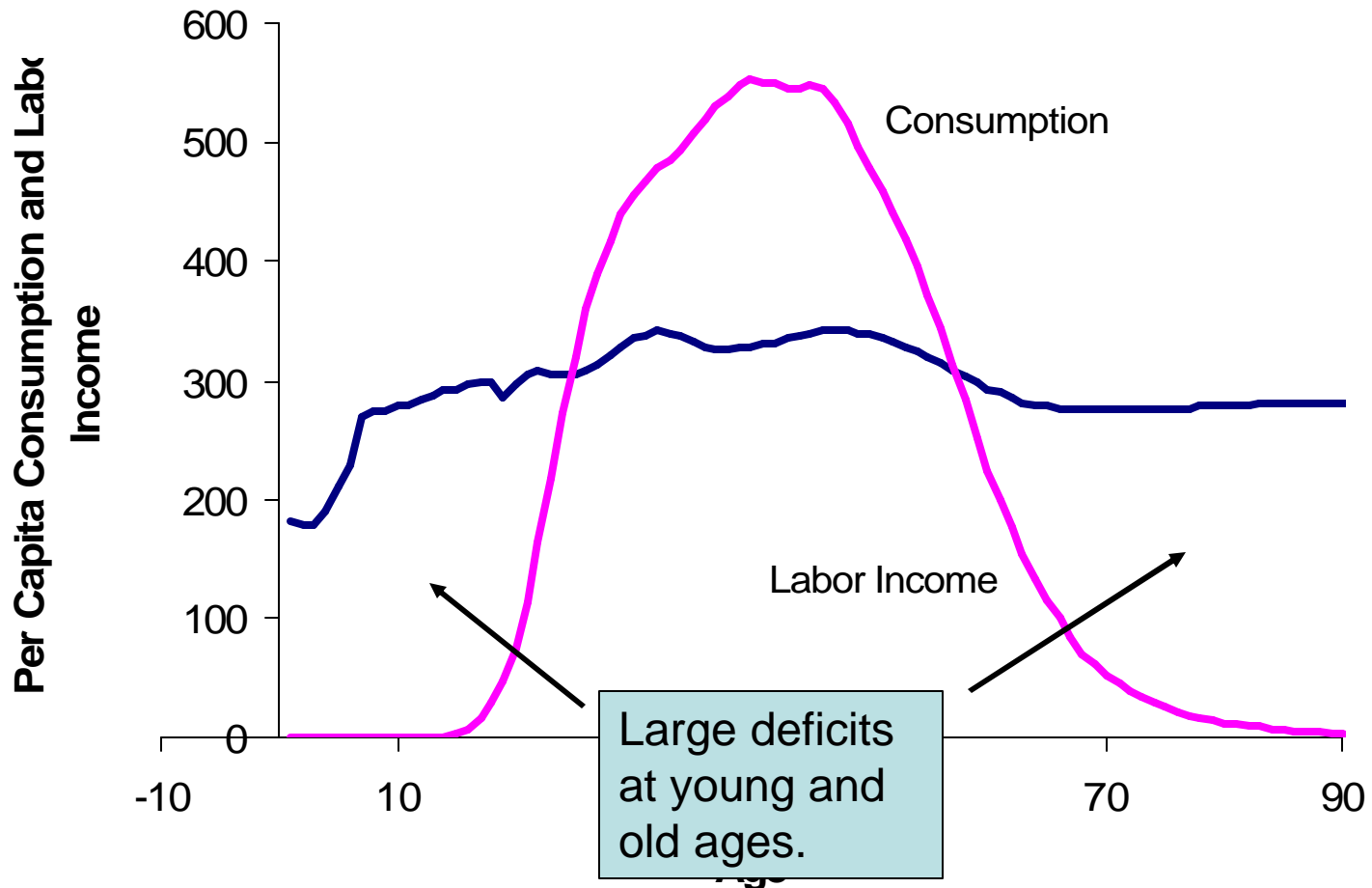


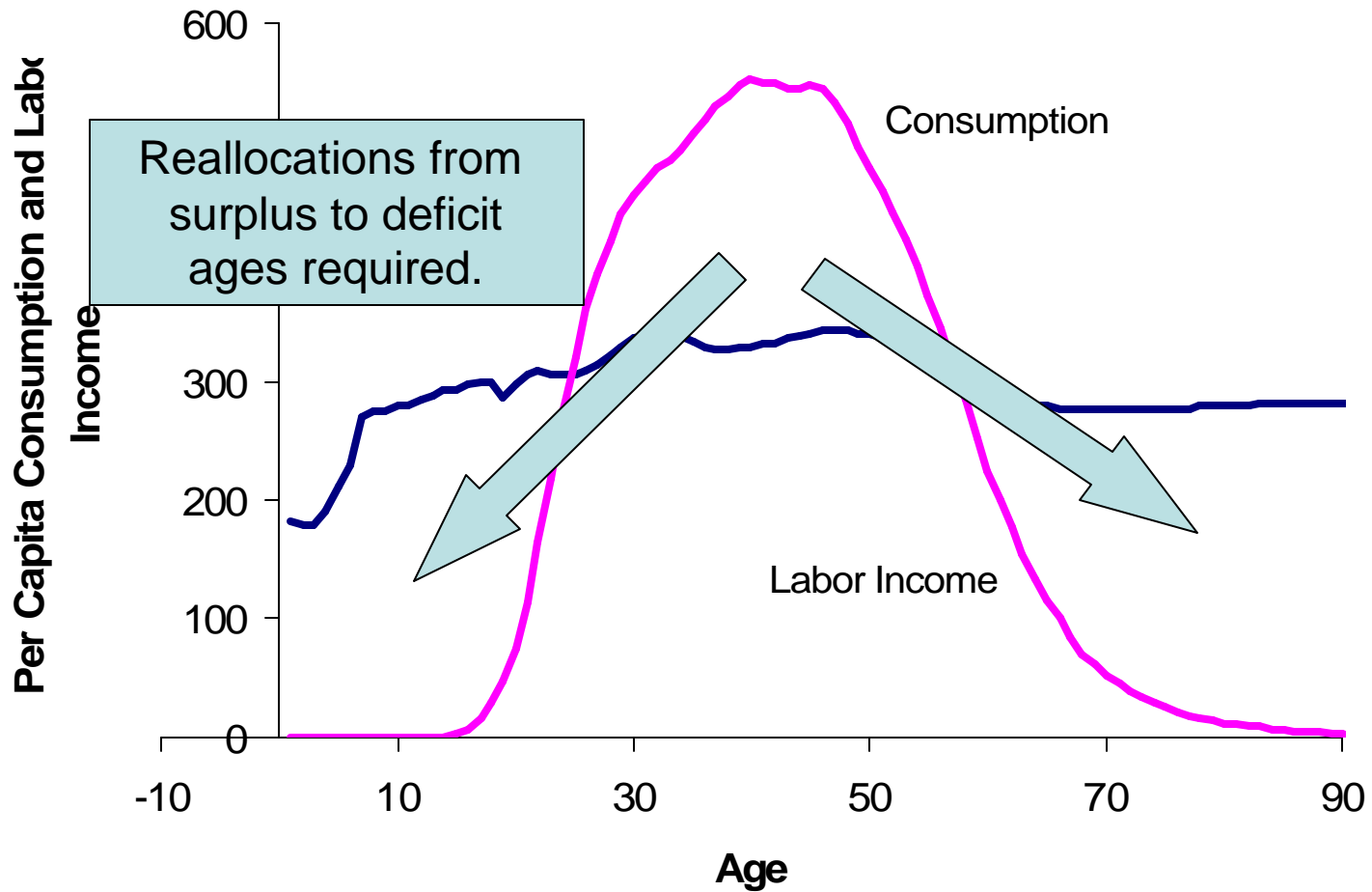
Aging, Intergenerational Transfers, and Economic Growth

Andrew Mason
September 2006

The Most Important Graph in the World: An Asian Economy's Economic Lifecycle



The Most Important Graph in the World: An Asian Economy's Economic Lifecycle



Why is it important?

The interactions among

- the economic lifecycle,
- population age structure, and
- systems for intergenerational support

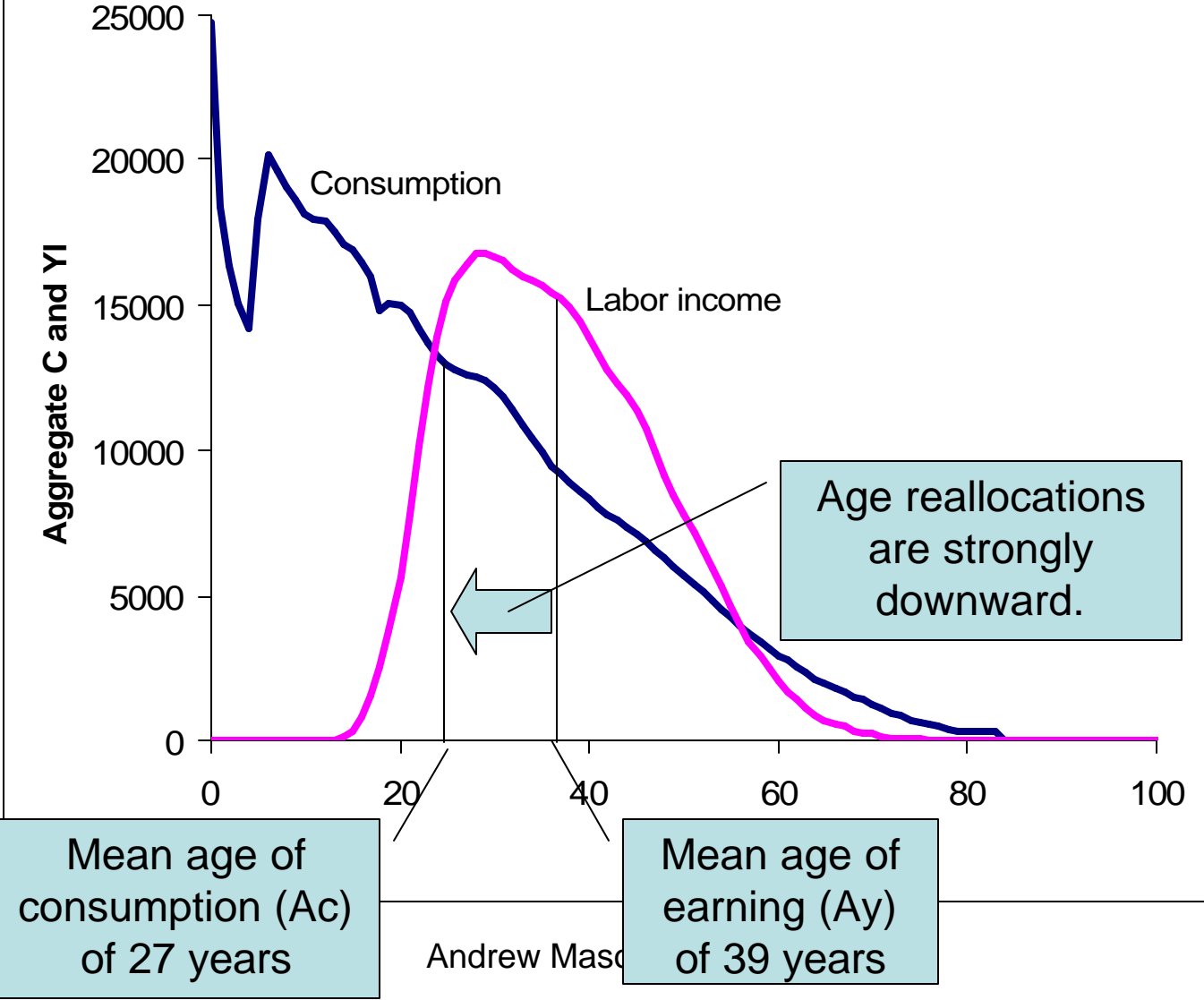
have potentially important implications for

- the accumulation of wealth,
- rates of economic growth,
- interest rates, and
- generational equity.

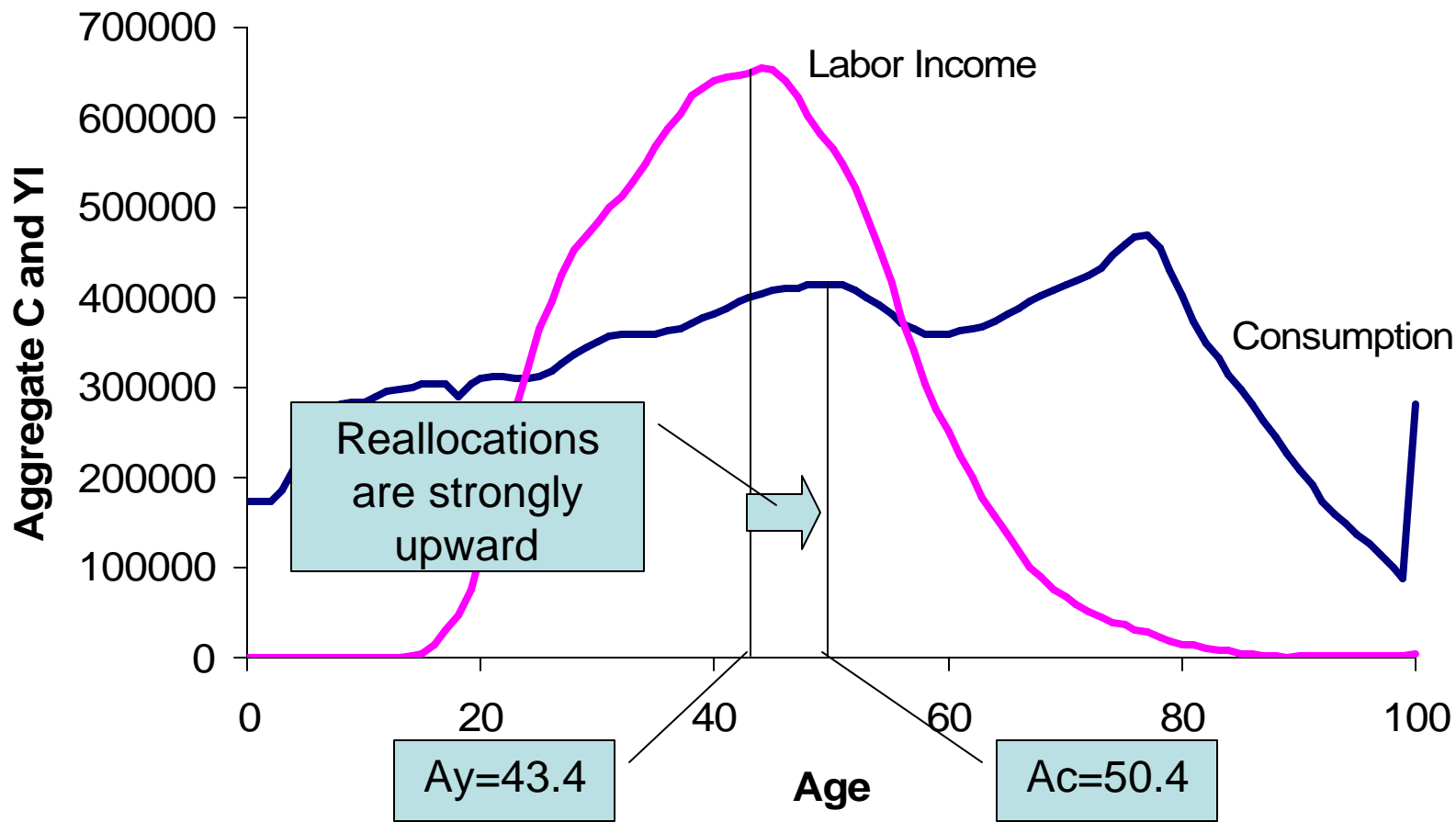
The Aggregate Lifecycle

- Incorporates the per capita economic lifecycle and the population age structure.
- In a young (low income) population, this leads to large reallocations of resources in a downward direction.
- In an old (high income) population, this leads to large reallocations of resources in an upward direction.

Aggregate Economic Lifecycle, Niger 1950 Age Structure



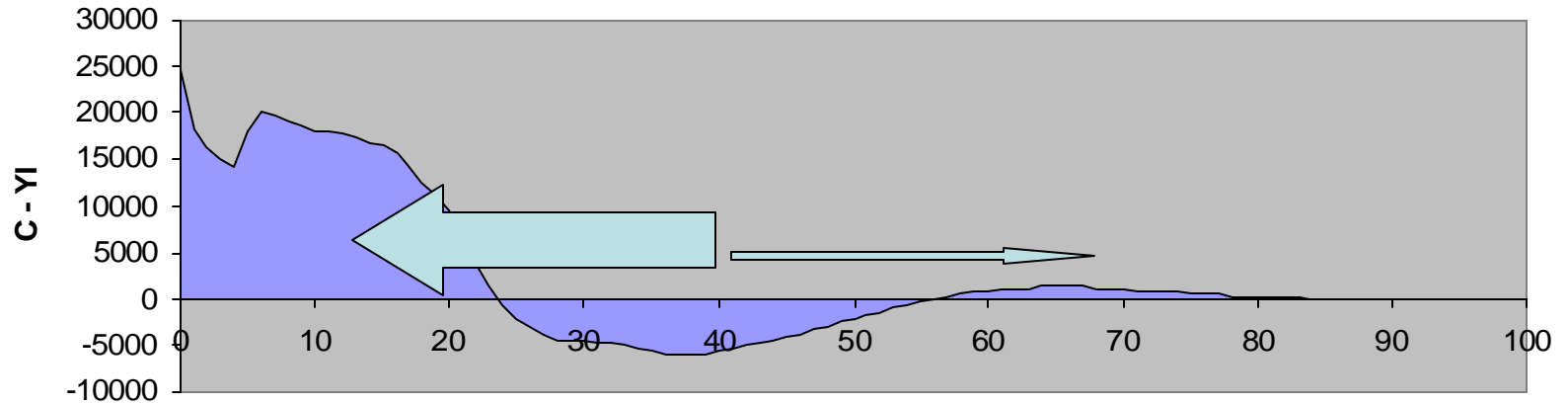
Aggregate Economic Lifecycle, Japan 2050 Age Structure



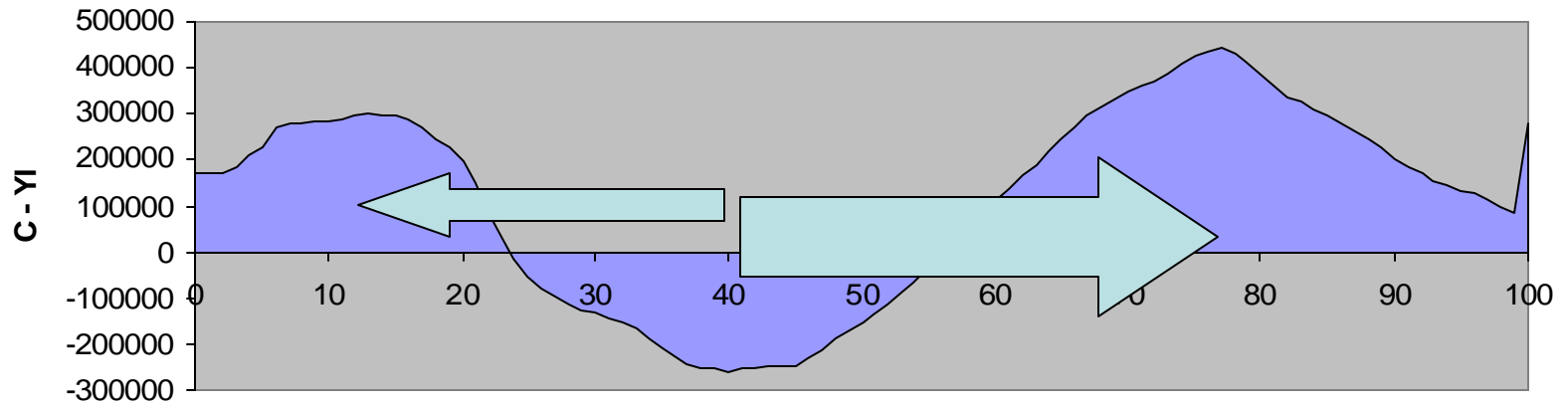
Downward and Upward Flows

- The net flows summarized by the mean ages of consumption and labor income combine two large countervailing flows:
 - Downward flow from working ages to child ages
 - Upward flow from working ages to old ages
- The relative importance of these two flows changes substantially over the demographic transition.

Lifecycle Deficit and Age Reallocations, Niger, 1950



Lifecycle Deficit and Age Reallocations, Japan, 2050



Implications for Wealth

Lee has shown that given golden rule steady state growth, the wealth $W(z)$ associated with any flow z across age groups is equal to:

$$W_z = Z [A_{\text{inflow}} - A_{\text{outflow}}]$$

A_{inflow} – mean age of the inflows (\$ weighted)

A_{outflow} – mean age of the outflows (\$ weighted)

Z – annual flow of the variable in question.

Lifecycle Child Wealth (W_k)

- Average age of inflow (perhaps 10) is well below the average age of the outflow (perhaps 40). Hence, child lifecycle wealth is negative and large in Niger 1950.
- This value is the debt that people who are currently alive “owe” to those who have not yet been born.
- The debt is overwhelmingly in the form of an unfunded obligation to make transfers to unborn children.

Lifecycle Pension Wealth (W_p)

- Average age of inflow (perhaps 80) is well above the average age of the outflow (perhaps 50). Hence, lifecycle pension wealth will be positive and large in Japan in 2050.
- This is the wealth on which the 2050 population will rely during its retirement years.
- It comes in two forms: transfer wealth and capital.

$$W_p = T_p + K.$$

- Transfer wealth is the present of value of net transfers, e.g., from Social Security. It is the flip side of the implicit debt imposed on future generations.
- Capital is growth enhancing.

Implications

- Depending on the features of the economic lifecycle, population aging will lead to an increase in lifecycle pension wealth.
- Depending on the features of the support system, this will lead to some combination of
 - an increase in capital (and National Income) and/or
 - an increase in transfer wealth, i.e., the implicit debt imposed on future generations.
- Based on golden rule growth will all its limitations.

The Simulation Model

- Small open economy
- Labor-augmenting technological growth with age-varying productivity that does not change over time.
- Consumption
 - Varies by age reflecting tastes, needs, etc., including altruism.
 - No bequests.

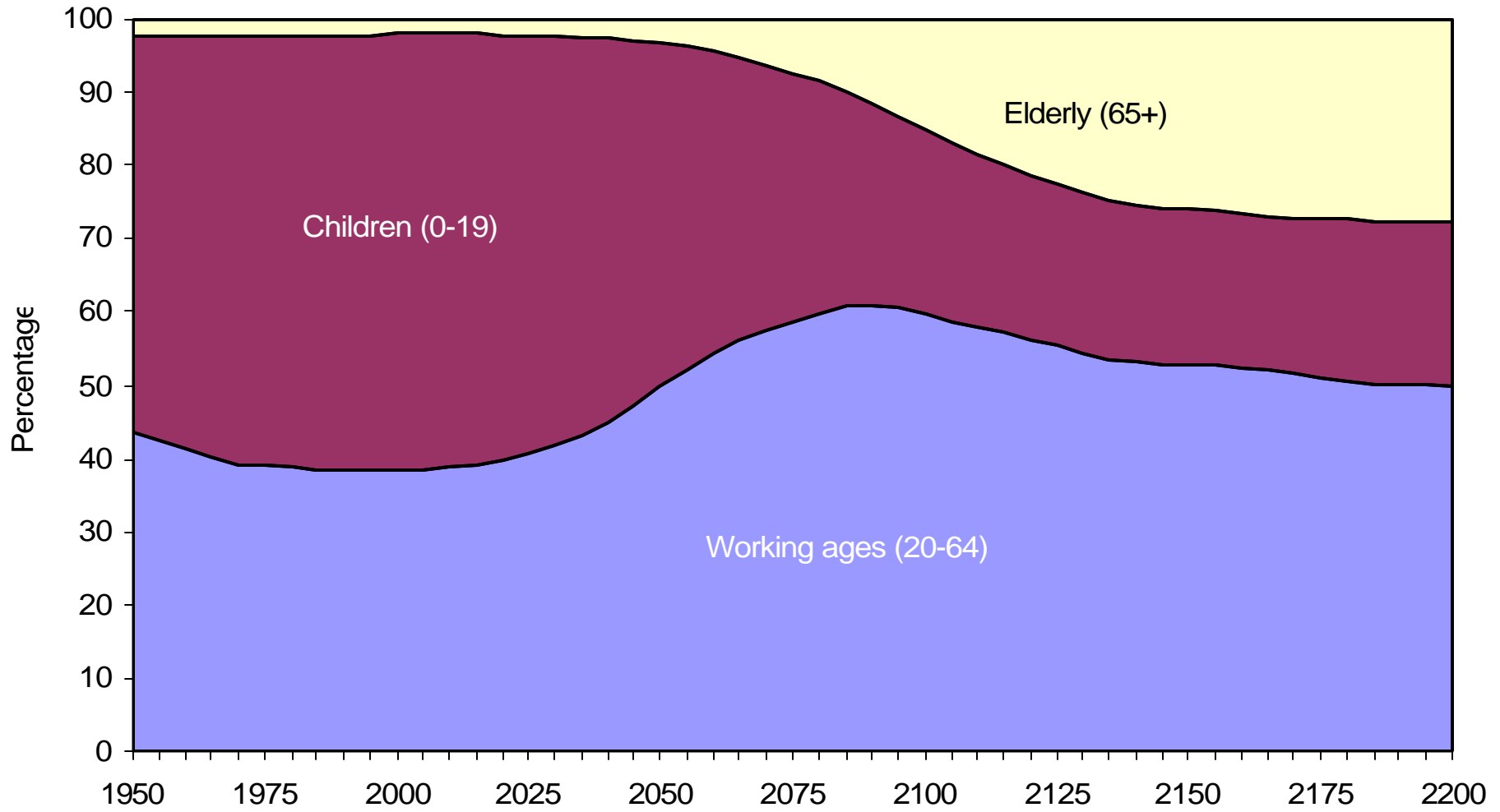
The Simulation Model (II)

- Reallocations to children consist of
 - Private transfers from parents
 - Public transfers from taxpayers (tax on labor income).
- Reallocations to old age consist of
 - Transfers
 - Asset-based reallocations (i.e. saving)
 - Assume that old-age transfer wealth is a constant fraction of lifecycle pension wealth.

Simulating a Demographic Transition

- Population of Niger 1950 – 2300
 - Highest TFR in the World in 2000 (7.9) declining to replacement in 2080
 - Life expectancy at birth: 36.2 in 1950-55; 44.3 in 2000-2005; 61.4 in 2045-50; 90 in 2300.
 - Lets us see the entire demographic transition

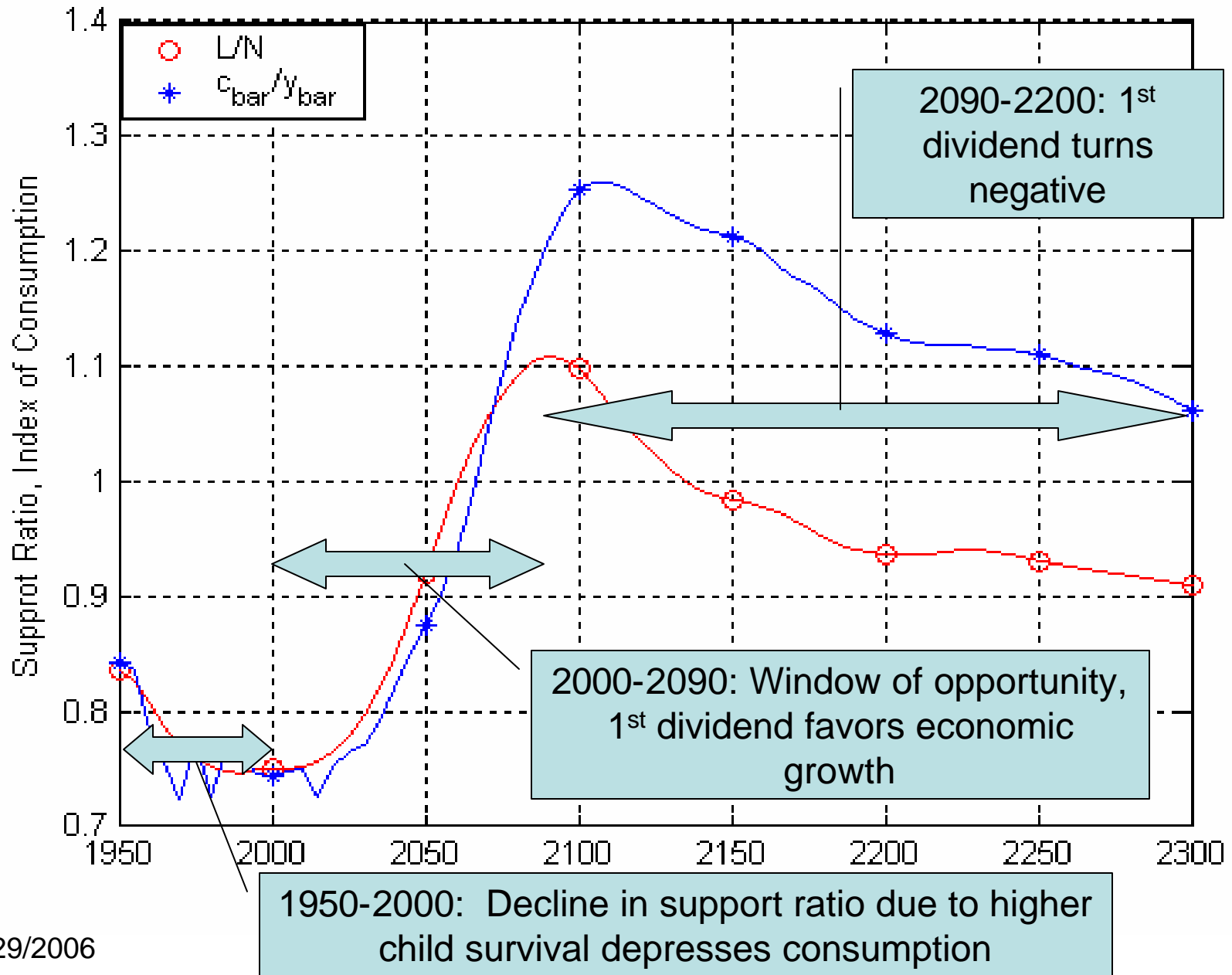
Figure 3. Age Distribution of Niger's Population, 1950-2200



Baseline Assumptions

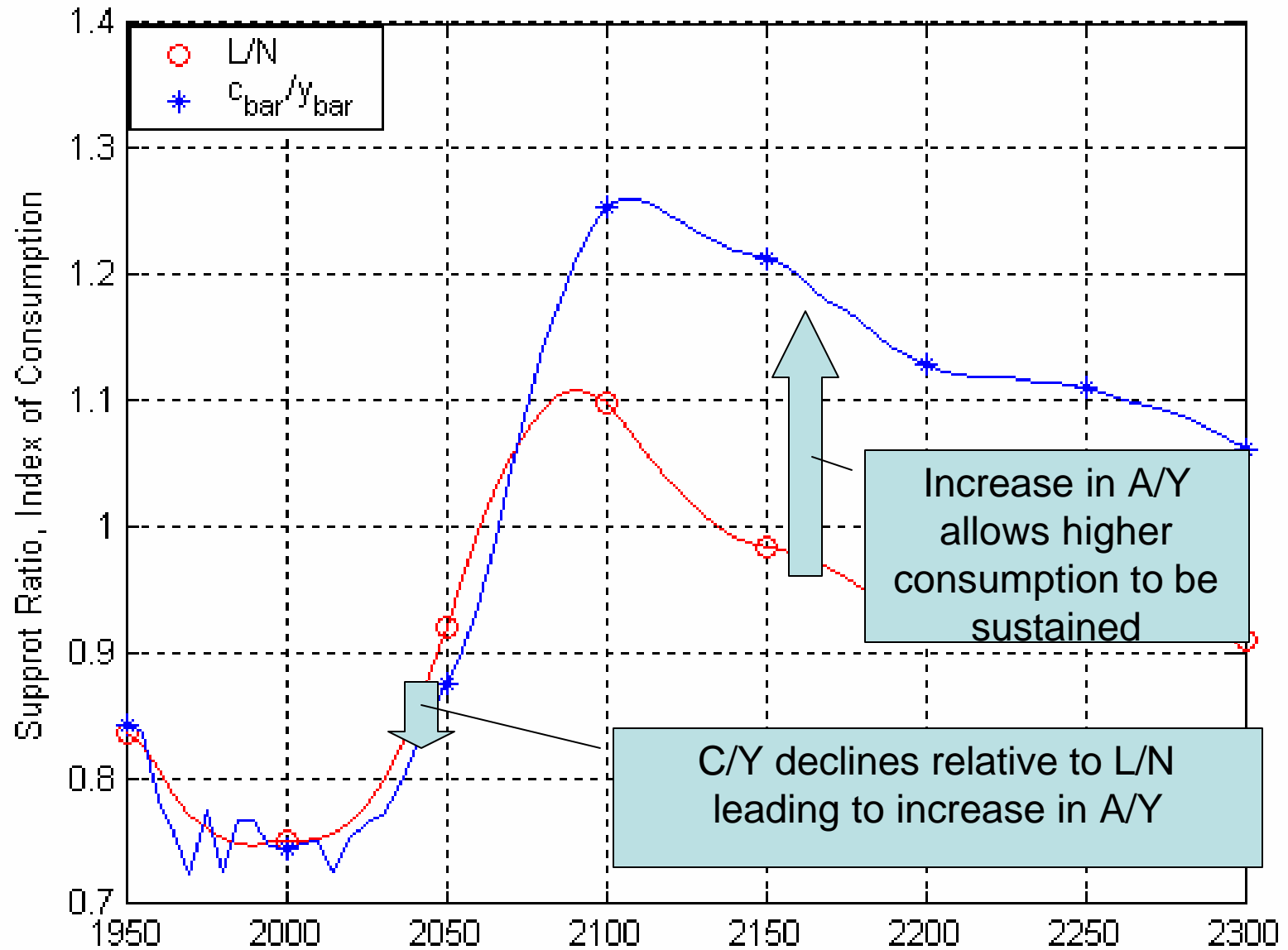
Productivity growth	1.5%
Depreciation rate	3.0%
Discount rate	3.0%
Interest rate	6.0% → 4.2%
Age profiles	Taiwan 1977
Familial share of transfers to children	0.67
Pension transfers as a share of pension wealth	0.35

Source: Mason and Lee 2006.

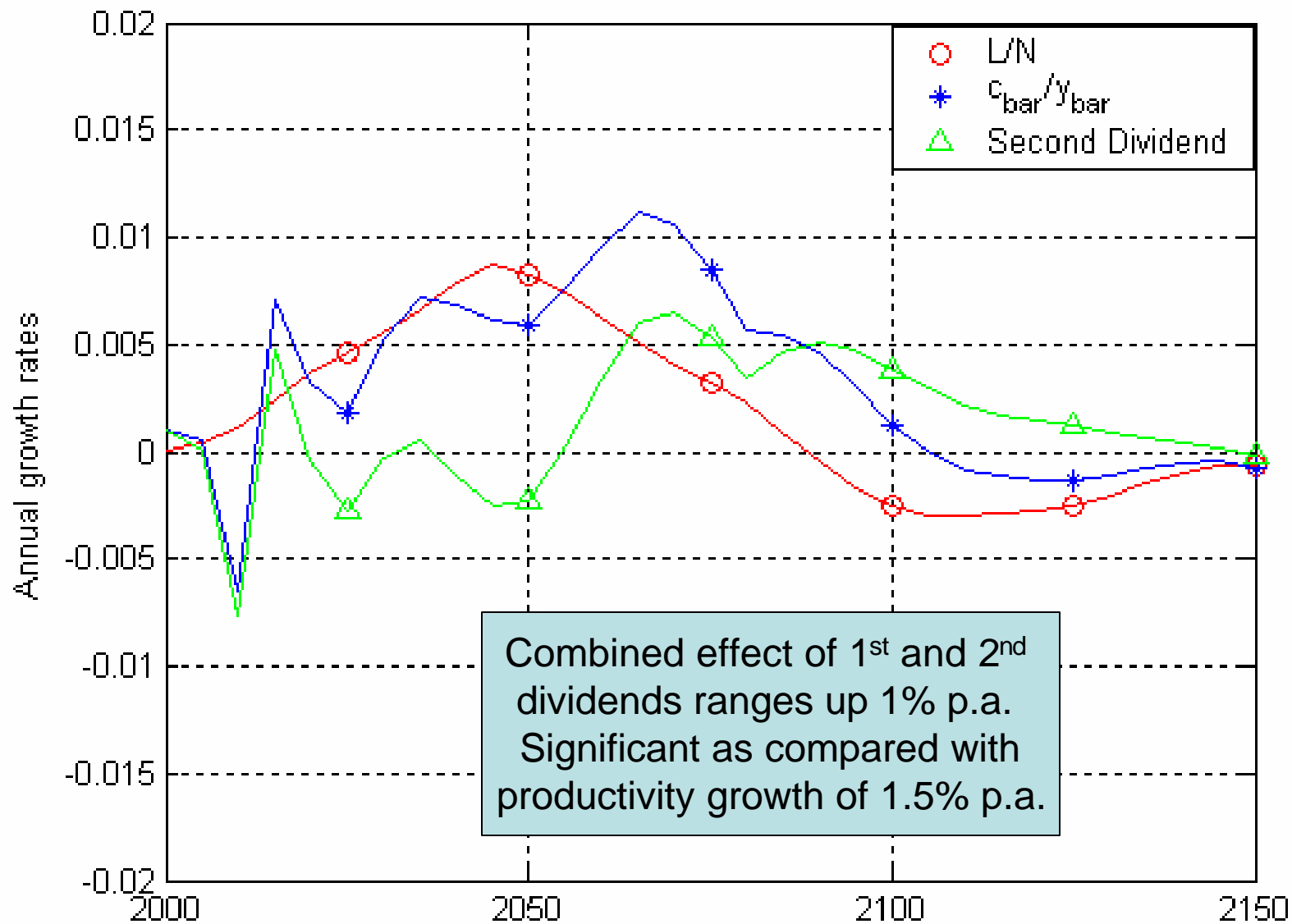


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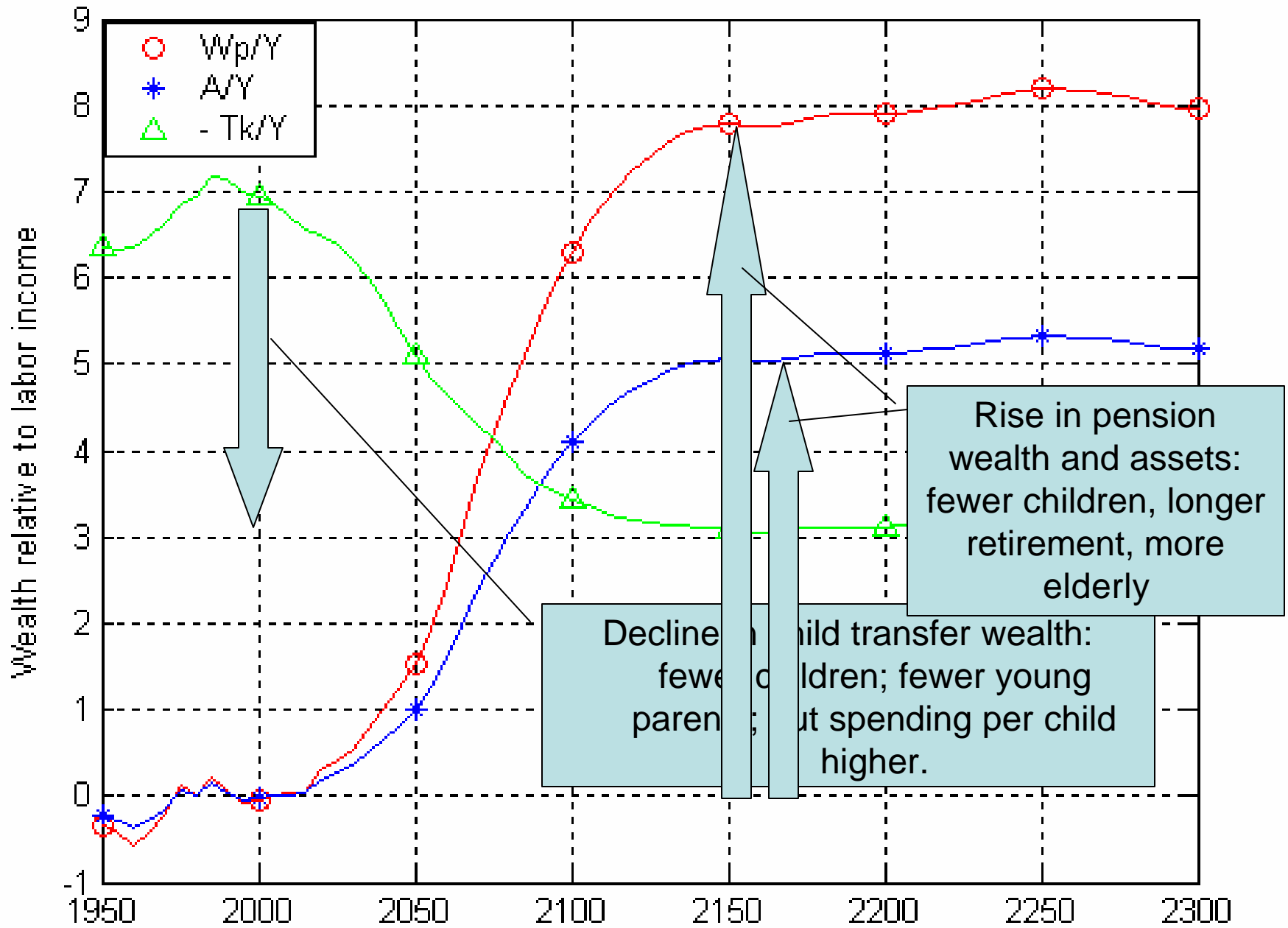
Source: Mason and Lee 2006.



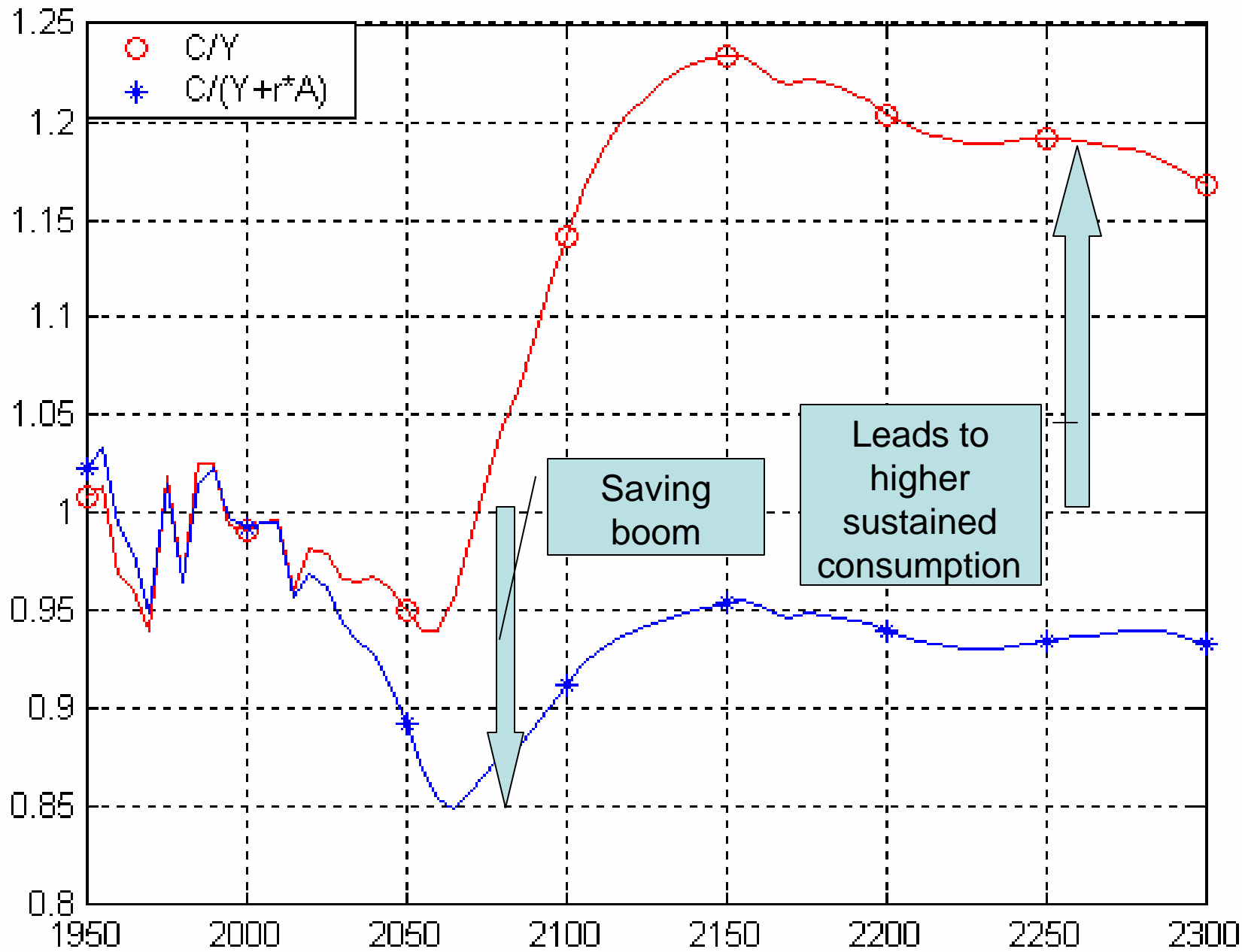
Source. Mason and Lee 2006.



Source. Mason and Lee 2006.



Source: Mason and Lee 2006.



The Demographic Dividends

- First Dividend
 - Leads to 50% increase in consumption per equivalent adult
 - Dividend period (window of opportunity) lasts for 70 years
 - First dividend is ultimately transitory – by 2200 support ratio is only 10% above its 1950 level

The Demographic Dividends

- The Second Dividend
 - First dividend is being capitalized:
consumption depressed by about 5% until
near the end of the first dividend period
 - Adds almost 20% to consumption at the peak
and thereafter
- Combined effect of the two dividends:
explains 25% of growth from 2030-2090.

Sensitivity Analysis

- US economic lifecycle leads to greater assets, higher consumption in the short-run, but lower consumption in the long-run
- Increase in pension transfer wealth has a very large effect, more than proportional, on wealth and adversely affects consumption.

Effects of Aging Depend on Two Features of the Economy

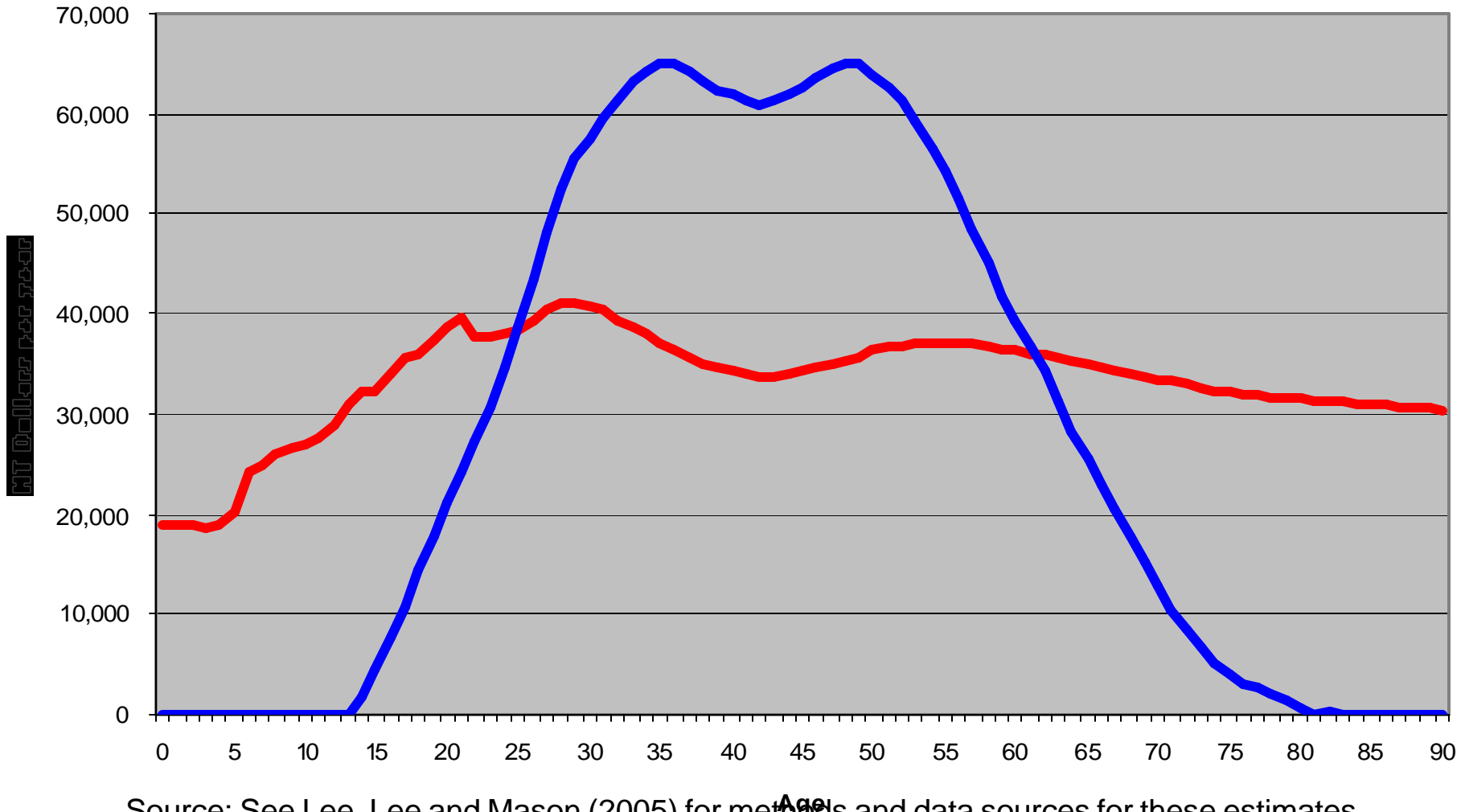
- Economic Lifecycle – extent to which economic resources are reallocated from prime adult ages to young and old ages.
- Reallocation System – the economic mechanisms used to shift resources across the lifecycle.

National Transfer Account Project

- Objective is to develop and apply a comprehensive system of accounts that measures the economic lifecycle and the economic support system.
- Conceptual foundation: Lee (1994) but also Samuelson (1958), Diamond (1965), and Willis (1988).
- Core project is collaboration between Hawaii and UC-Berkeley; funding from National Institute of Aging. Other countries funded from diverse sources.

How does the economic lifecycle
vary across societies and over
time?

**Figure 1B. Per Capita Labor Income and Consumption, Taiwan
(1977)**



Source: See Lee, Lee and Mason (2005) for methods and data sources for these estimates.
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Summary of Aggregate Economic Lifecycle, Taiwan, 1977-2003

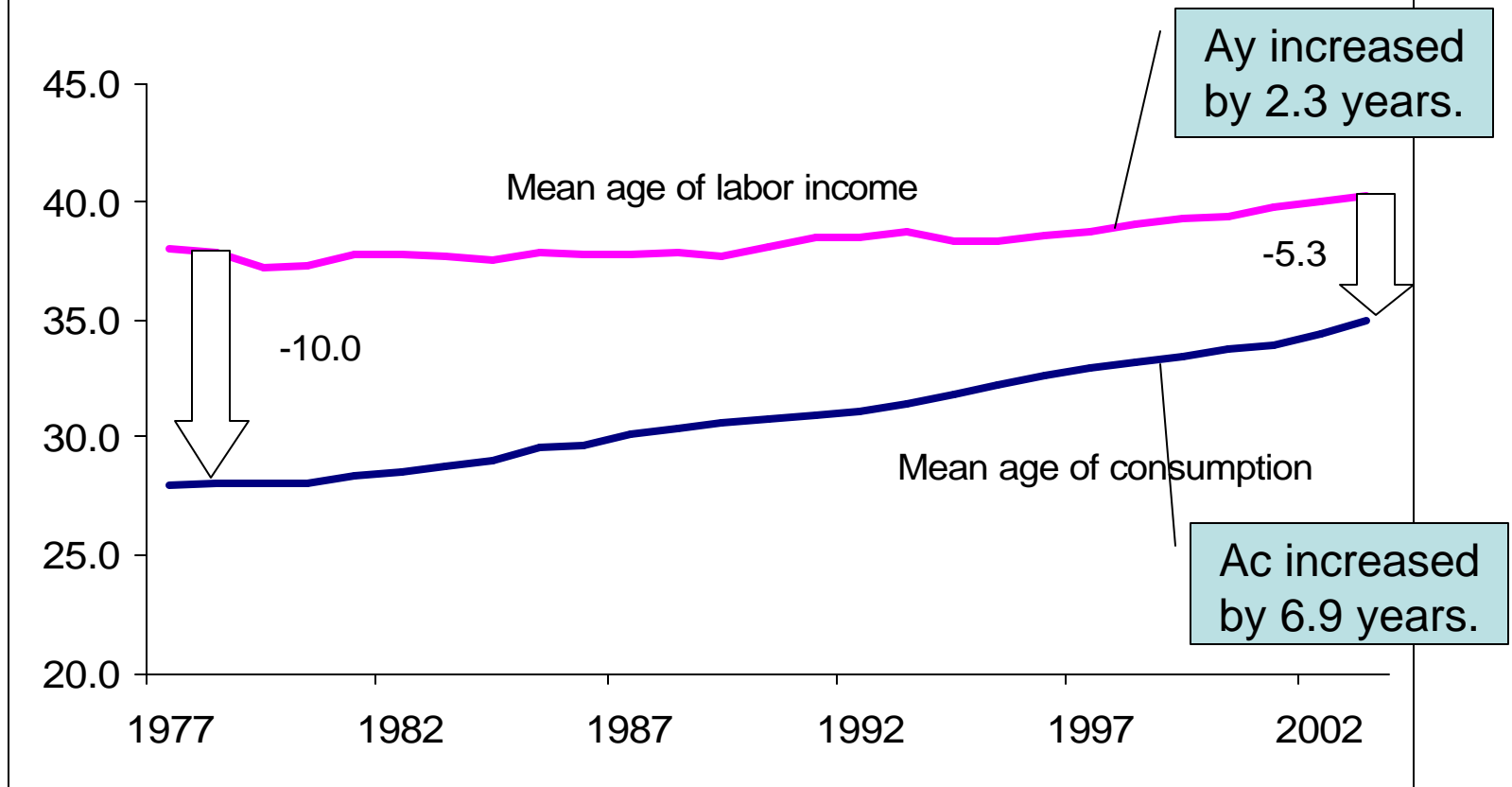
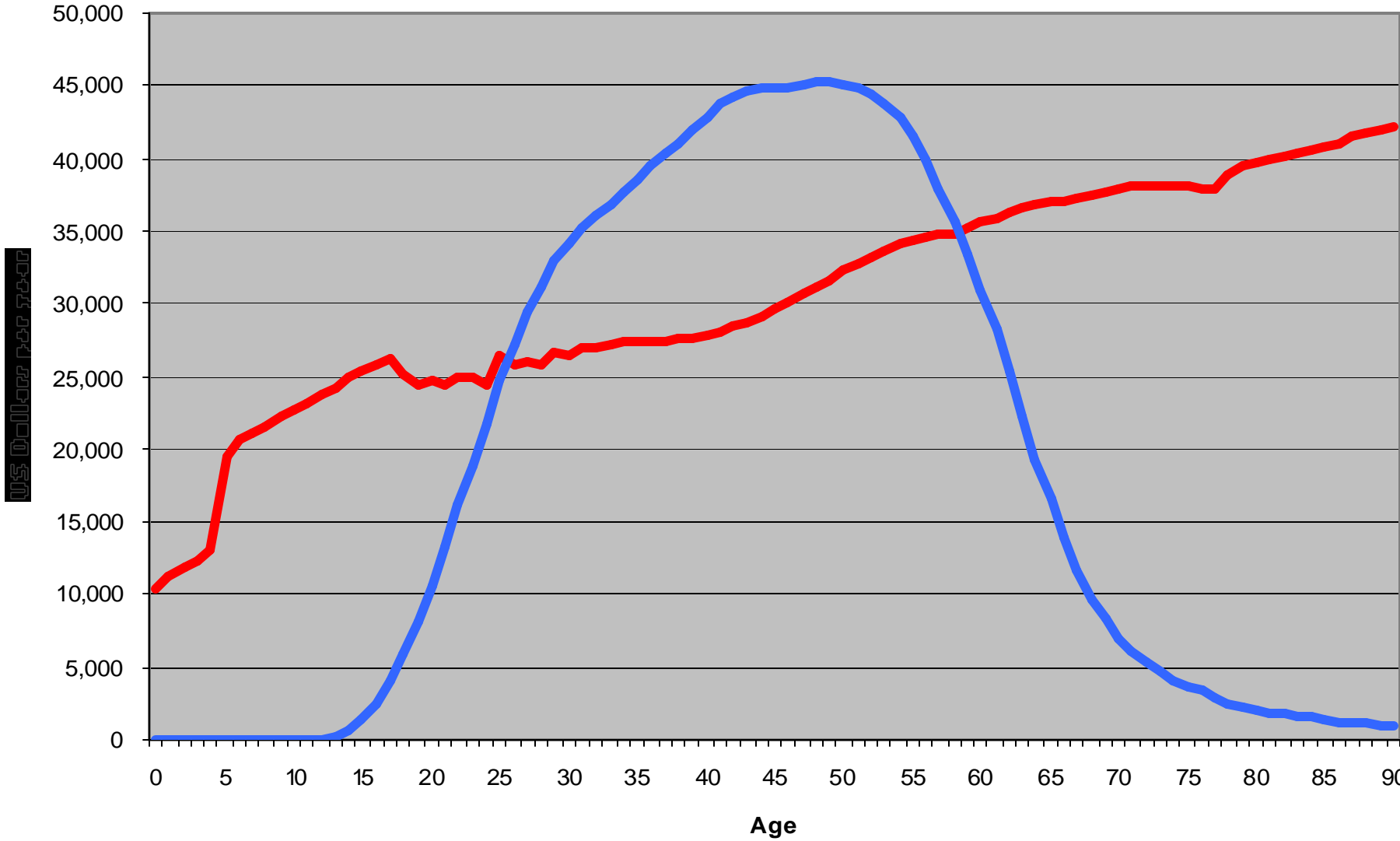


Figure 1A. Per Capita Labor Income and Consumption, US (2000)

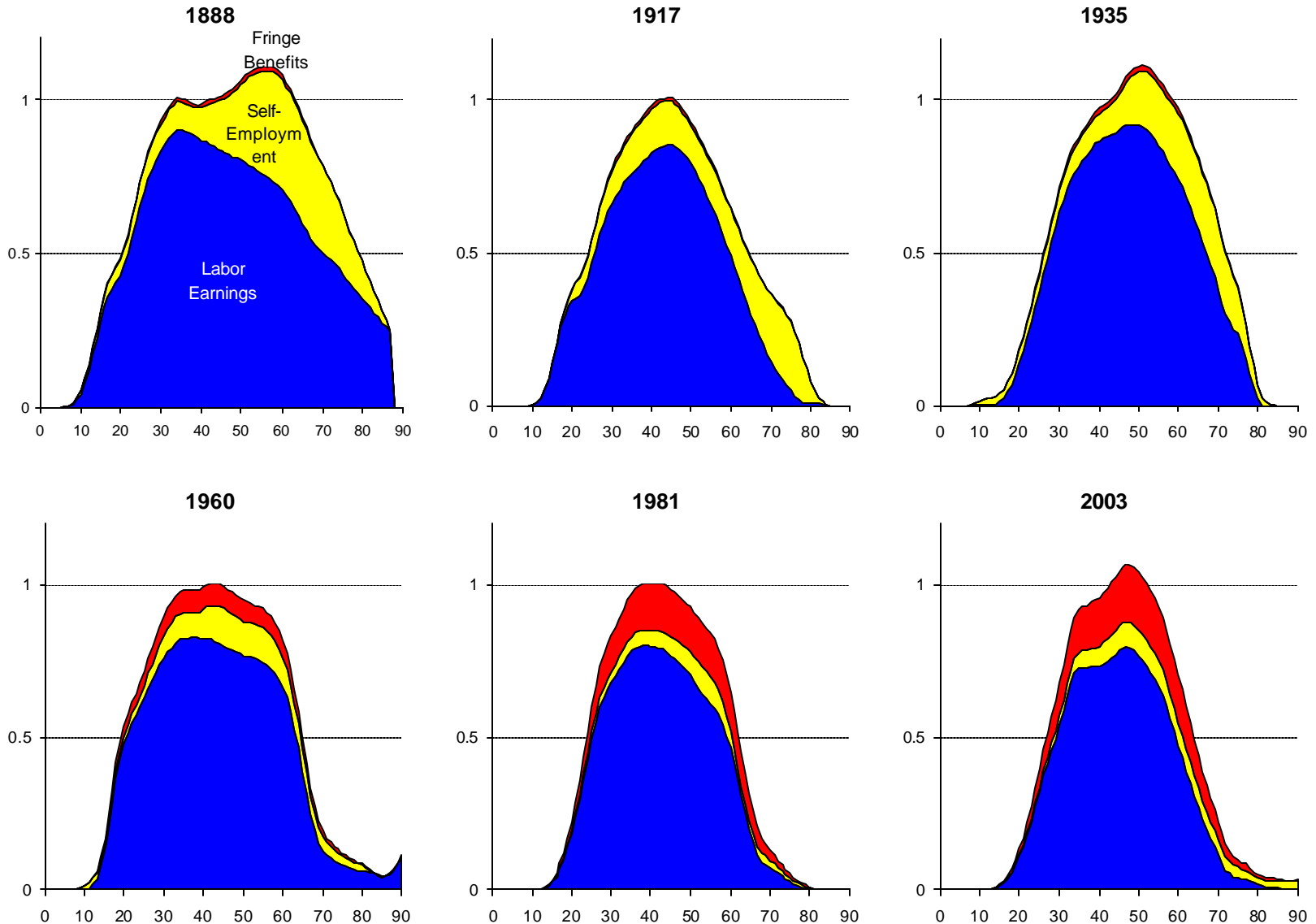


Source: See Lee, Lee and Mason (2005) for methods and data sources for these estimates.

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Components of US Labor Income

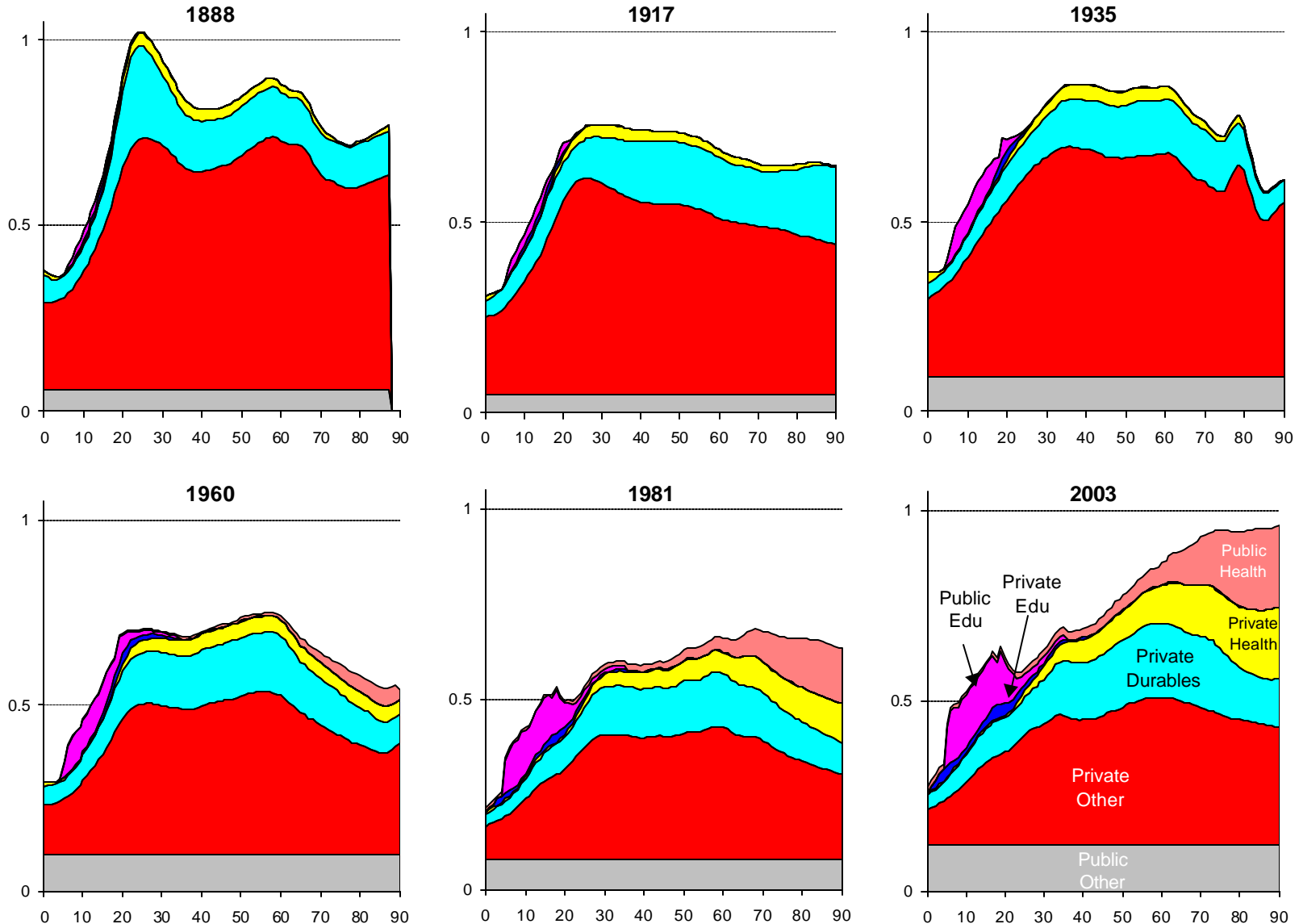


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Source: Gretchen Donehower (2006); Lee et al.

Components of US Consumption



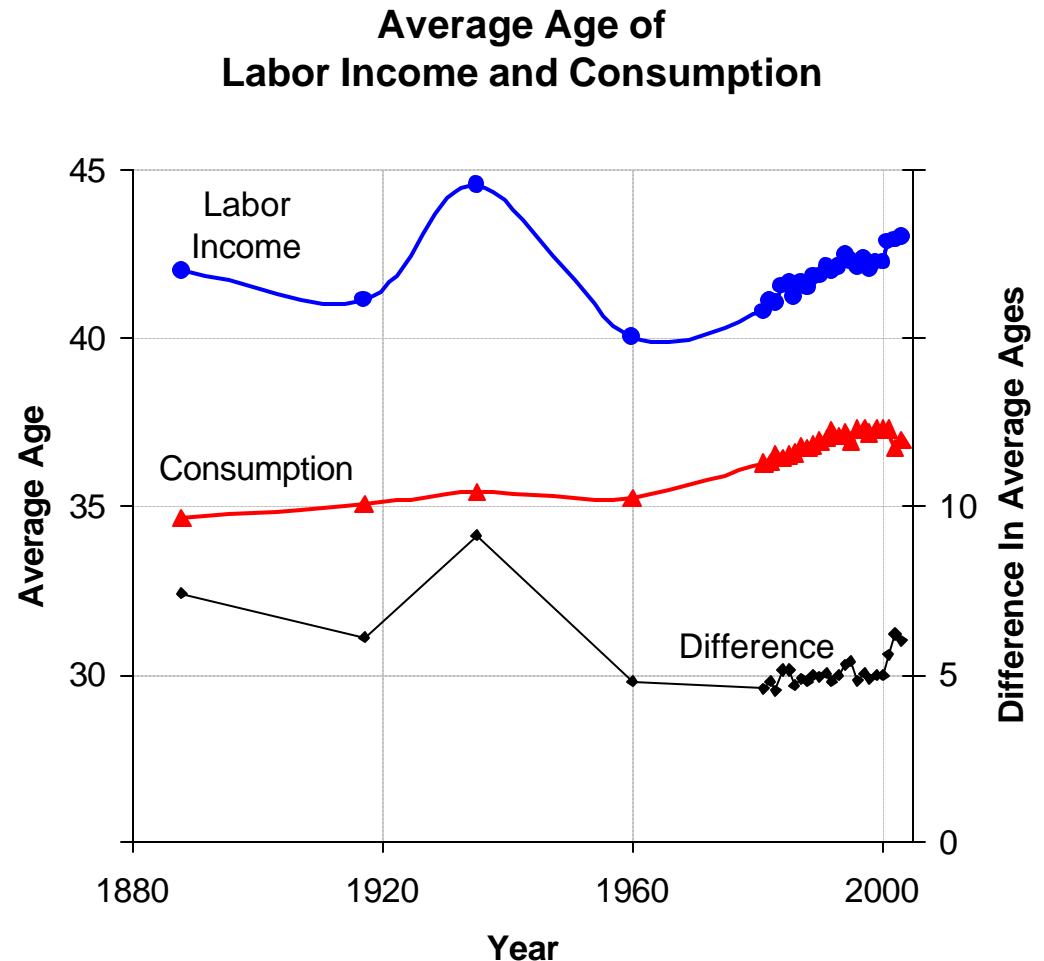
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Source: Gretchen Donehower (2006); Lee et al.

Summary Measures: Average Age of Profile

- Constant age distribution (US 1950 is used here)
- Recent strong increases in average ages of consuming AND producing.



How do the economic support systems vary across societies and over time?

Saving

Capitalistic transformation

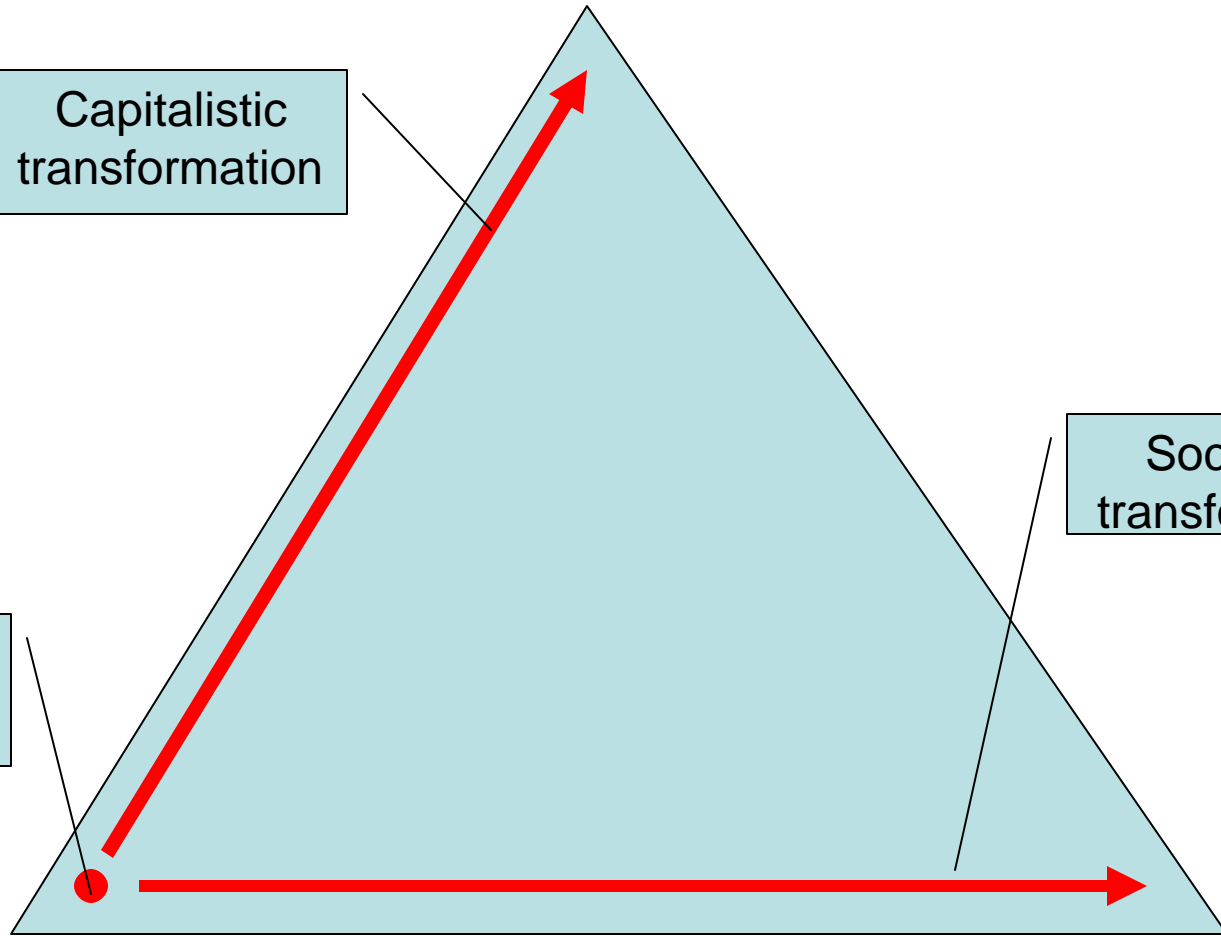
Socialistic transformation

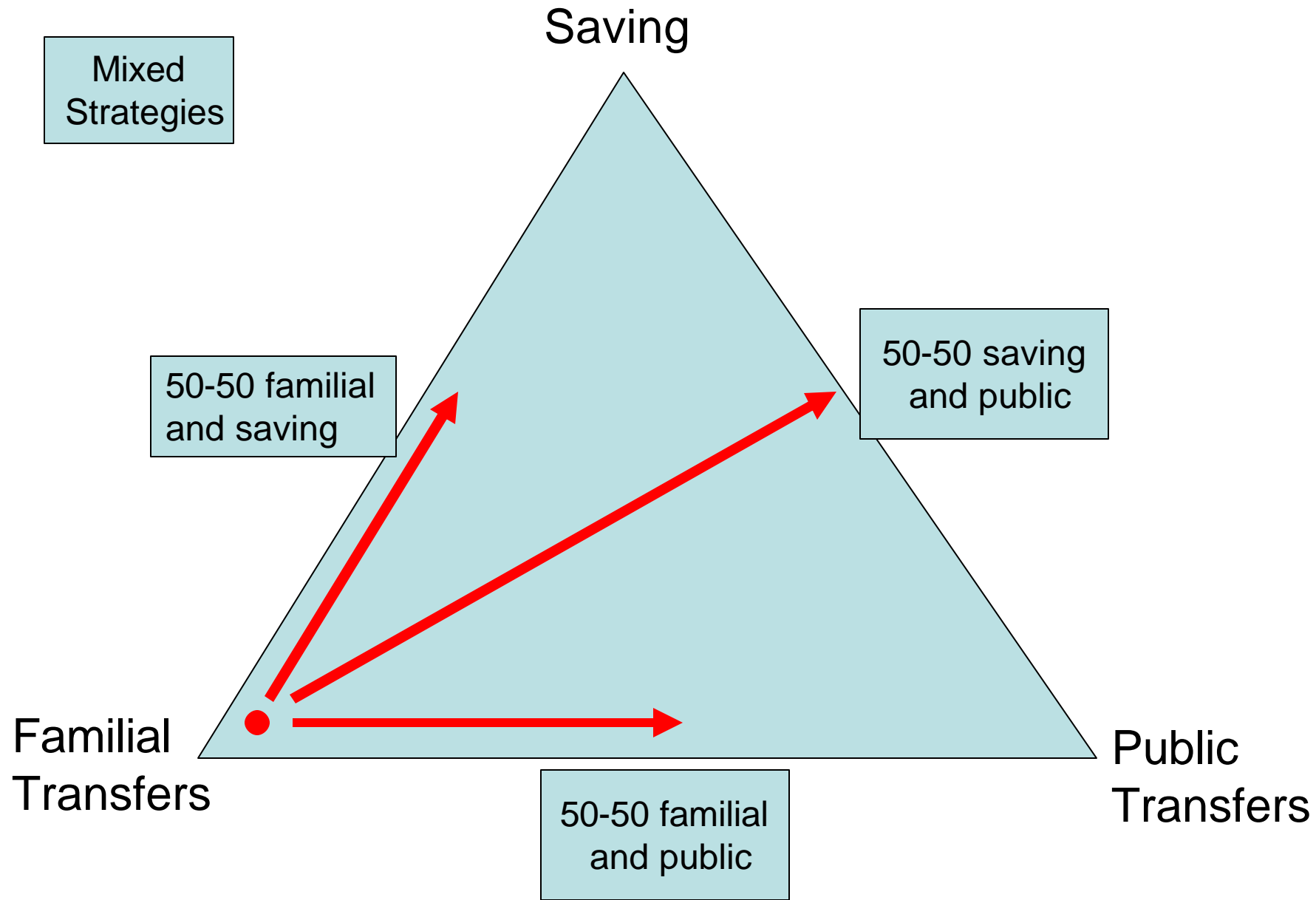
Traditional society

Familial Transfers

Public Transfers

Old-Age Reallocation Systems



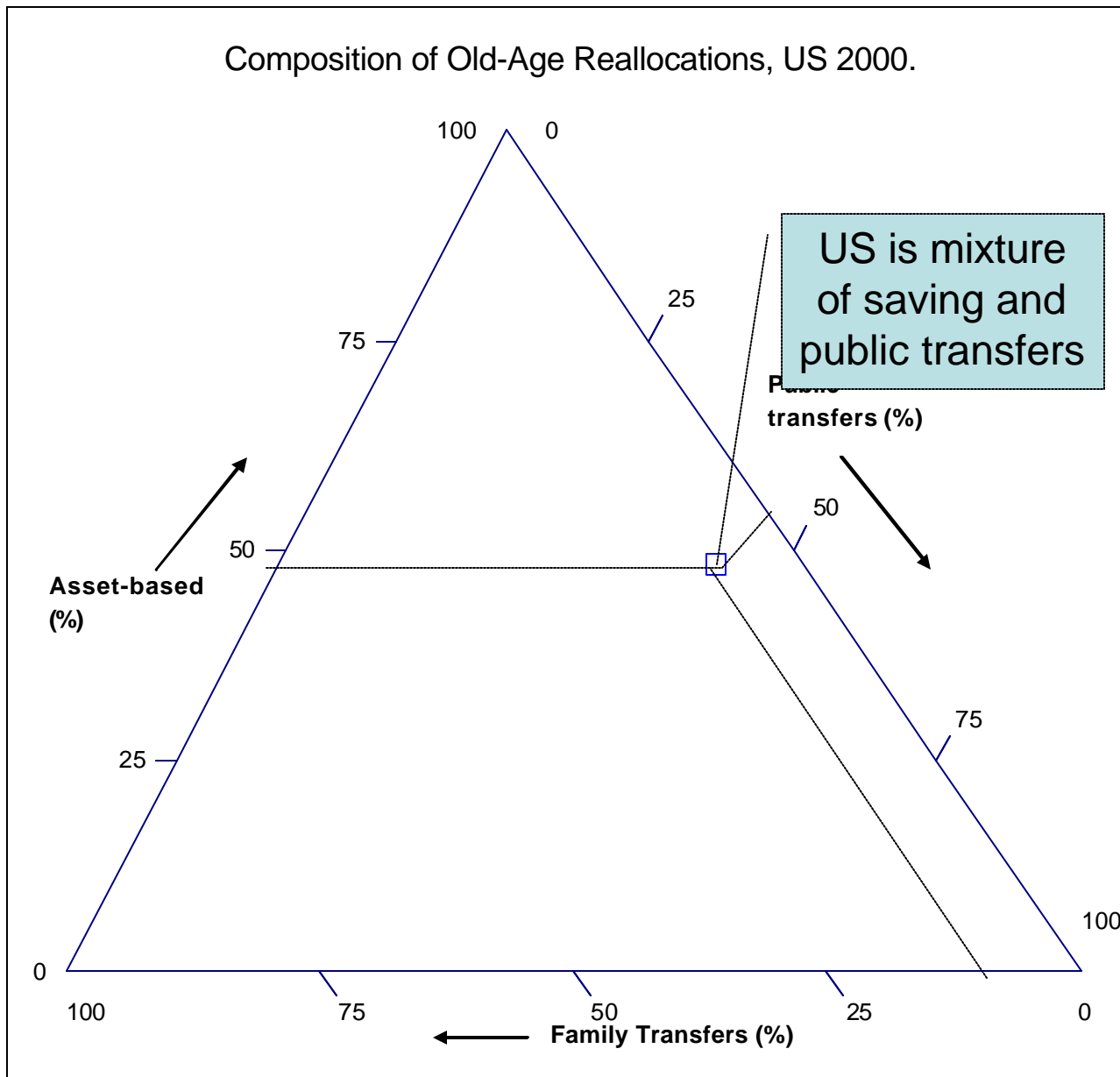


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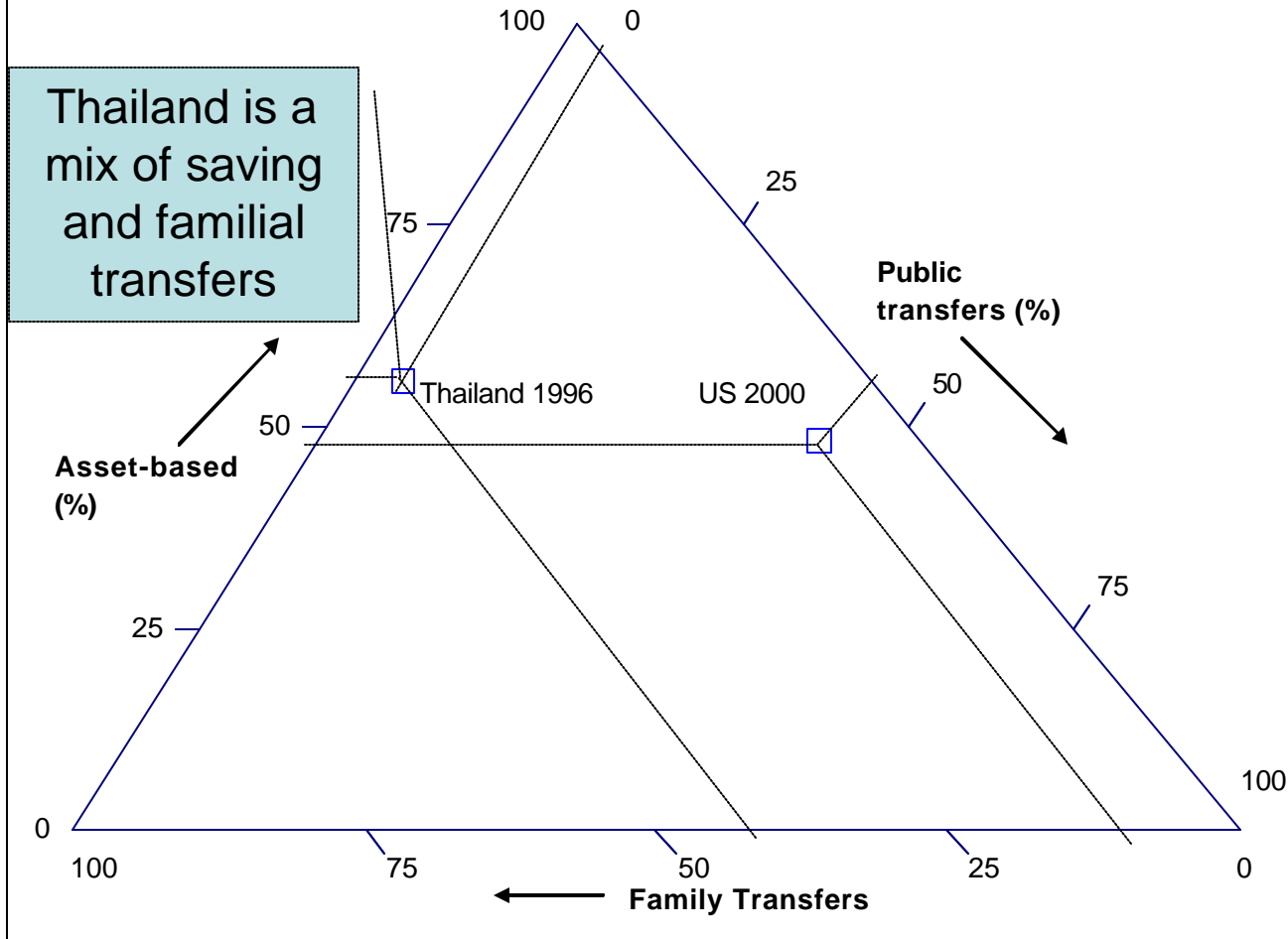
Old-Age Reallocation Systems

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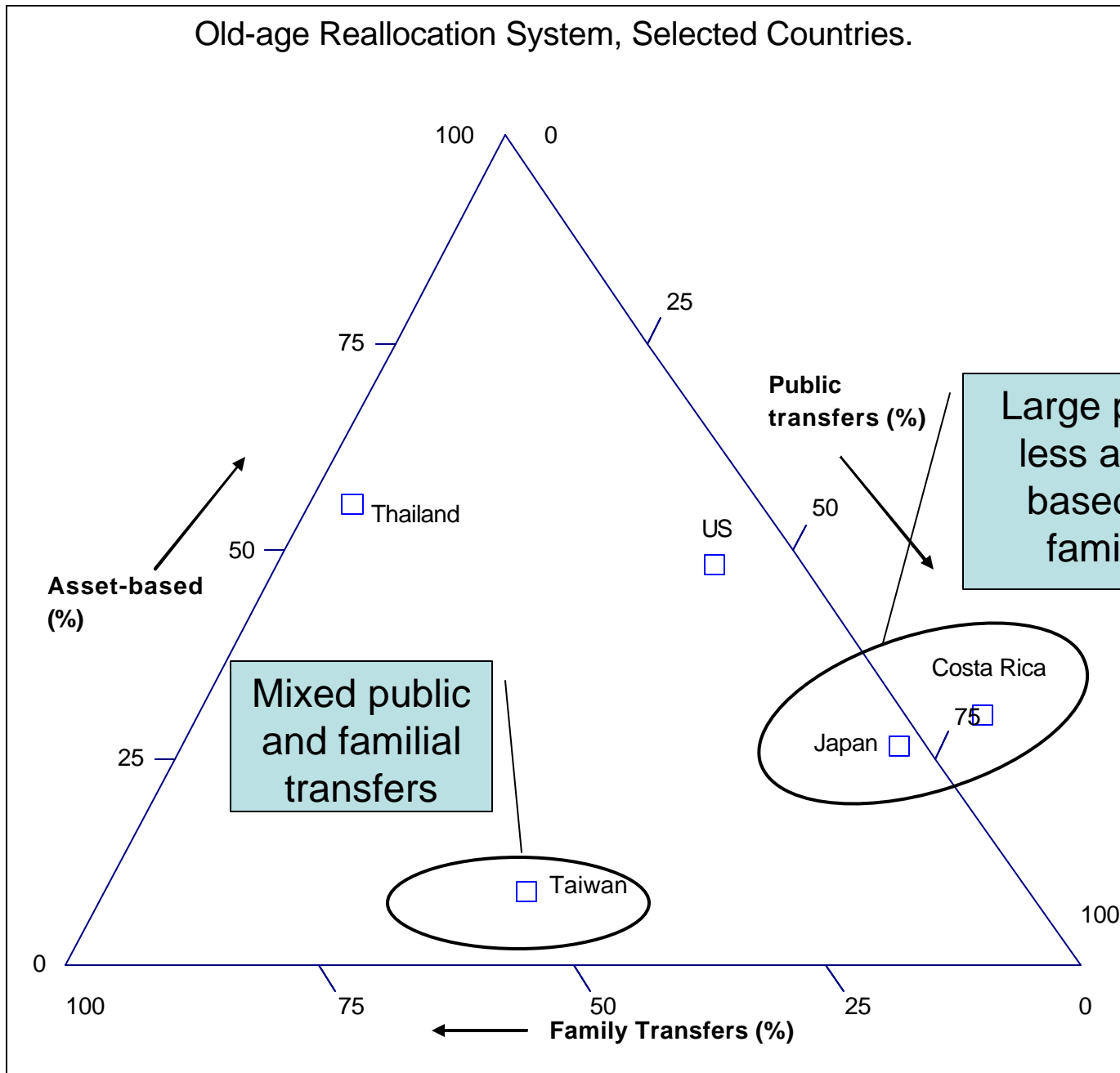
Composition of Old-Age Reallocations, US 2000.



Old-Age Reallocations, US & Thailand.



Old-age Reallocation System, Selected Countries.



Work is preliminary

- Important changes in economic lifecycle but we have not yet investigated why.
- Large variation in the old-age asset reallocation system. Understanding this better is clearly a priority.

US

Lee, Ronald([ronlee](#))
Mason, Andrew([amason](#))
Miller, Tim([tmiller](#))
Ebenstein, Avi([ebenstei](#))
Wongkaren, Turro([turro](#))
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Comelatto, Pablo([pabloc](#))
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Sambt, Joze([joze](#))

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NIA, R01-AG025247