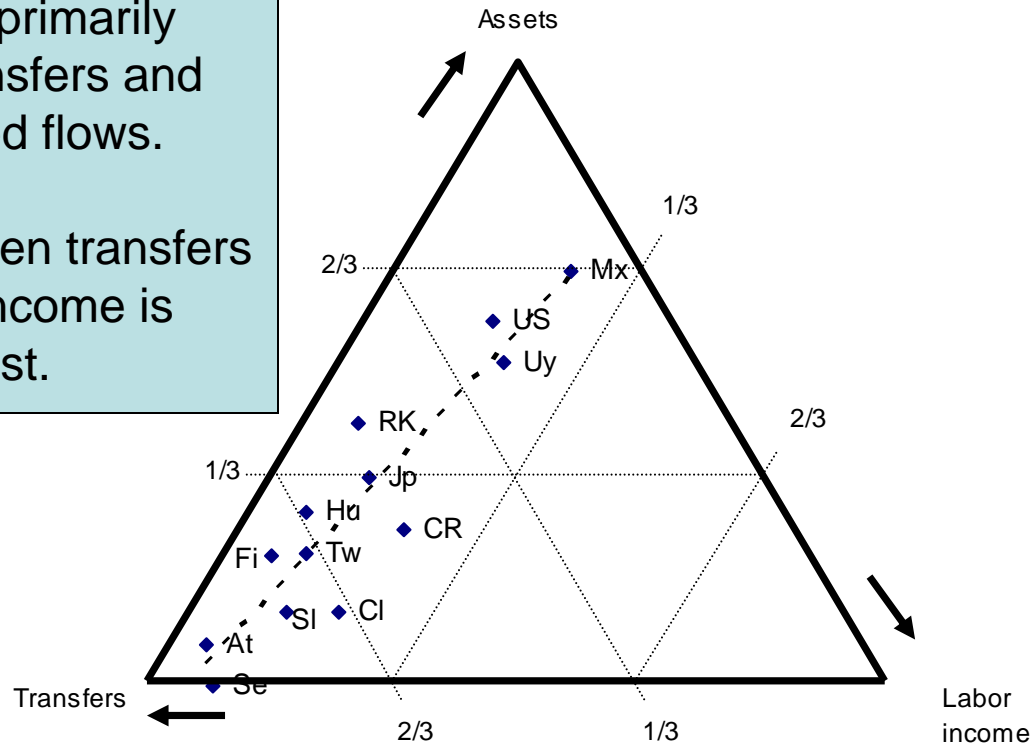
Further Analysis

- Preceding graph conceals possible effects of the support system on consumption.
- A simple statistical analysis provides a useful DESCRIPTION of how four components, consumption, labor income, transfers, and asset-based flows vary across countries.

$$Y_{i,j} = \alpha_j + \beta_j \tau_i + \epsilon_{i,j}$$

where Y is C, AR, or Yl

A one unit increase in transfers must be balanced by a one unit increase in consumption, a one unit decrease in asset-based flows, a one unit decrease in labor income, or some combination of the three. Seemingly unrelated regression problem for which OLS is appropriate, although it would be nice to have more than 13 observations!

Results

Dependent variable	Coefficient	Standard error
Consumption	0.224	0.237
Labor income	-0.110	0.078
Asset-based flows	-0.666	0.183

An Important Issue

- Are asset-based flow lower in high transfer setting because asset income is lower or saving is higher.

- If asset income is lower, results would be consistent with high transfers leading to lower accumulation during the working years.

- If saving is higher, results would be consistent with higher transfers leading to higher bequests.

The Results

Dependent variable	Coefficient	Standard error
Saving	0.003	0.378
Asset income	-0.656	0.401

Nothing can be concluded based on these estimates – standard errors are HUGE!

Key Points

- Large per capita deficits at old-age are universal.
- Old-age deficits have increased over time as health spending increases and age at retirement declines.
- Addressing these two trends an important part of the policy agenda.
- Demography is very important. Differences in fertility have an enormous impact on the economics of aging – Japan vis-à-vis the United States.
- Population aging is reversing the direction of intergenerational transfers with the elderly claiming a greater share and children a smaller share of resources.
- The basic structure of old-age support systems vary widely around the world; the key tradeoff is between asset-based flows and transfers.
- Consistent with the view that large transfer systems create dis-incentives to save among workers (as reflected in low assets and asset income for retirees).
- We cannot rule out an alternative interpretation, that large transfer systems generate higher saving by the elderly and larger bequests.

Important Qualifications

- Construction of NTA is complex and subject to error.
- Results are descriptive and open to a variety of interpretations.
- Too few countries, no times series (presented here), no pseudo-cohort data. We're working on these problems.
- Partial equilibrium analysis: in all comparisons we are controlling for level of development. The effects of support systems on labor supply and investment in human and physical capital and, hence, the level of development were not explored here.

Bottom Line

- Older generations have it in their power to redistribute resources to their descendants by
  - Having children
  - Investing in their human capital
  - Transferring wealth through bequests or inter vivos capital transfers
- Societies have the same opportunities through collective action.
- The welfare of generations beyond our own depends on how we answer these challenges.

The End