Labor Income over the Life-Cycle: Evidence from Twenty-Three Countries

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Outline of Talk

- Objectives, Importance, Definition
- Theoretical Background and Empirical Issues
- Estimation Results
  - Cross-section
  - Over time
- Sources of Differences and Change
  - Components
  - Decomposition
  - Relationship with economic development or demographic transition

Objectives, Importance, and Definition

Objectives

- Objectives
  - How do labor income profiles differ across countries?
  - How do labor income profiles evolve over time?
  - What are the sources of the differences and change?
  - Policy implication

Importance

- Unique approach
  - We estimate the profile using the entire population.

- Different from the conventional measure of labor income by age.
  - Conventional measures
    - Estimated for the employed or for full-time employees.
    - Focuses on labor force participation or retirement decision
    - May have limited implication (e.g. if elderly productivity is low, then delaying retirement does not solve aging problem)

- Significance of our approach
  - It offers the comprehensive available measure of the amount produced over the life-cycle
  - Consistent with NIPA

Definition of Labor Income

- Labor income includes
  - The compensation of employees
    . wages and salaries
    . employee benefits + deferred payments
  - Labor's estimated share of mixed income (self-employment income)

- Does not include in-home activities which does not produce market goods or services (e.g. childrearing)

Theoretical Background and Empirical Issues

Theoretical Background

-- “Mechanical” decomposition

$$\left(\frac{Y}{N}\right)_a = \left(\frac{L}{N}\right)_a * \left(\frac{Y}{L}\right)_a \text{ or}$$

$$y_a = l_a * \bar{y}_a$$

Per capita labor income profile
= Activity rates by age x
Average productivity by age
(weighted by working hours by age)

Theoretical Background (cont'd)

- Activity rates by age
  - Children is delaying entry into the labor force
    - Quality-quantity trade-off (Becker and Lewis 1973)
    - Compulsory education policies (Lancaster and Ray 2004, Maliki 2005)
    - Micro and macro evidences on the trade-off between schooling and child labor (Basu 1999)
  - Older men are withdrawing from the labor force at a younger age.
    - Pay-as-you go retirement pension (Gruber and Wise 1999)
    - Micro and macro evidences (Anderson et al. 1999; Borsch-Supan 2000, Clark et al 1999)
  - Women are increasingly participate in the labor market
    - Women's value of time at home declines, and hence reservation wage falls.

Theoretical Background (cont'd)

- Productivity profile of working population
  - Investment on human capital decreases by age (Mincer 1962; Becker 1962)
  - Depreciation of physical and mental ability (Skirbekk 2003)
  - Technological progress (Autor et al. 2003)

- The two factors are related
  - Declining productivity due to depreciation leads a person to retire (Quinn et al. 1990; Dwyer and Mitchell 1999)

- Real world has much more factors
  - Choice of working hours are possible (Hurd 1993)
  - Legal age of work
  - Minimum wage
  - Seniority-based wage system or other wage rigidity

Empirical Issues

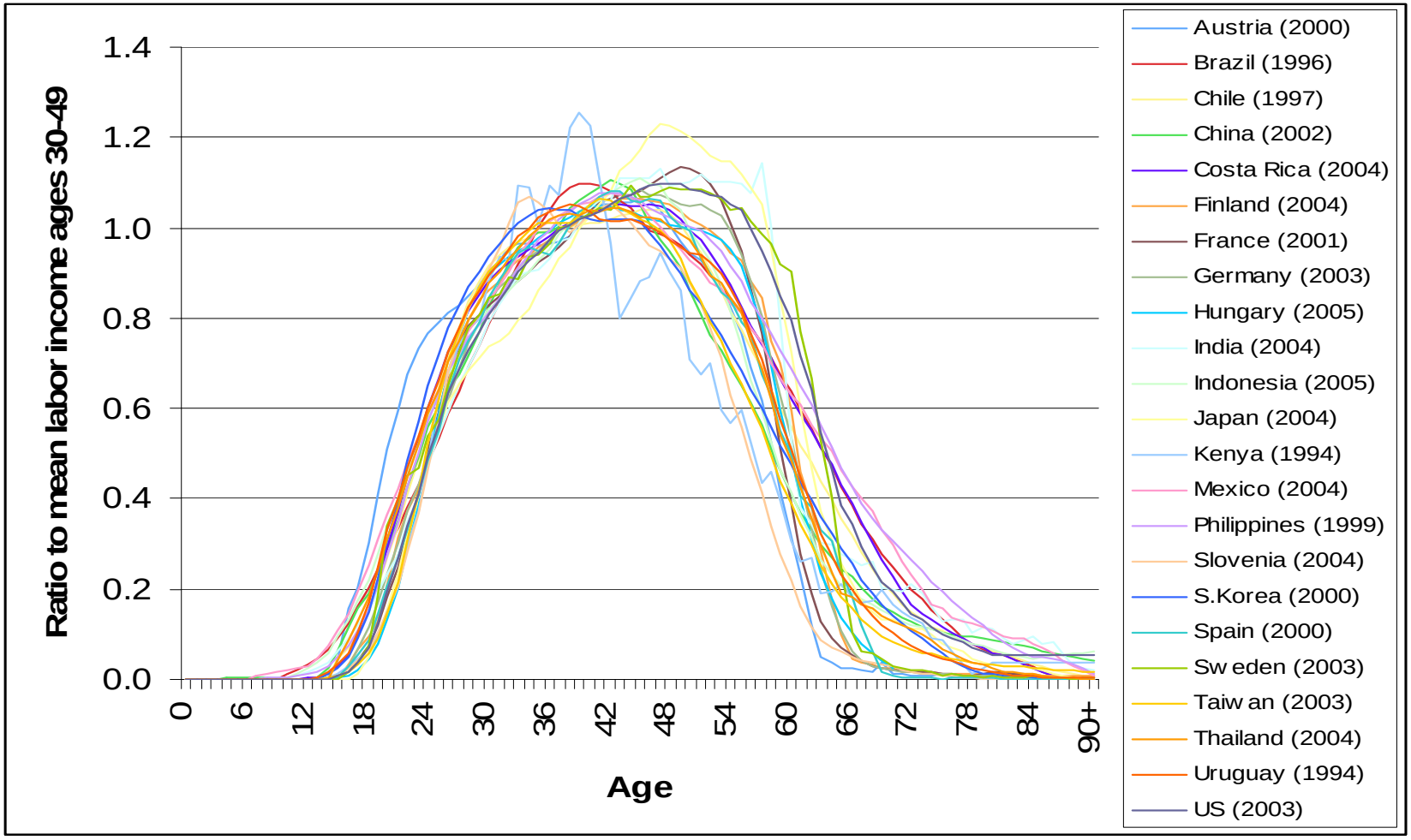
- Issues in estimating self-employment income
  - Characteristics of labor markets in low-income countries (Rosenzweig 1988; Deaton 1997)
  - Issues in estimating unpaid family income
    - Estimate using the age profile of earnings of *employees* as a share to allocate household self-employed income to self-employed workers including unpaid family workers.
- Issues in aggregate control (return to labor)
  - Gollin (2002)'s calculation ranging from 0.654 to 0.686
  - Conducted some sensitivity analysis

Results

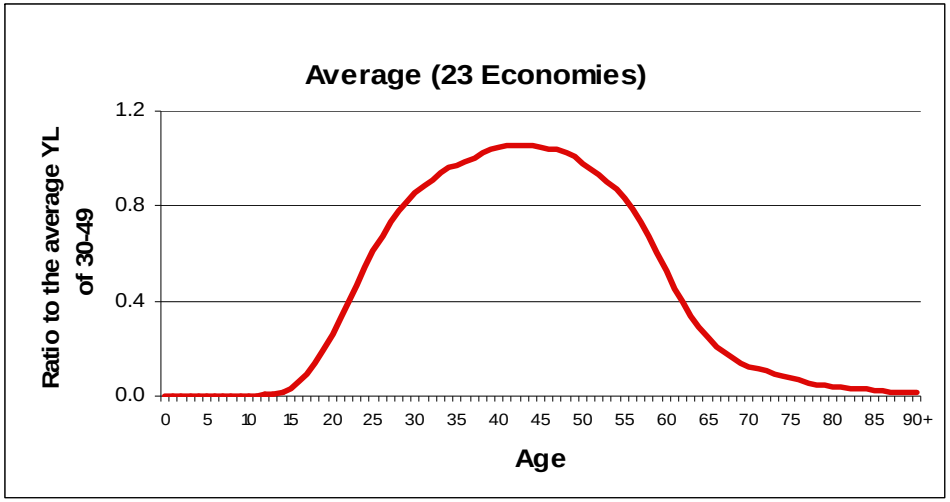
Notes

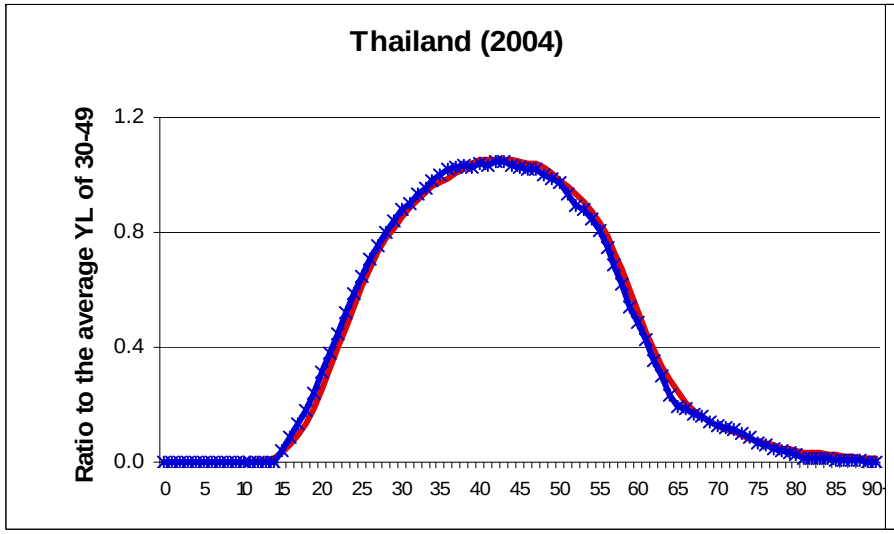
- Sources of estimation are suppressed.
- A lot of results are still preliminary.
- Per capita earnings are divided by average per capita earnings of people ages 30-49 for comparison (normalized)
- Compared with the “average” profiles of 23 economies.

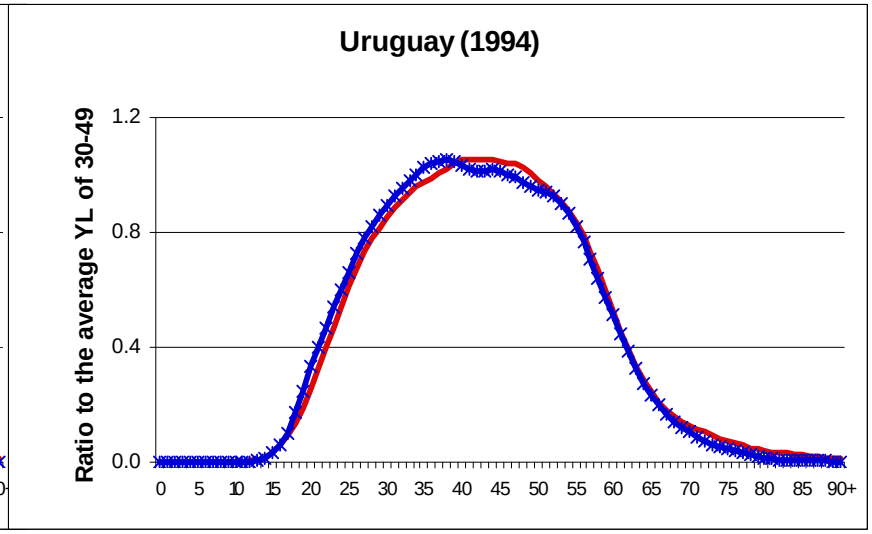
Per Capita Labor Income Profile (23 Countries)



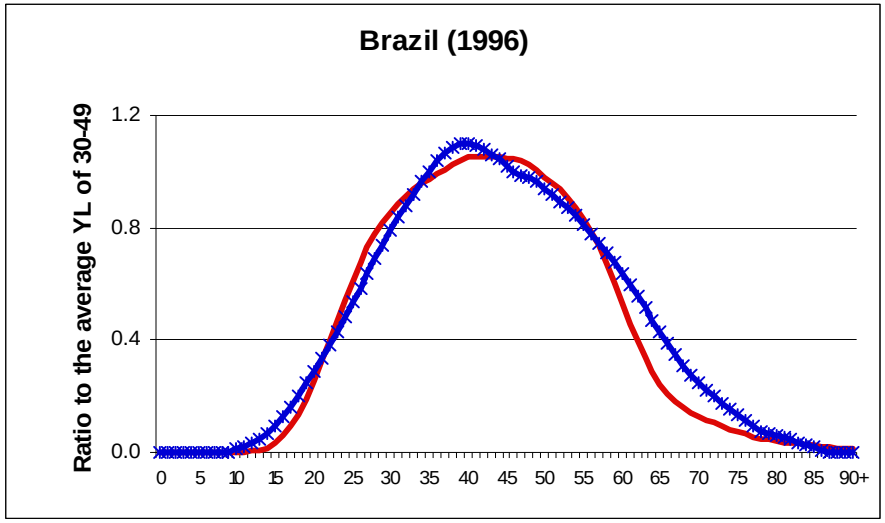
A. Closest to Average Profile: Thailand and Uruguay

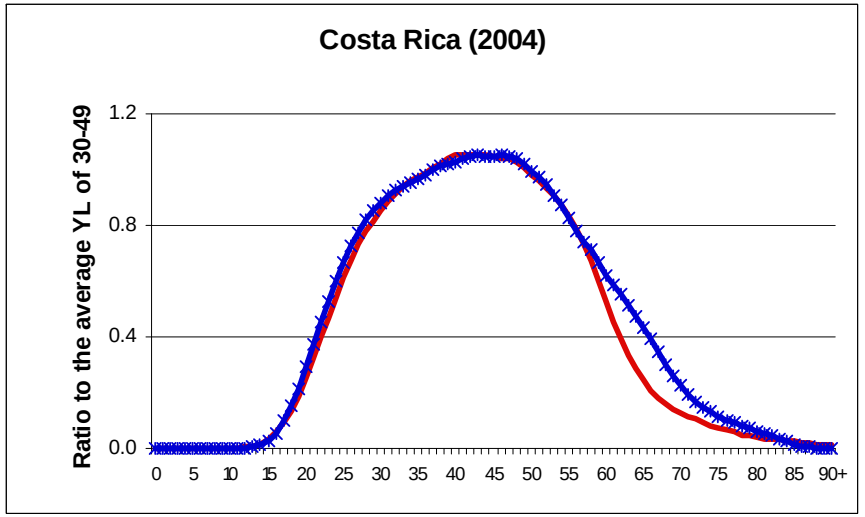


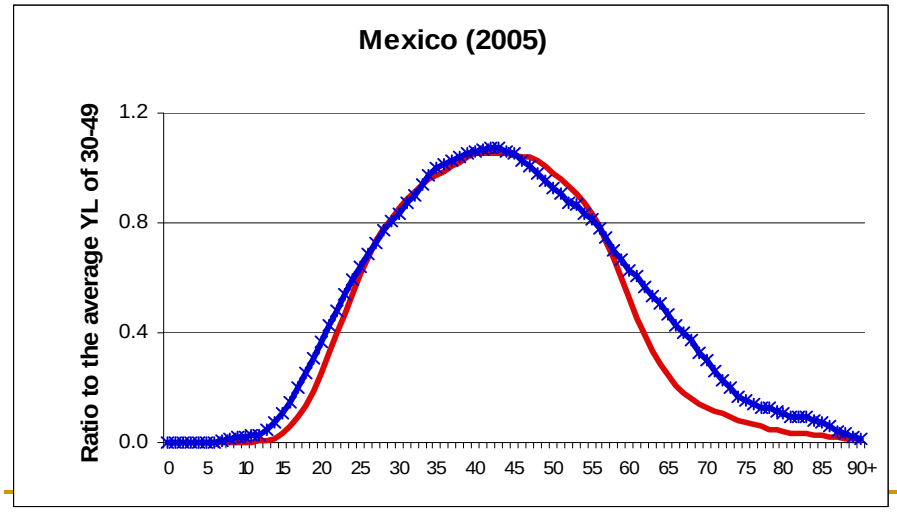


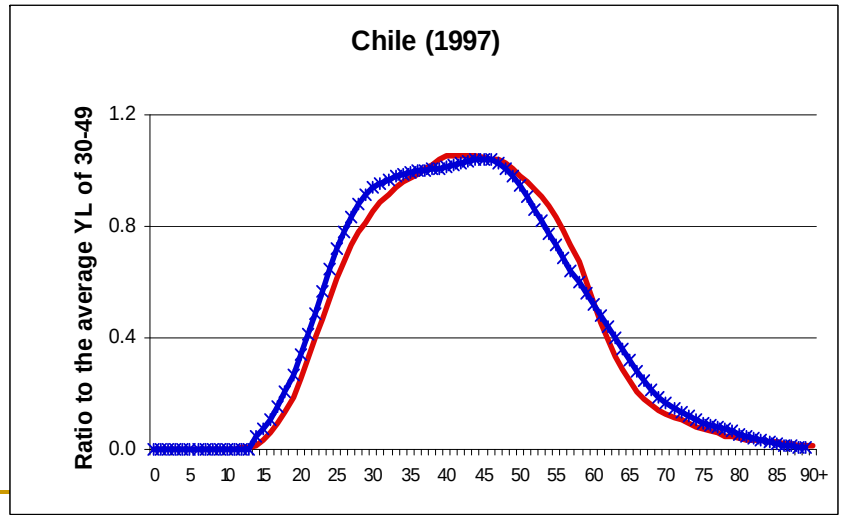


B-1. Large Elderly and Children's Share: Brazil, Costa Rica, Mexico, and Chile

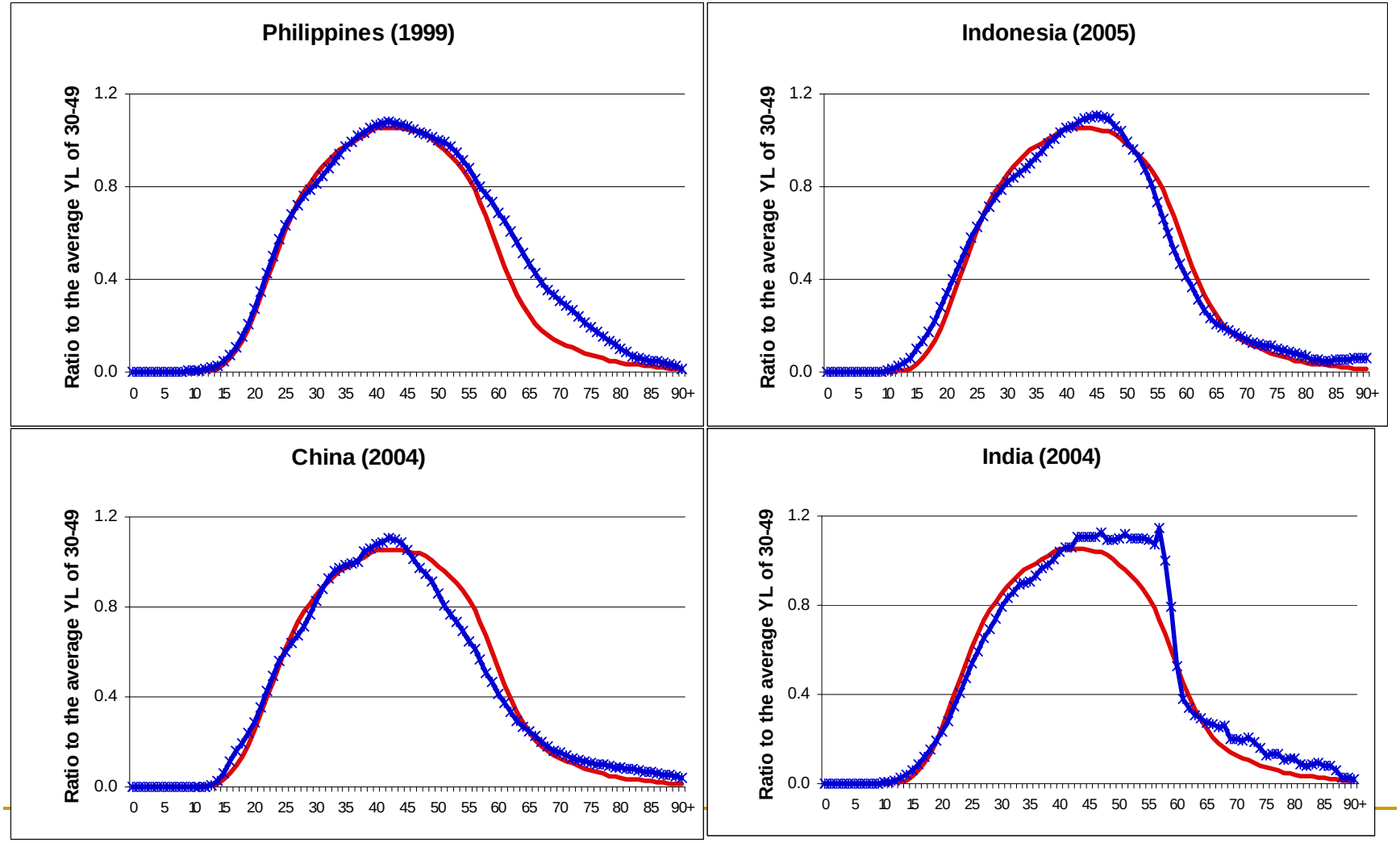




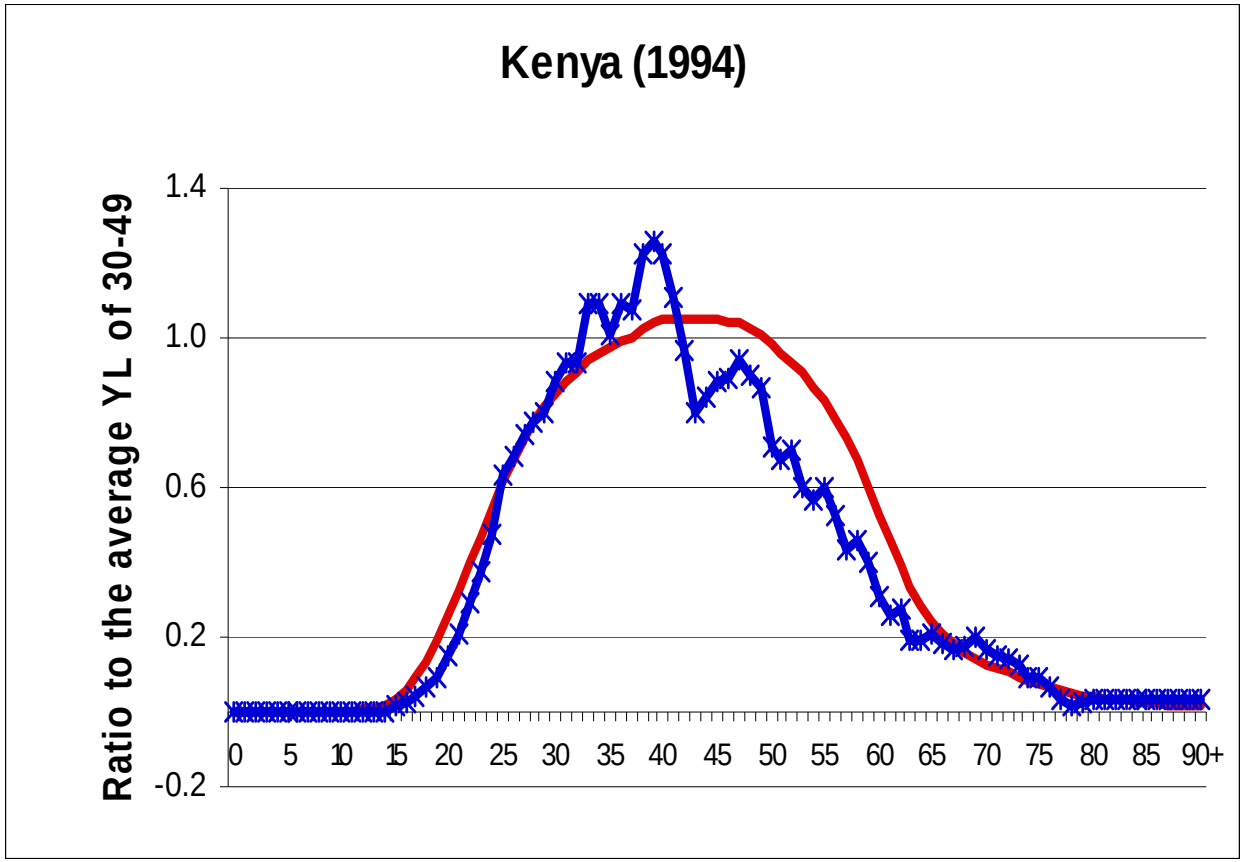




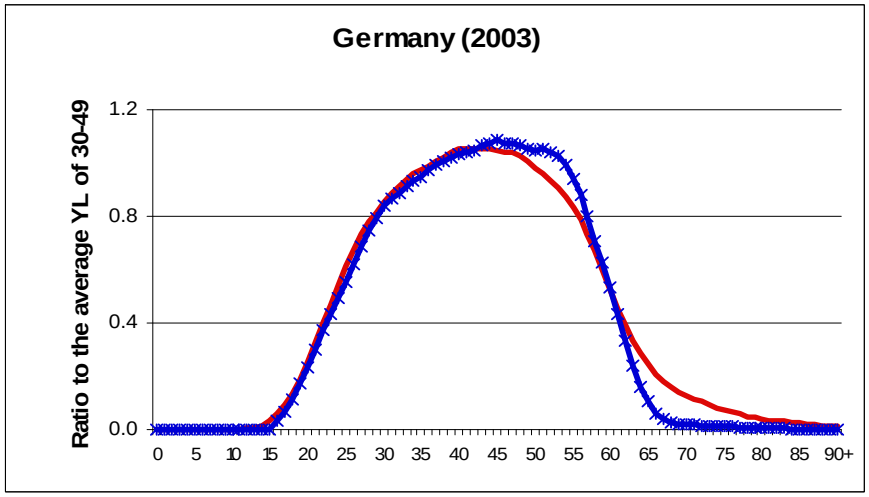
B-2. Large Elderly and Children's Share: The Philippines, Indonesia, China, and India

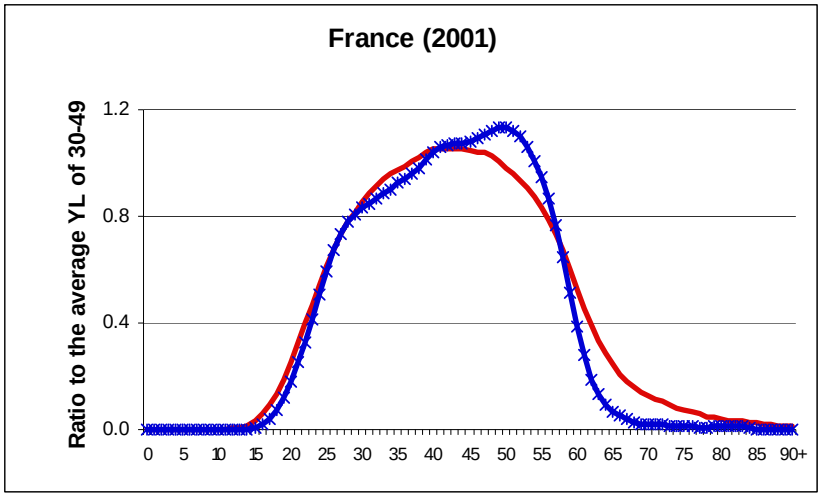


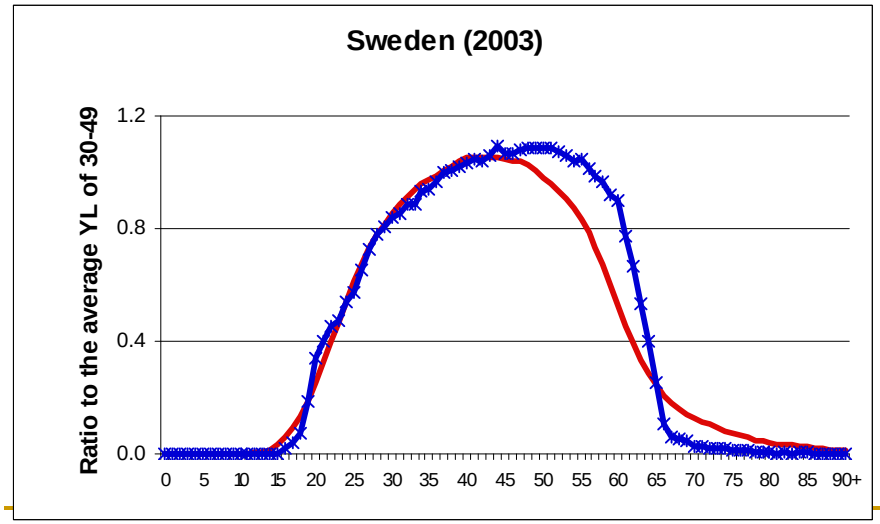
Large Elderly and Children's Share? No. Kenya

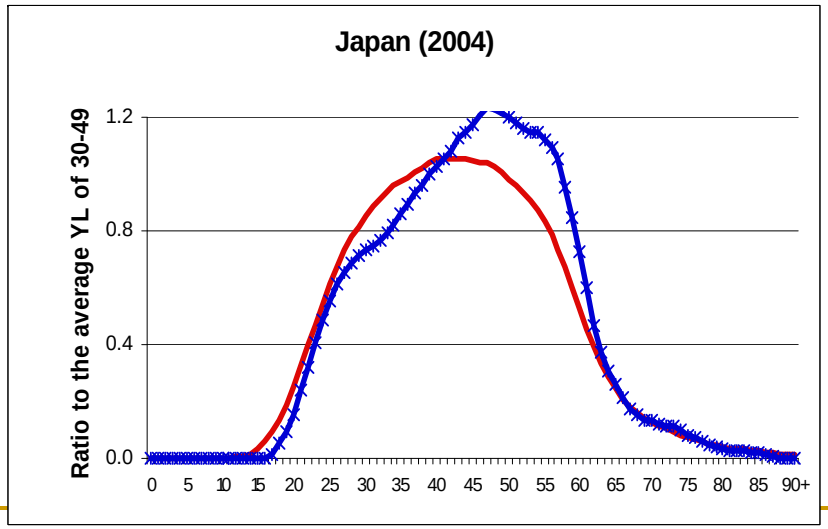


C-1. Rapid Decrease at Old-Age: Germany, France, Sweden, and Japan

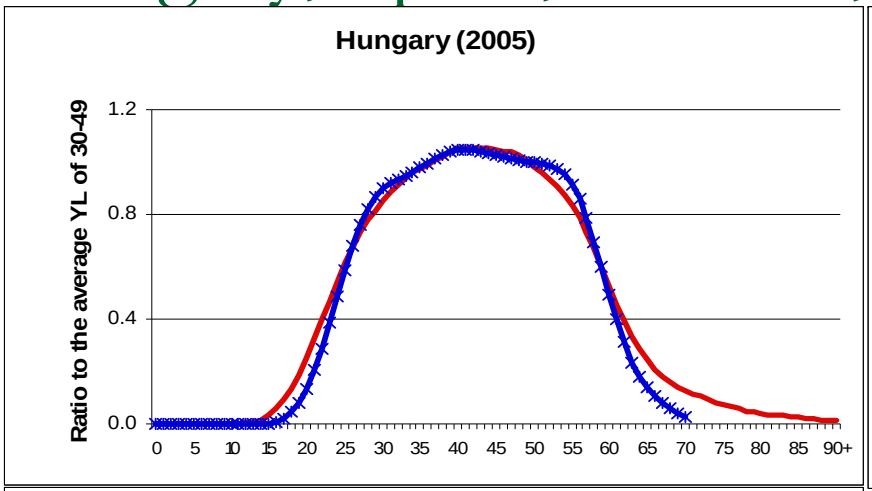


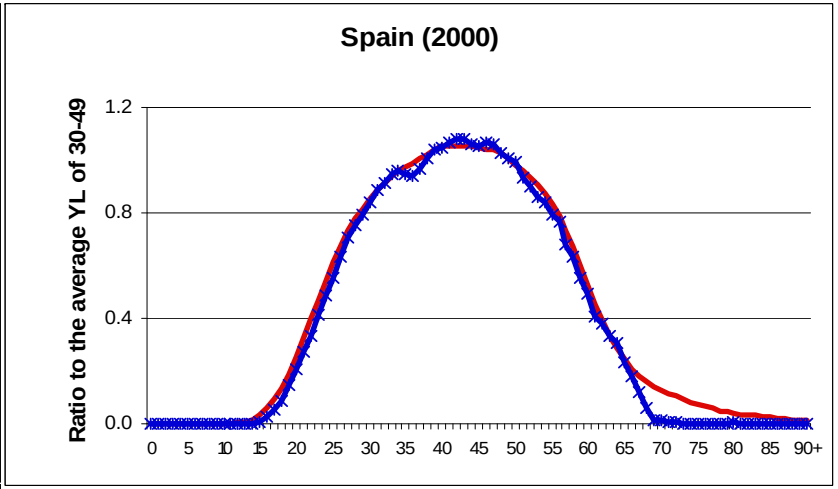


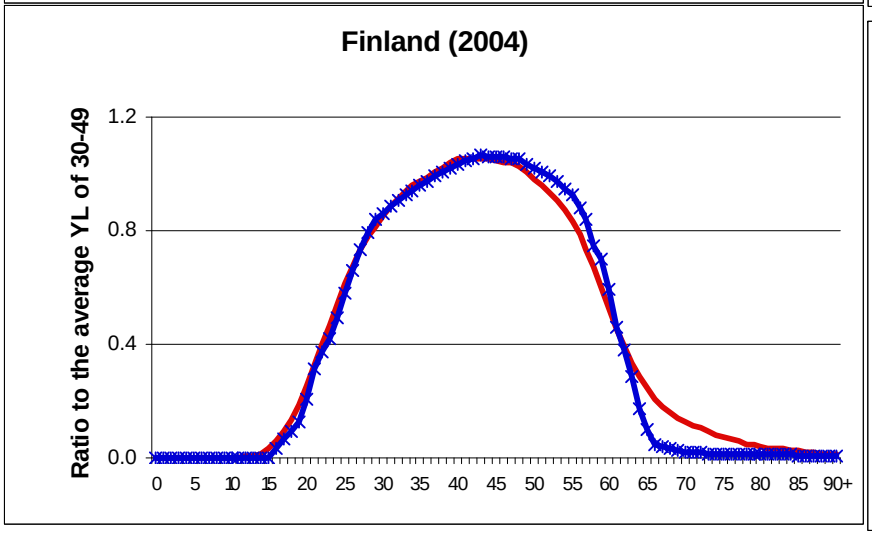


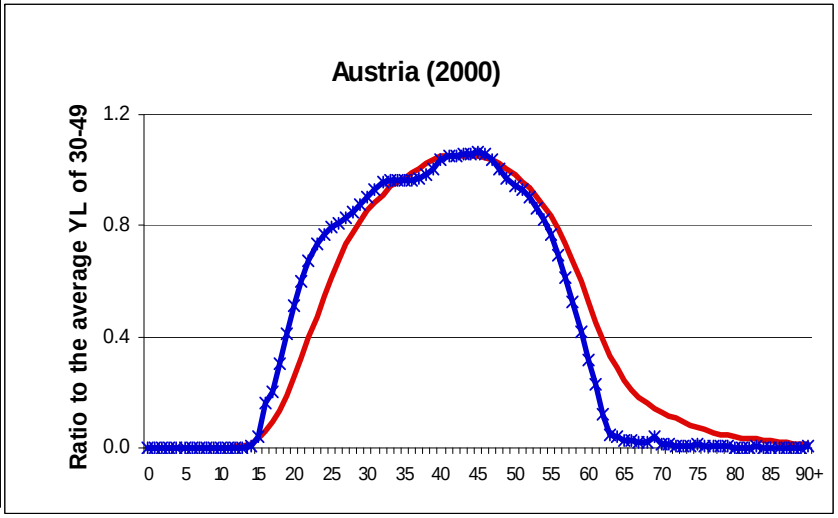


C-2. Decrease (not that rapid) in Old-Age: Hungary, Spain, Finland, and Austria

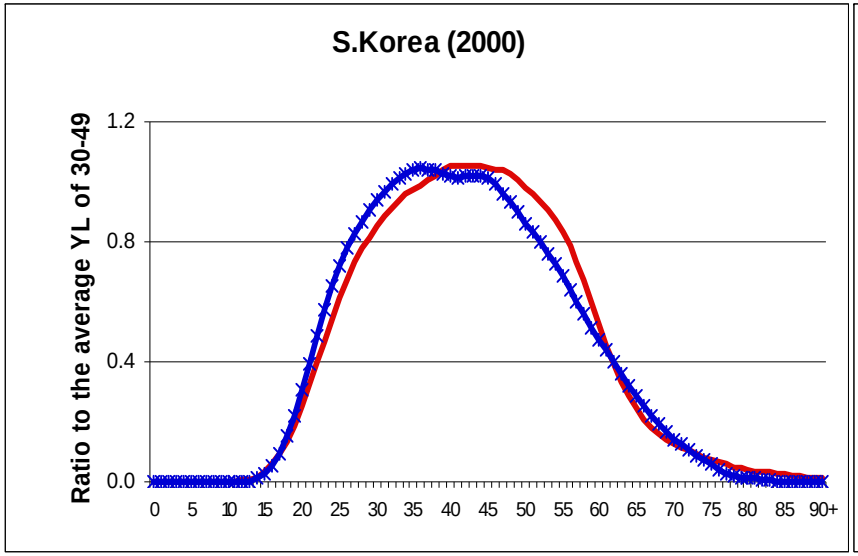


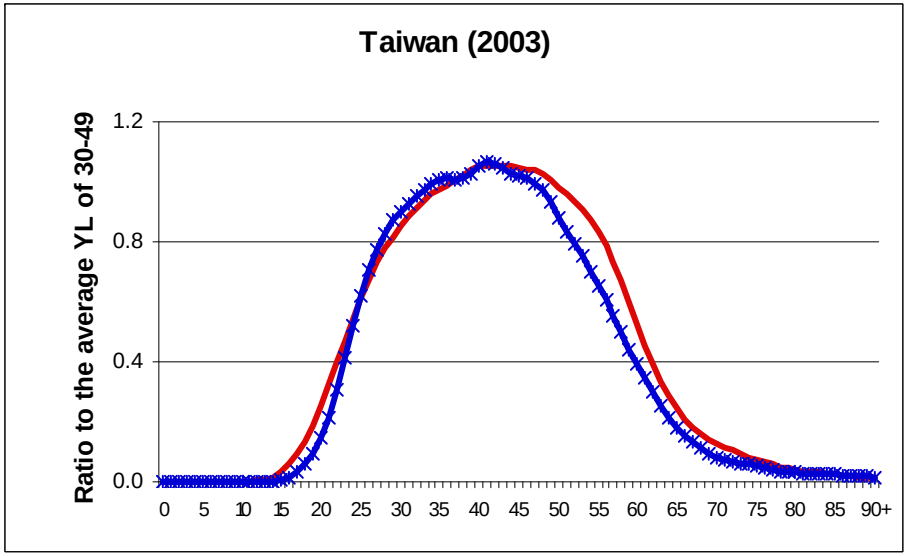


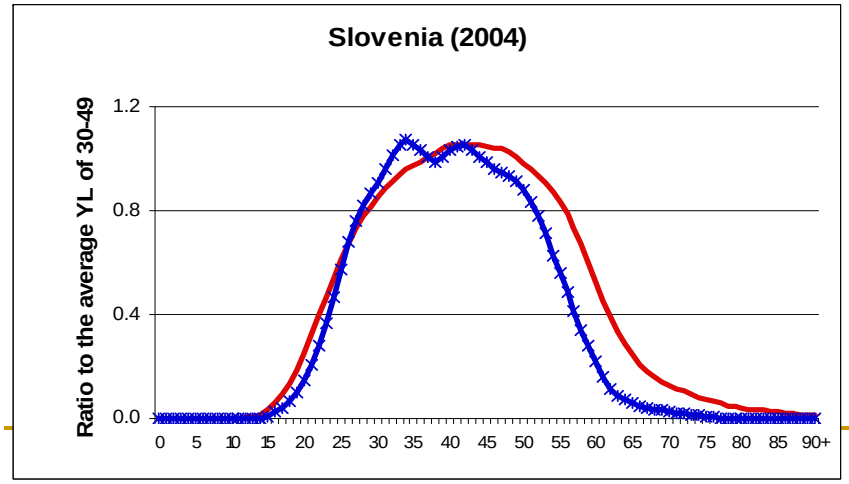




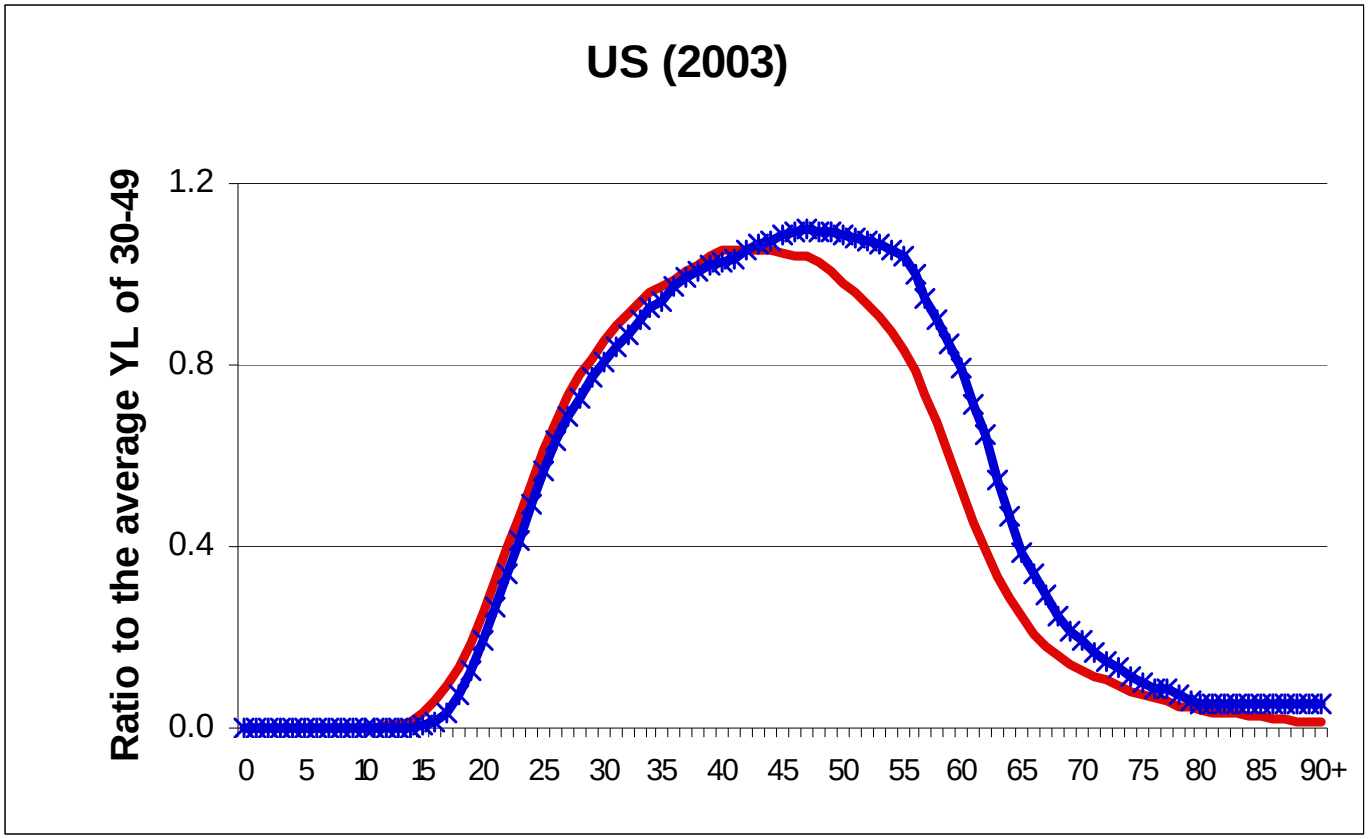
D. Rapid Increase at Young Age Exit Early: Slovenia, S. Korea, and Taiwan





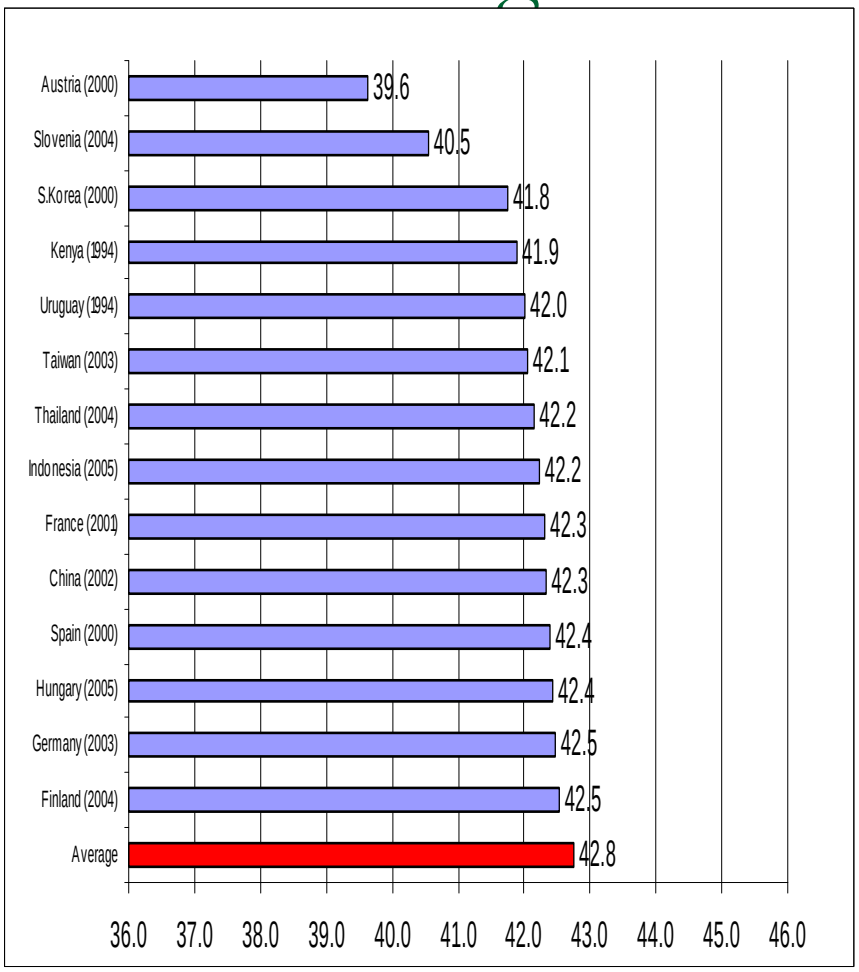


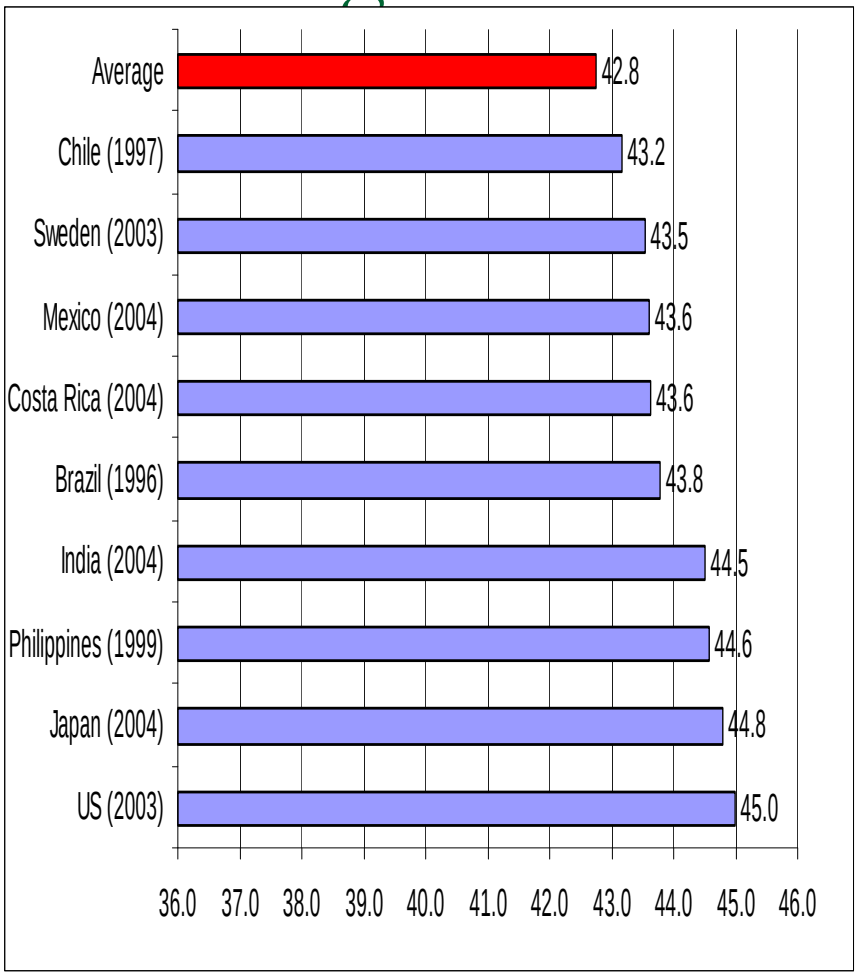
E. Start Late and Exit Late: The US



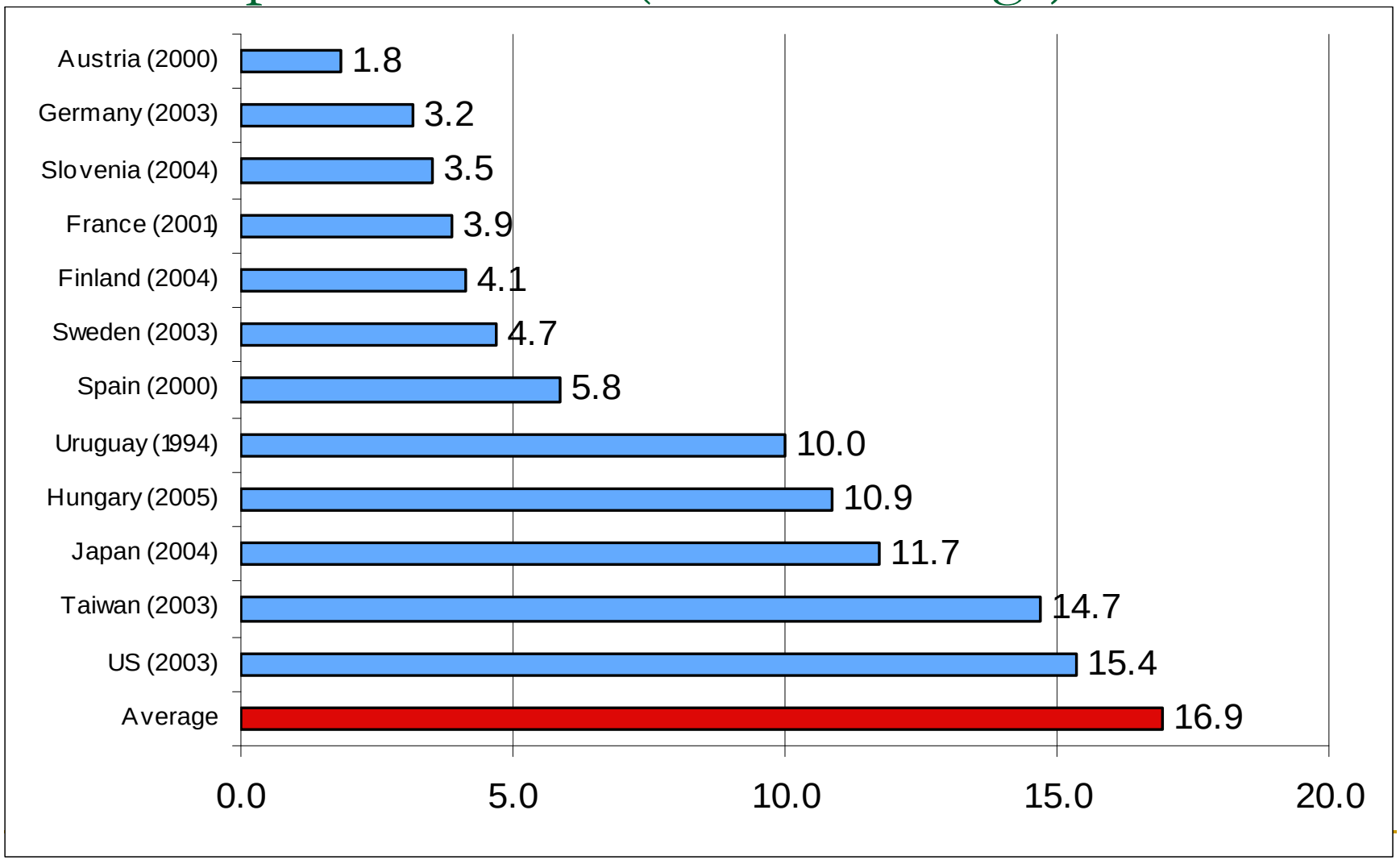
	Mean	Peak	Median	25th pctile	75th pctile	Share 0-19	Share 0-24	Share 65+
Austria (2000)	39.6	45	38	29	47	3.2	12.4	0.4
Brazil (1996)	43.8	39	42	32	52	2.7	7.7	6.3
Chile (1997)	43.2	45	41	32	51	1.6	7.1	5.3
China (2002)	42.3	42	40	31	49	2.3	8.4	4.9
Costa Rica (2004)	43.6	42	42	32	51	1.5	7.3	5.9
Finland (2004)	42.5	43	41	32	50	0.9	6.0	0.9
France (2001)	42.3	49	41	32	49	0.8	5.6	0.8
Germany (2003)	42.5	45	41	32	50	1.1	6.3	0.8
Hungary (2005)	42.4	41	41	32	50	0.5	4.8	1.0
India (2004)	44.5	47	43	33	52	1.9	6.4	5.7
Indonesia (2005)	42.2	45	41	31	49	2.9	9.3	4.3
Japan (2004)	44.8	47	44	34	52	0.4	4.7	3.5
Kenya (1994)	41.9	39	39	32	48	0.8	5.4	4.4
Mexico (2004)	43.6	42	41	32	52	3.2	9.2	7.4
Philippines (1999)	44.6	41	42	33	53	1.7	7.1	7.7
Slovenia (2004)	40.5	34	39	31	47	0.8	5.5	0.8
S.Korea (2000)	41.8	36	39	31	49	1.5	8.3	3.7
Spain (2000)	42.4	42	41	32	49	0.9	5.9	1.5
Sweden (2003)	43.5	44	42	33	52	0.8	6.6	1.4
Taiwan (2003)	42.1	41	40	32	49	0.6	5.4	2.9
Thailand (2004)	42.2	40	40	31	50	1.9	8.1	3.3
Uruguay (1994)	42.0	38	40	31	50	1.8	8.2	2.9
US (2003)	45.0	47	43	34	53	0.7	5.1	5.4
Average	42.8	42.3	40.9	31.9	50.2	1.5	7.0	3.5

Mean Age of Production: Below Average vs. Above Average

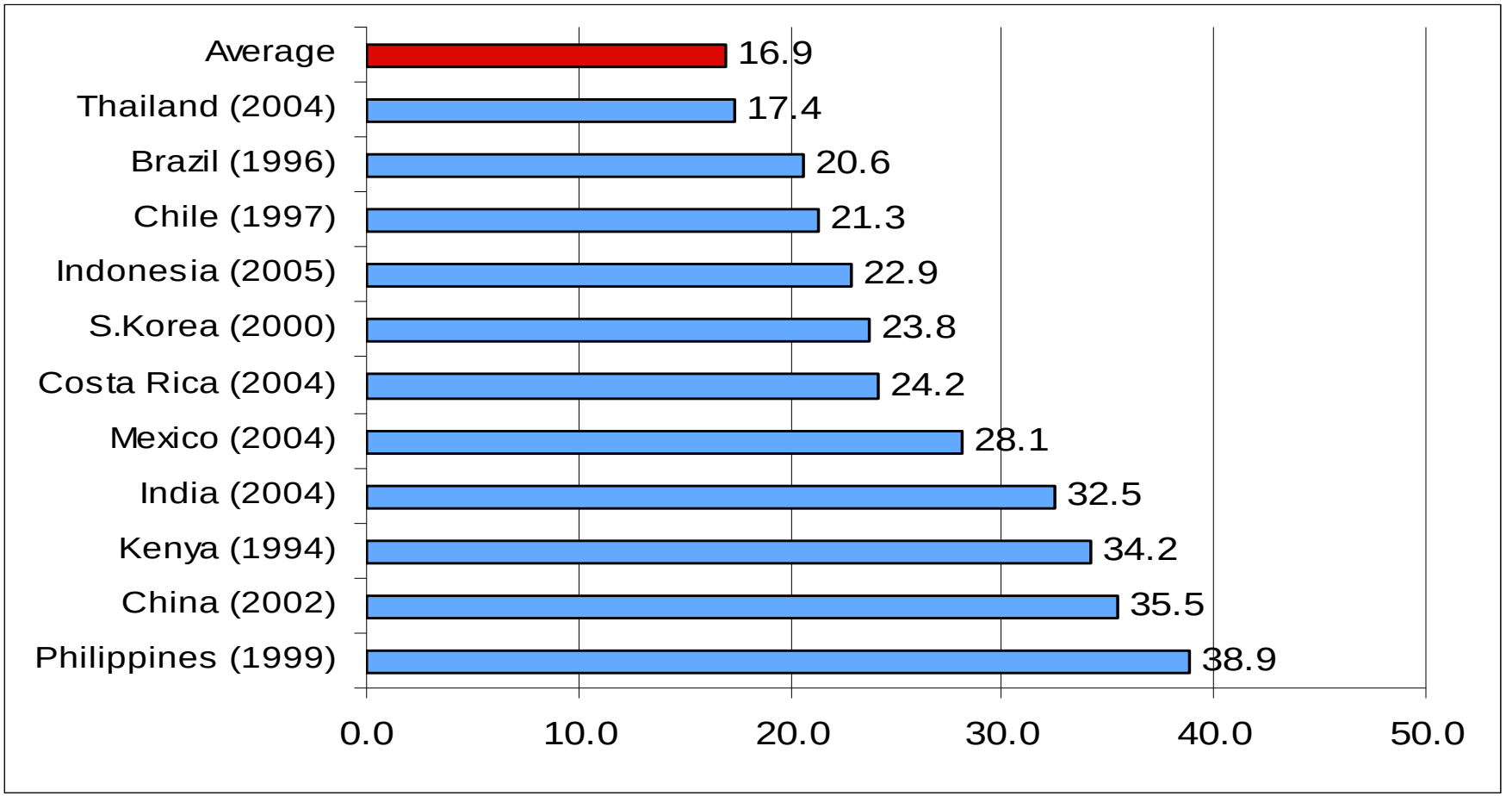




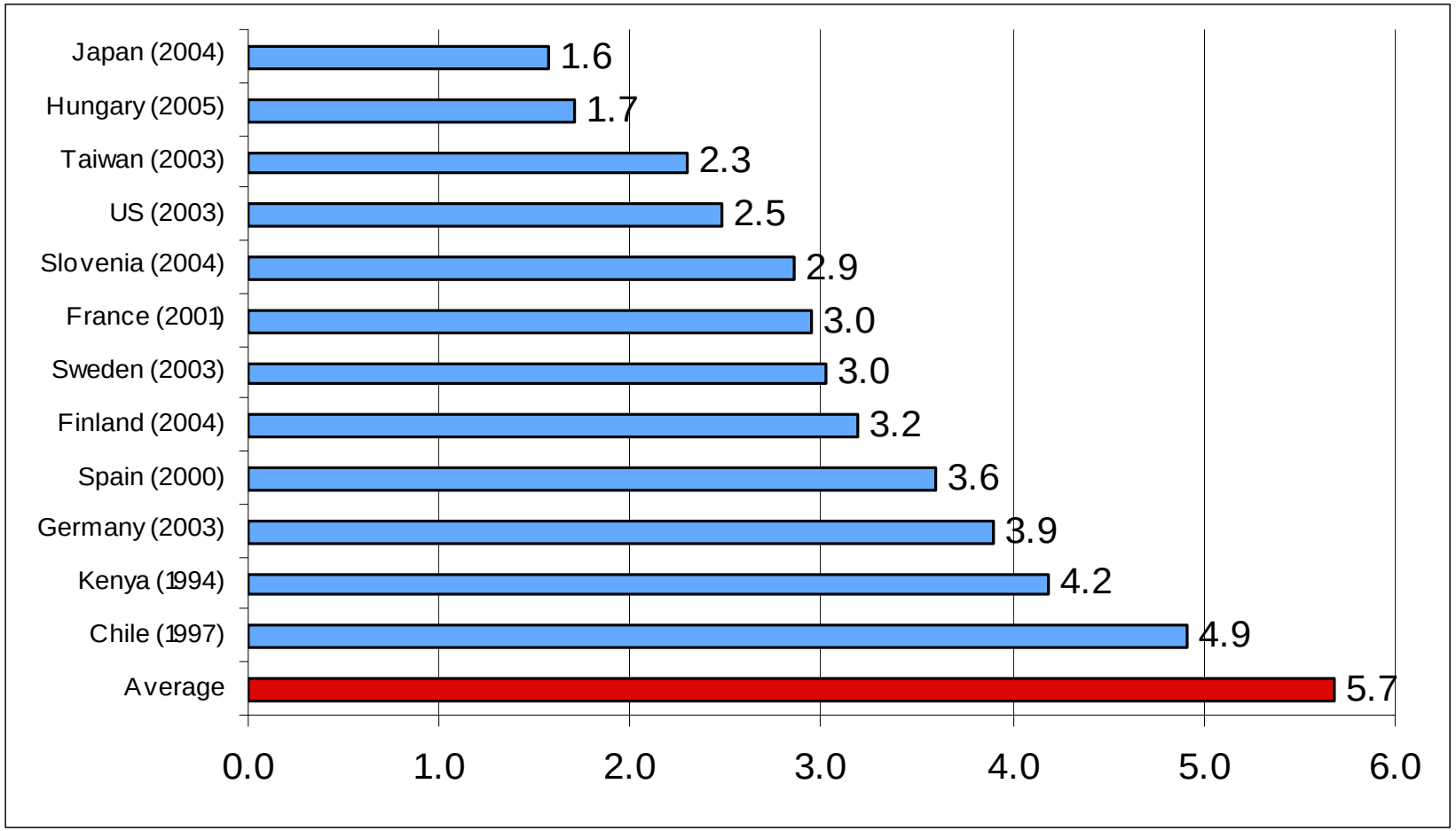
Labor Income as a Source of Financing Consumption for 65+ (Below Average)



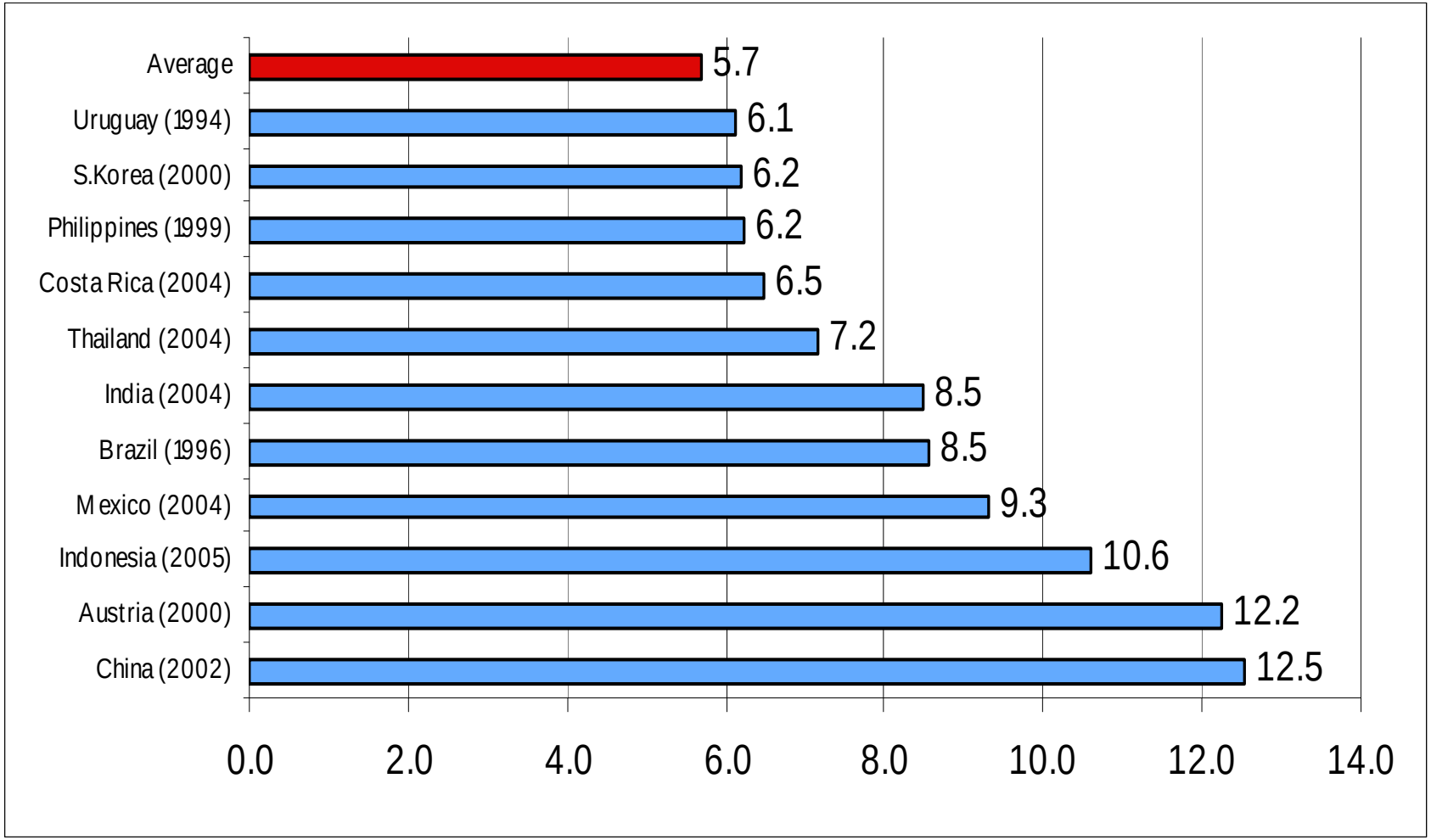
Labor Income as a Source of Financing Consumption for 65+ (Above Average)



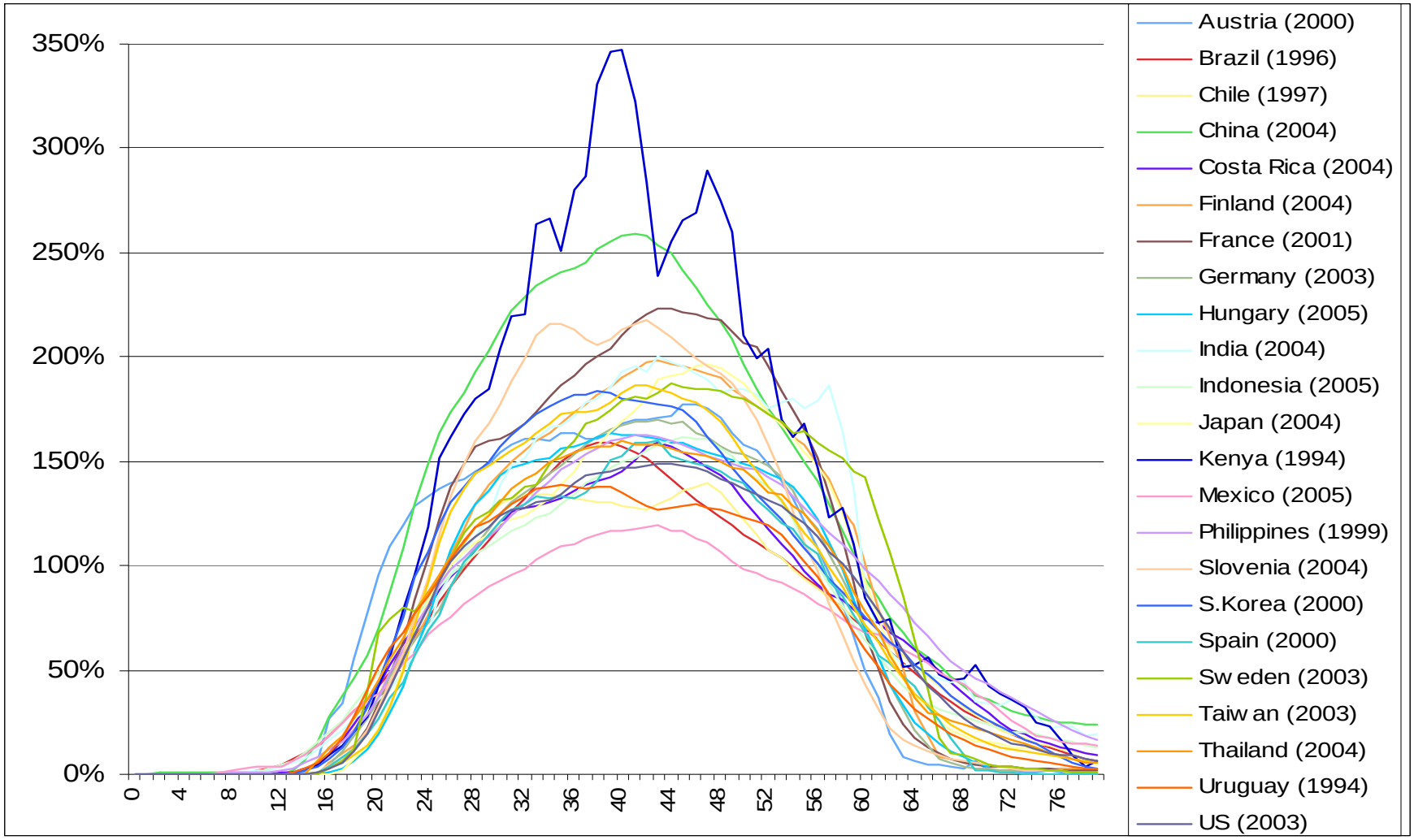
Labor Income as a Source of Financing Consumption for 0-19 (Below Average)



Labor Income as a Source of Financing Consumption for 0-19 (Above Average)

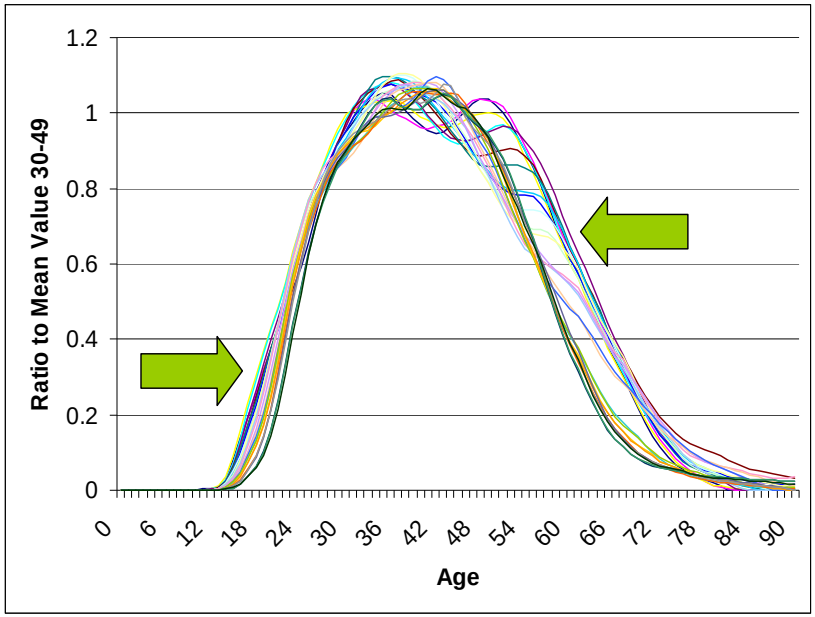


Ratio of Labor Income to Consumption by Age

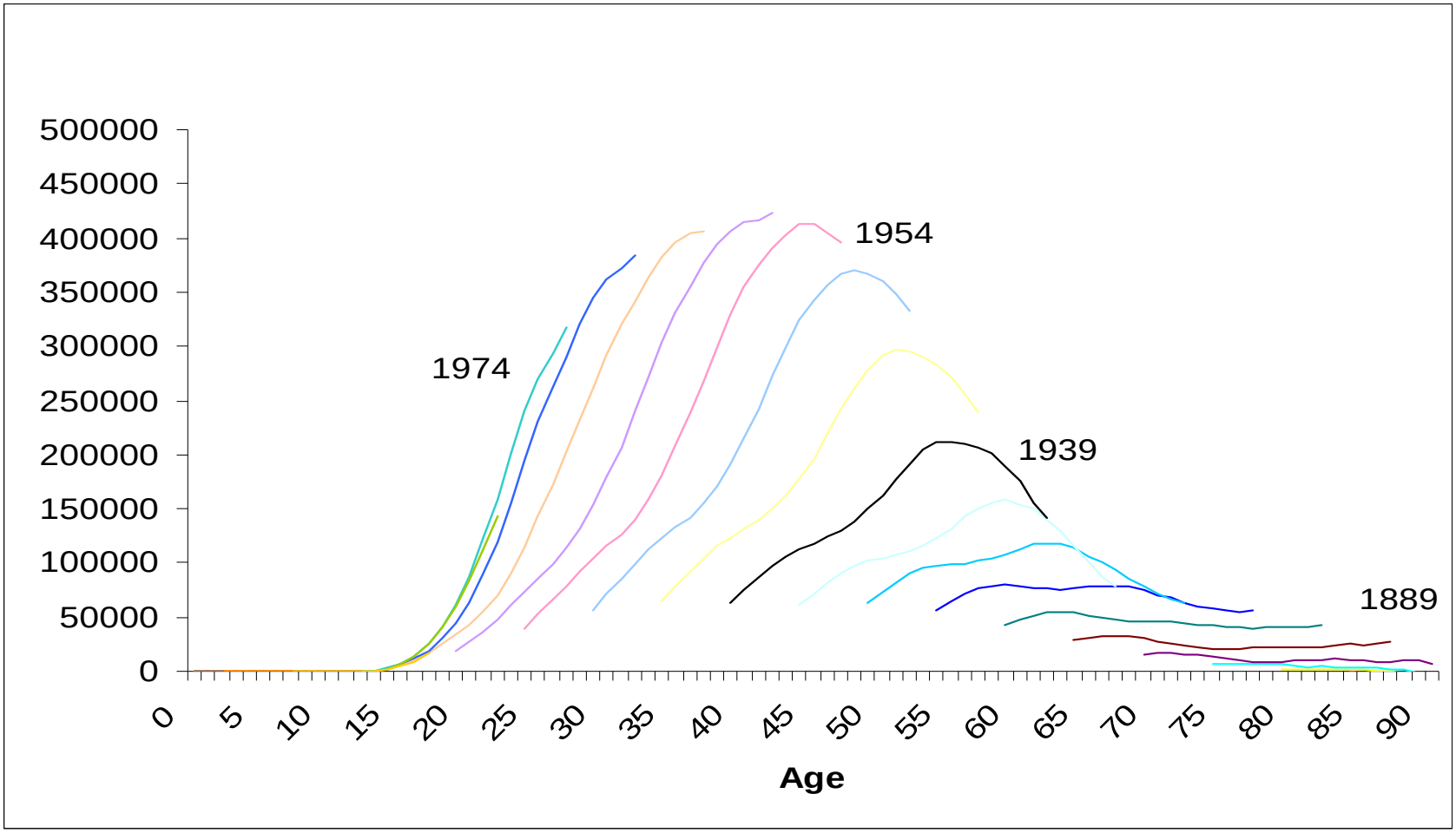


Labor Income Over Time: Taiwan 1977-2003

- Has an advantage over cross-country Analysis
  - Consistent data sets & definitions
  - Decomposition across years
  - Policy change analysis
- Limited data availability.



Per Capita Labor Income: 5 Year Birth-Cohorts, Taiwan 1889-1974

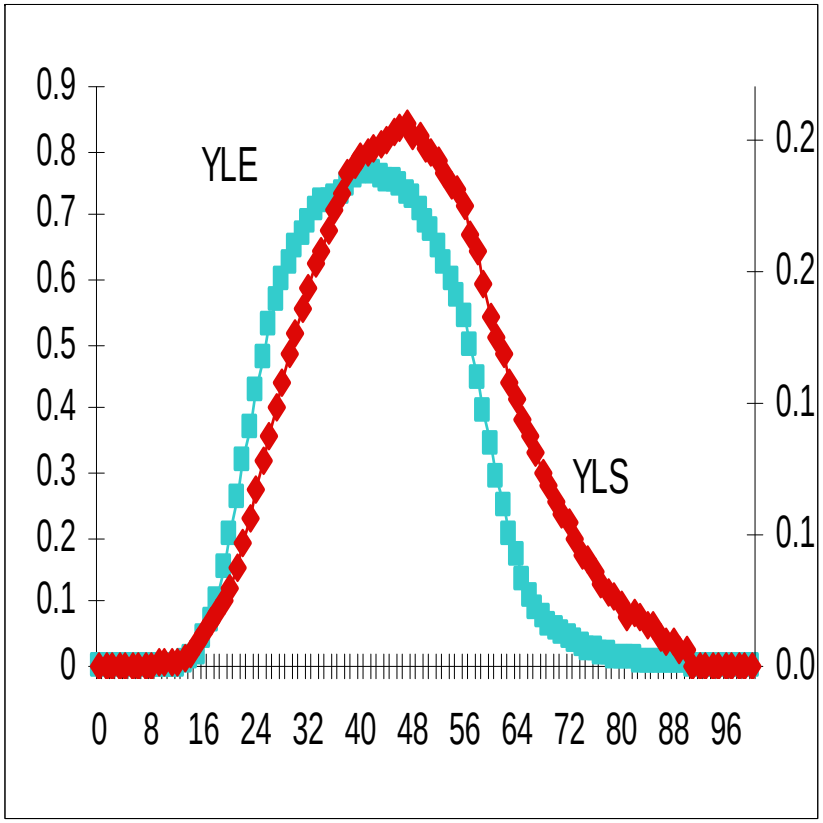


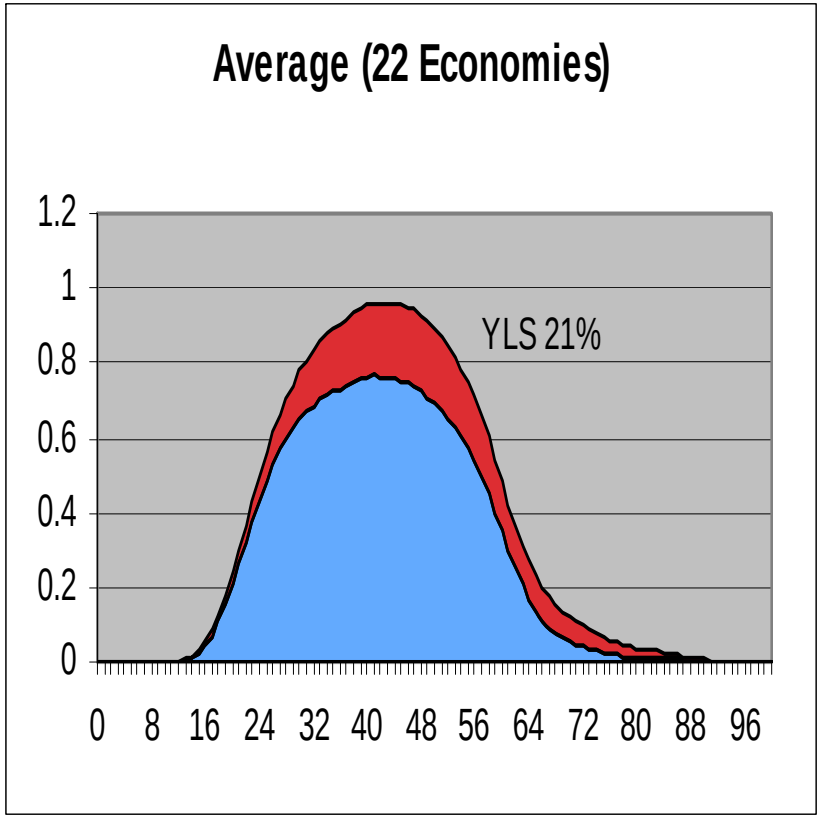
Sources of Differences and Change

Questions & Puzzles

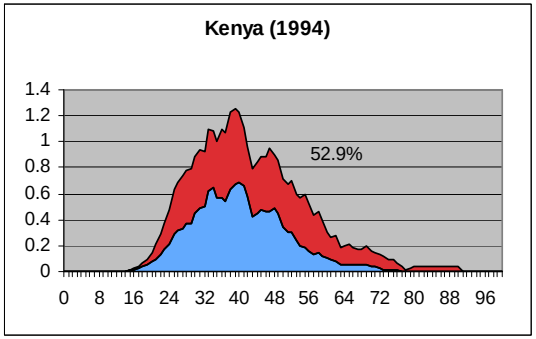
- What are the source of differences?
- S. Korea and Taiwan profiles look very similar. What does that imply?
- Why the share of labor income for young people in Austria so high?
- Why the share of labor income for children/elderly for Kenya so low?

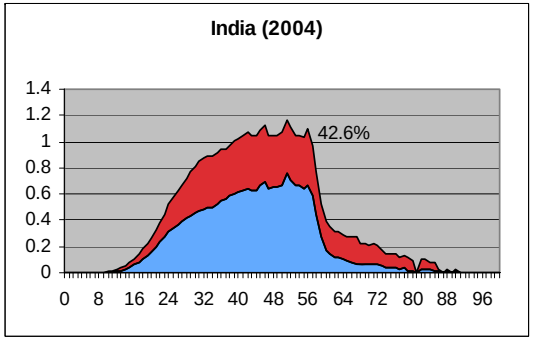
Earnings vs. Self-Employment Income

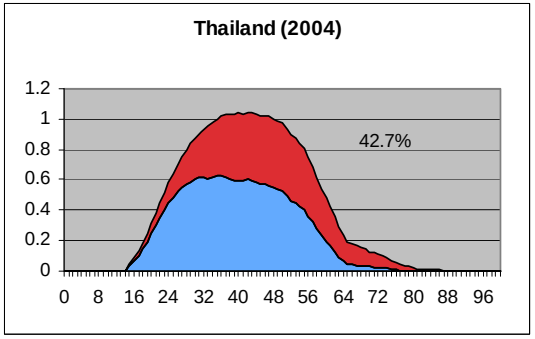


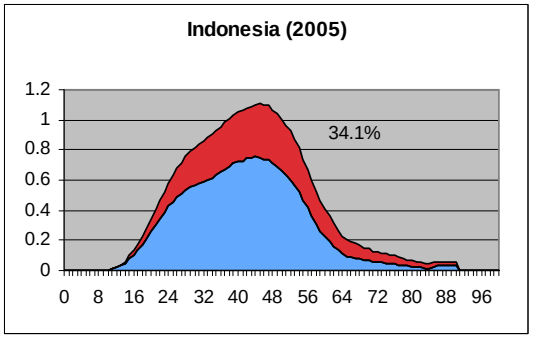


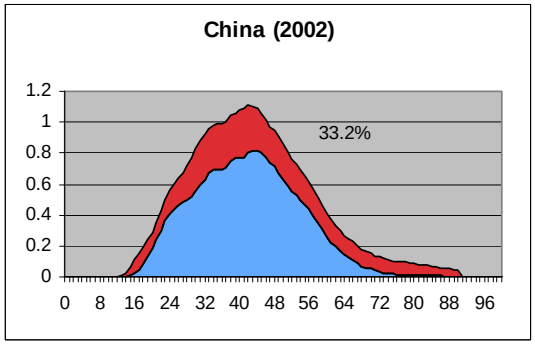
Share of Self-Employment Income

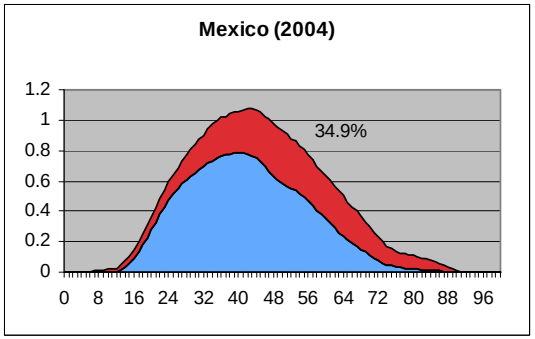


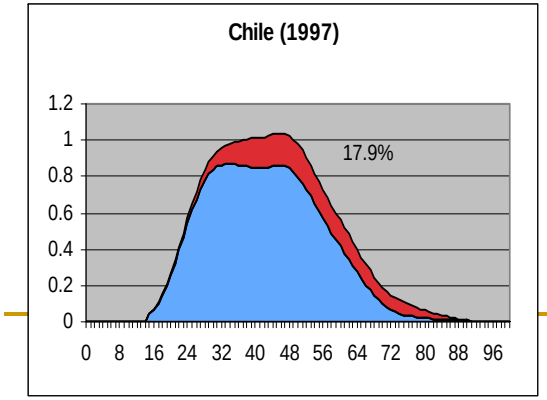


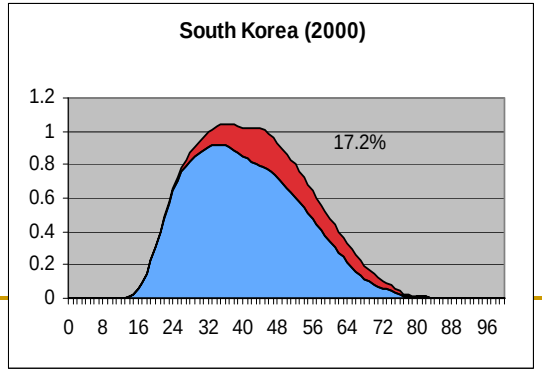




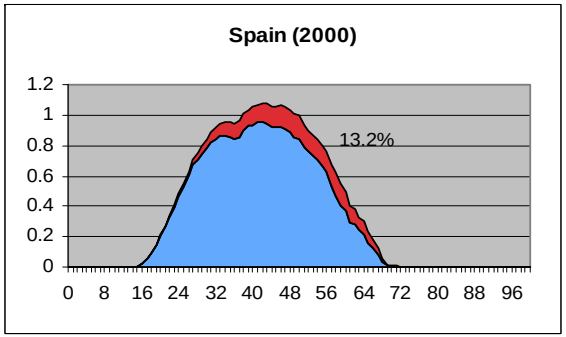


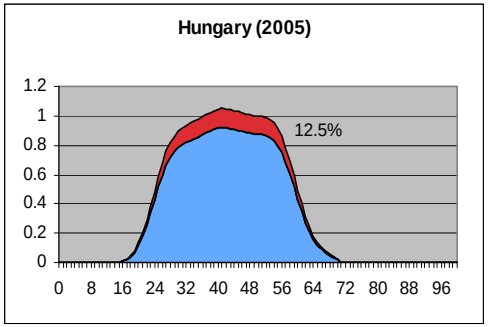


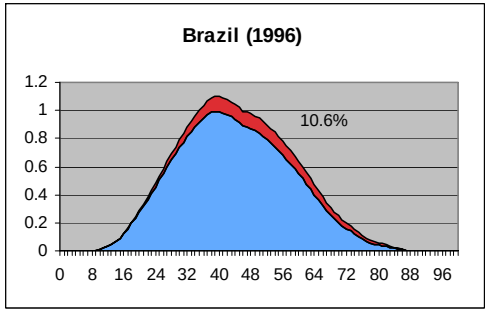


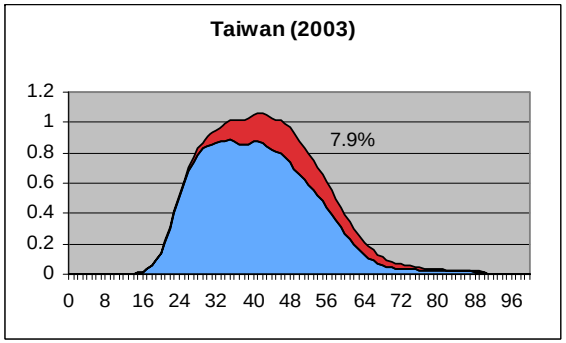


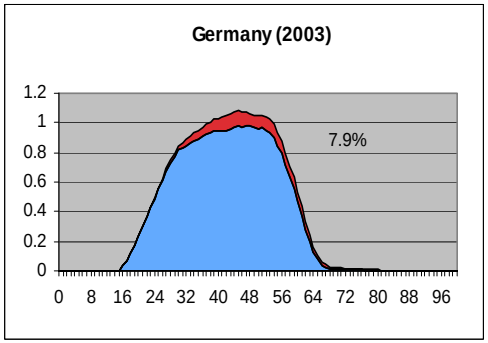
Share of Self-Employment Income (Cont'd)

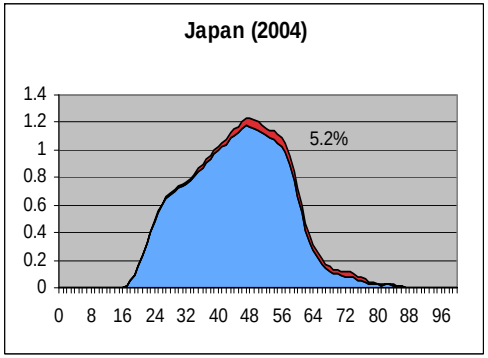


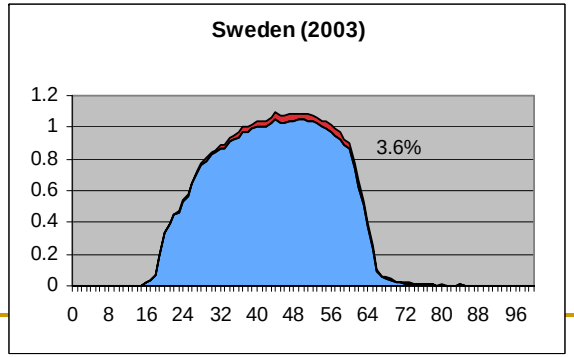




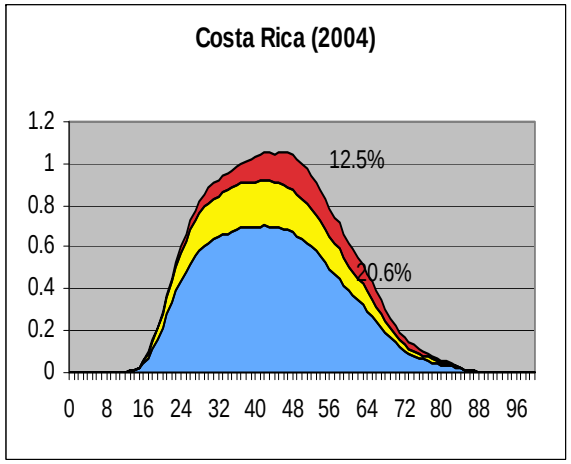


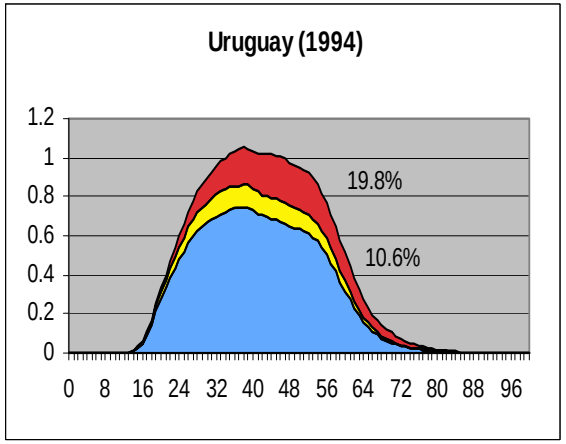


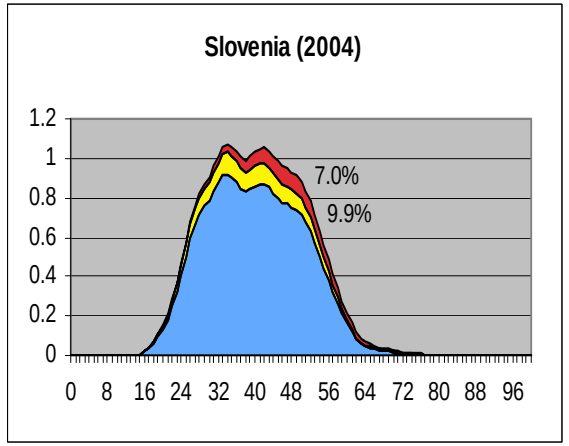


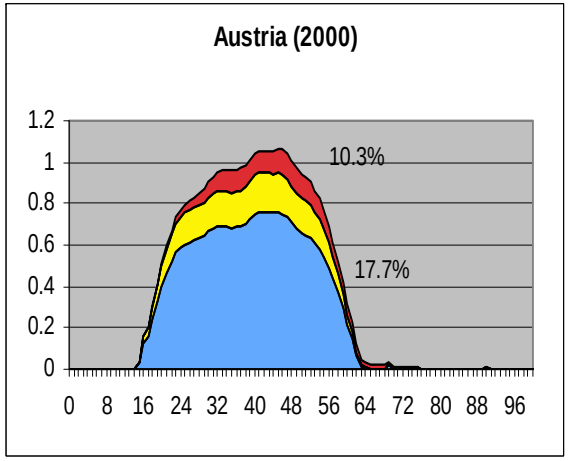


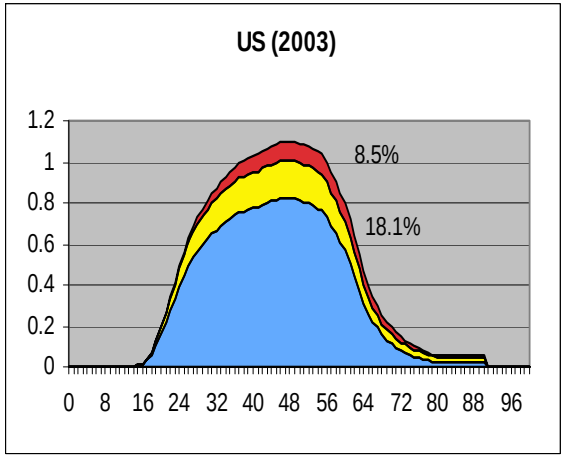
Share of Fringe Benefit

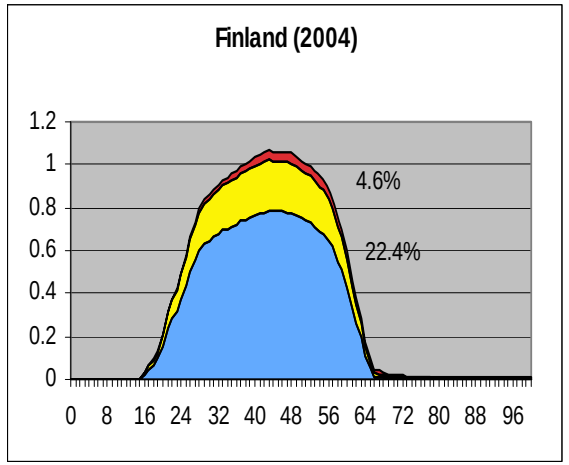




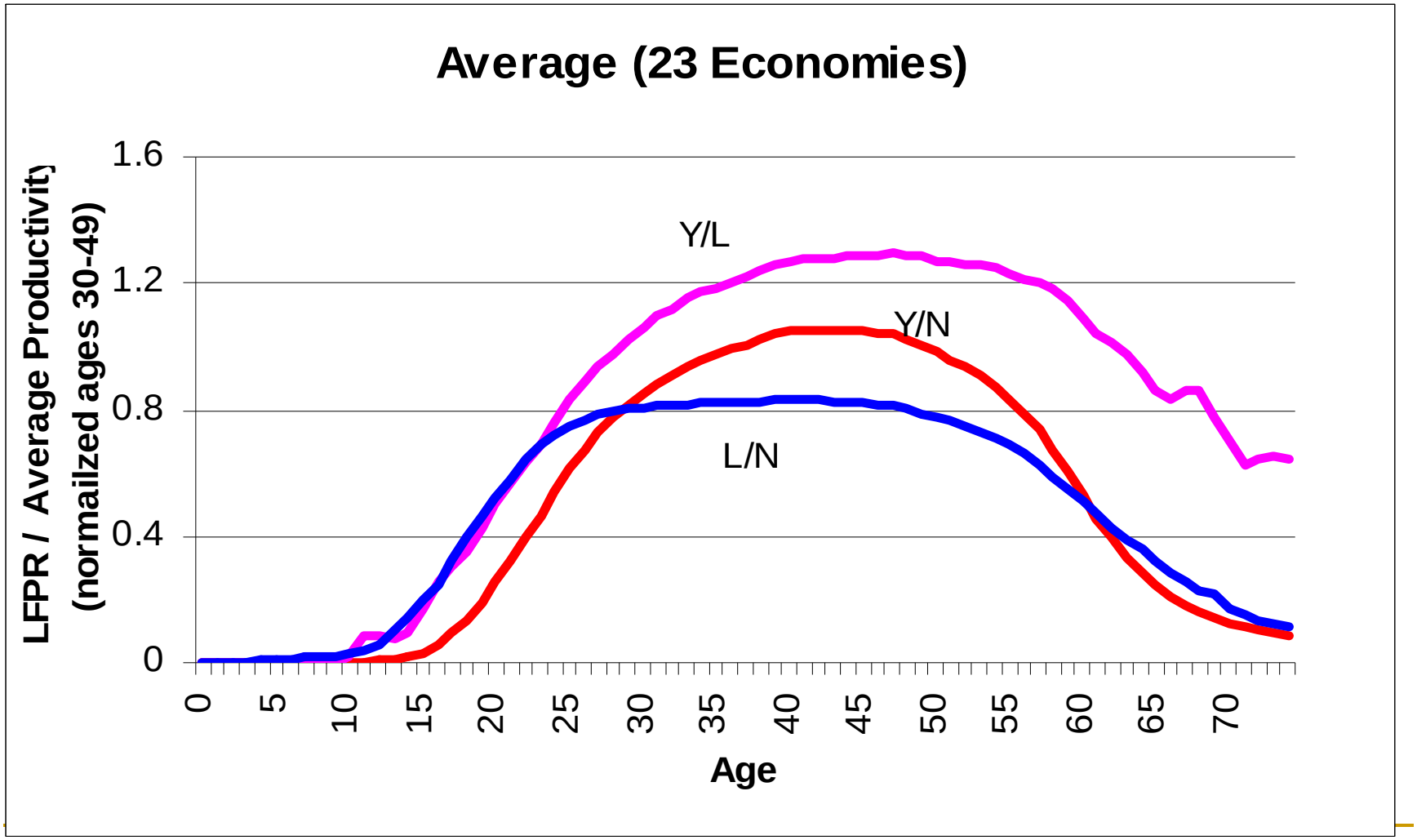




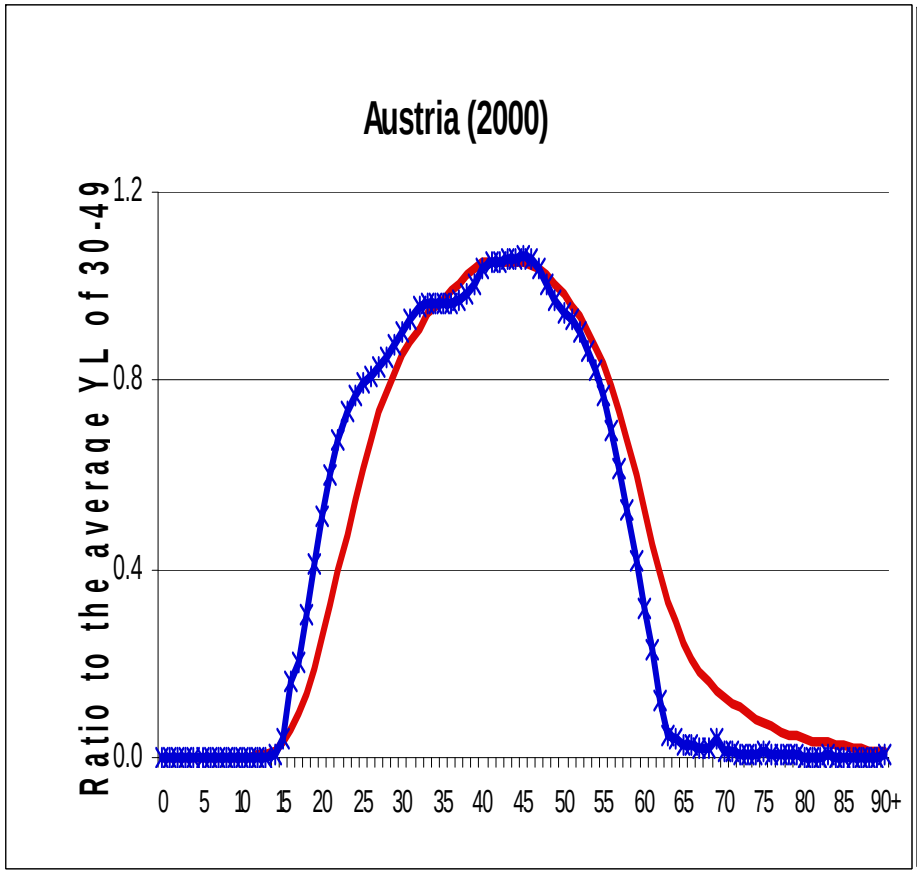


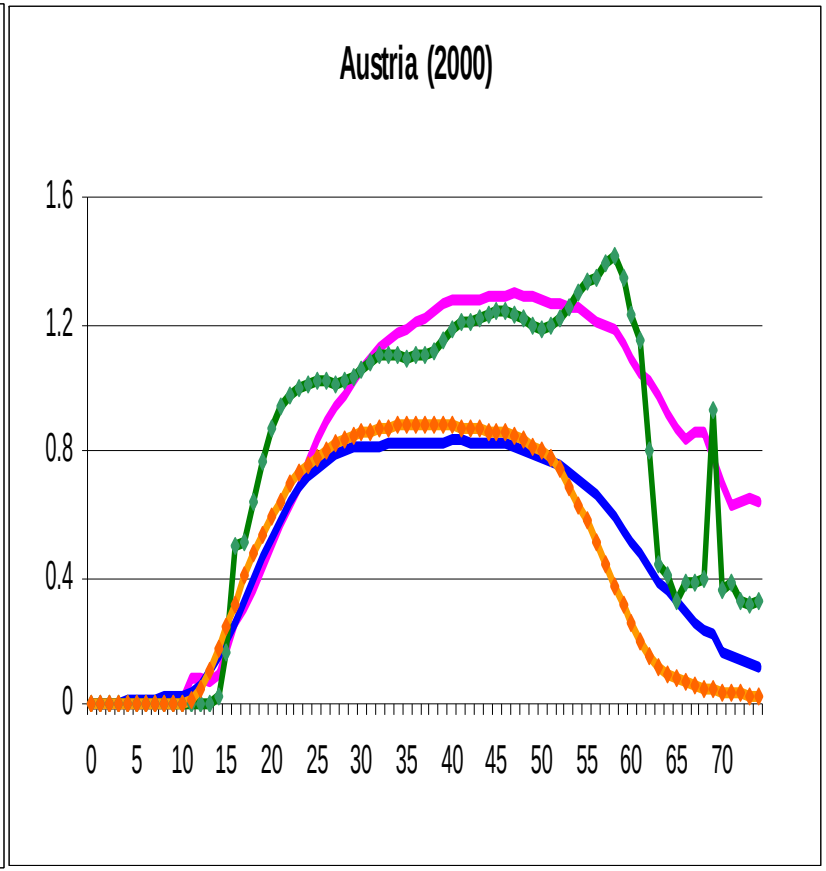


Decomposition of Labor Income: Average Productivity vs. Activity Rates

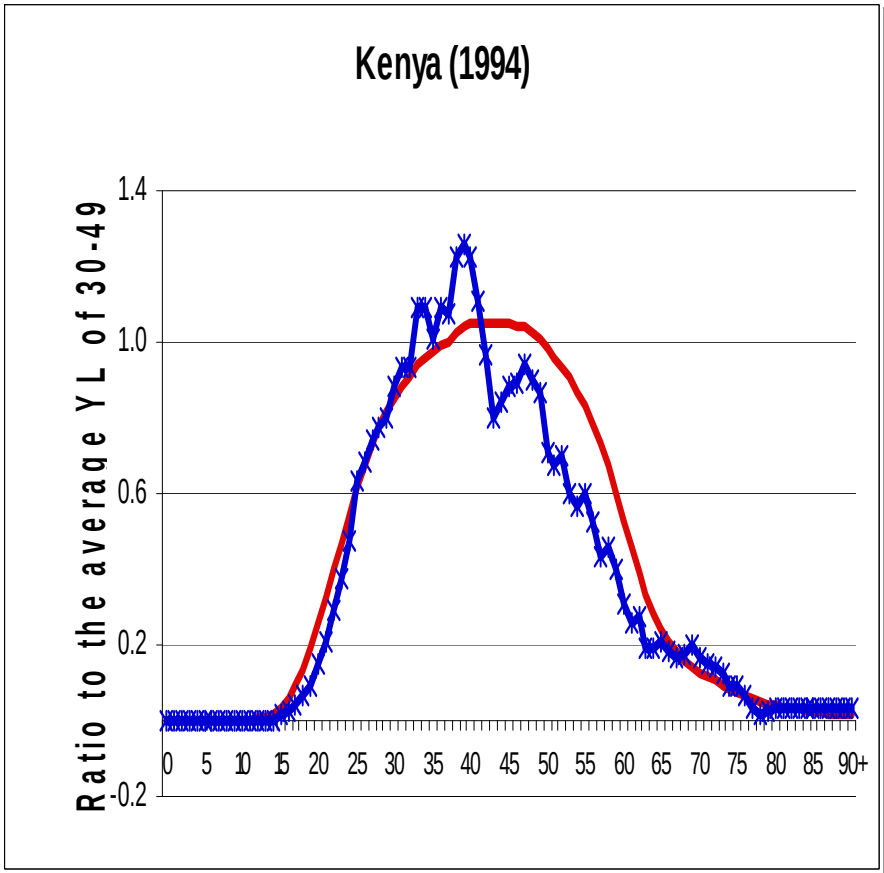


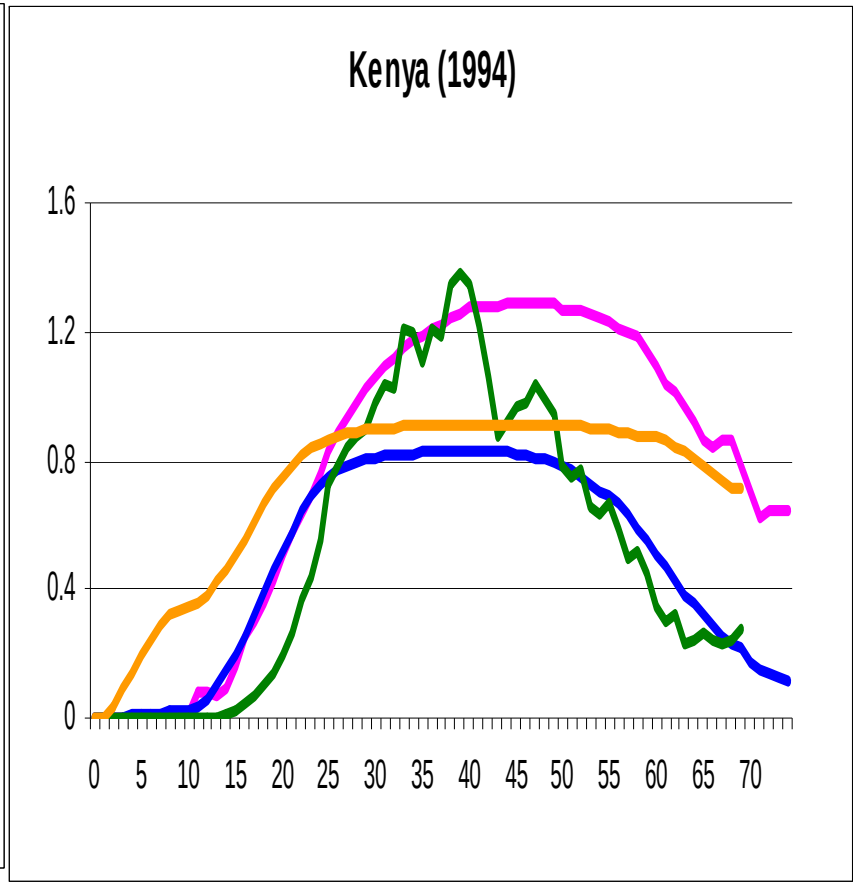
The Curious Case of Austria: Apprenticeship?



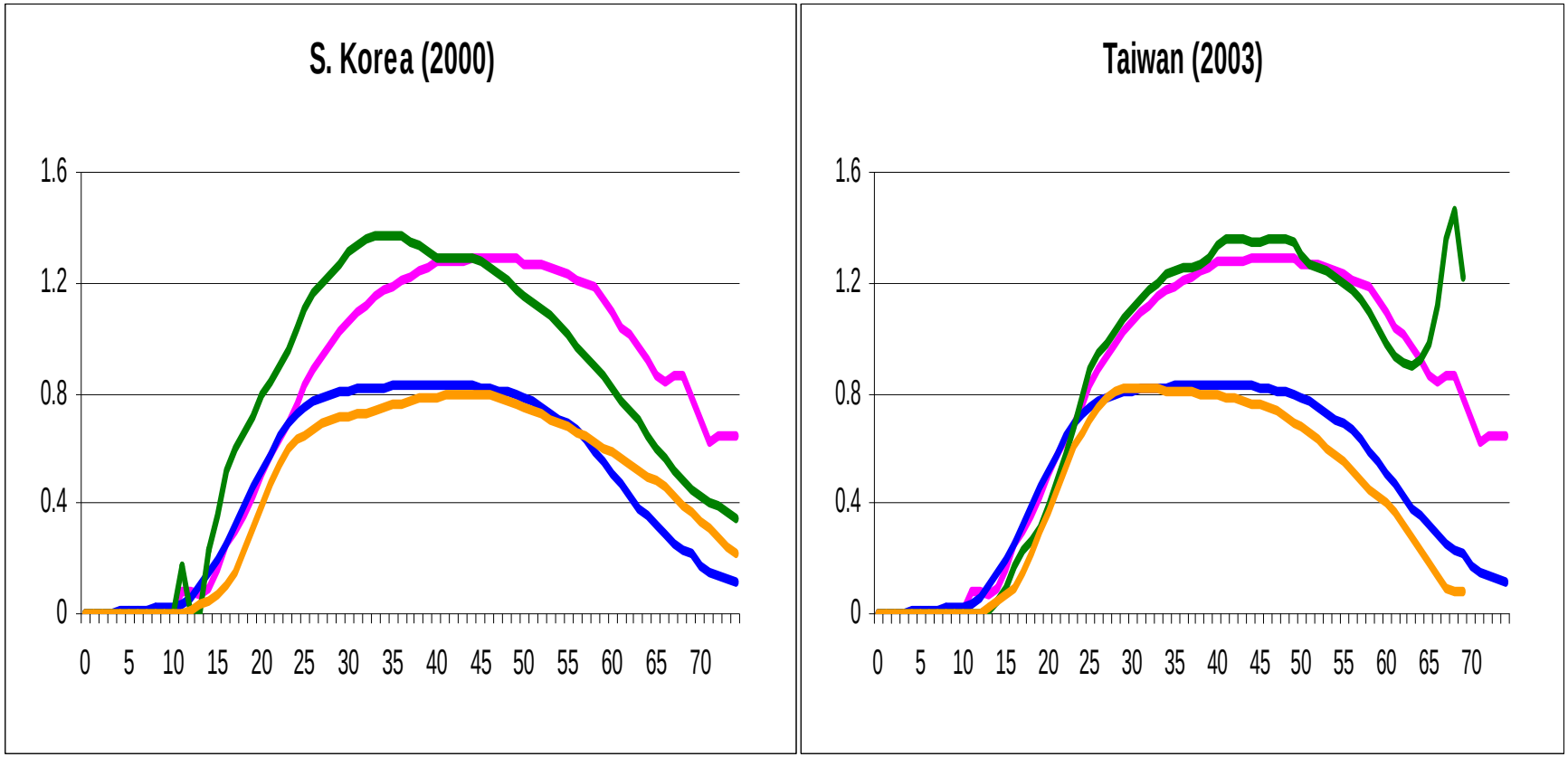


Kenya

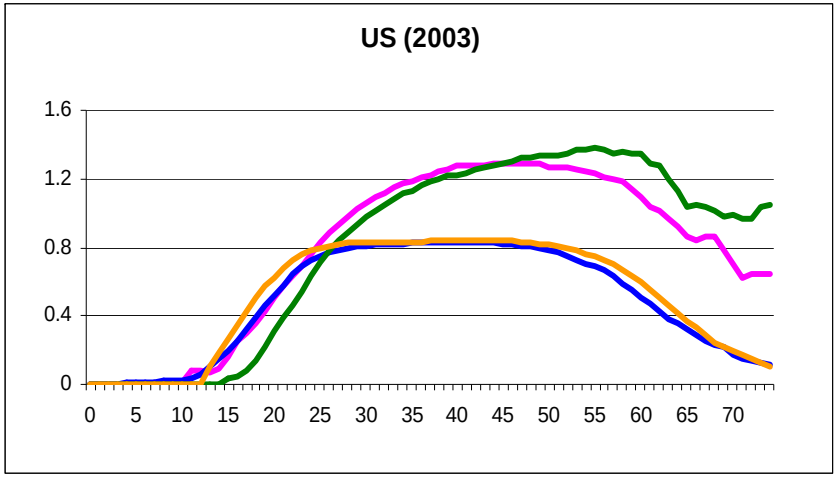

Kenya (1994)
Ratio to the average YL of 30-49
1.4
1.0
0.6
0.2
-0.2
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90+

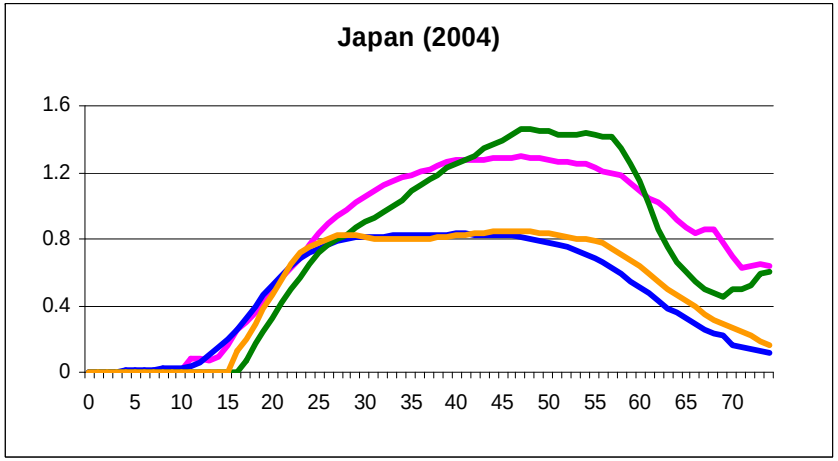

Kenya (1994)
1.6
1.2
0.8
0.4
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70

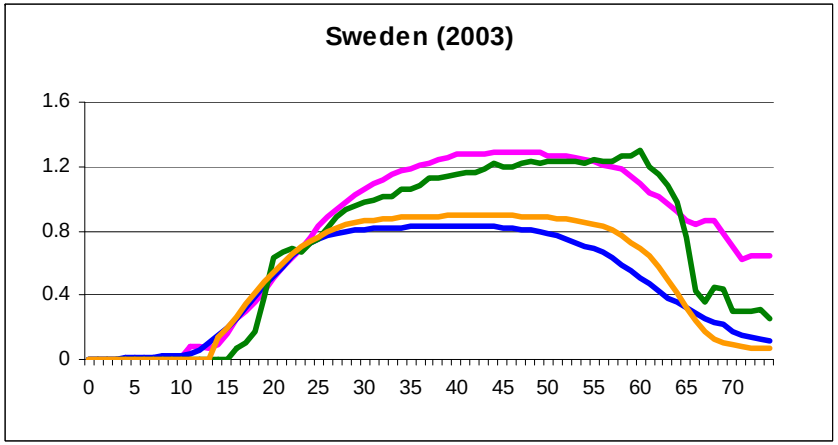
S. Korea vs. Taiwan: Different Policy Implication



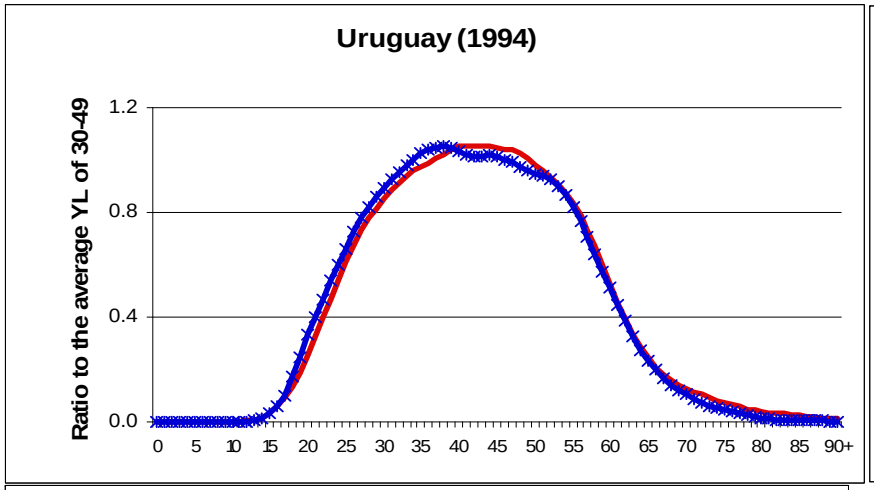
US, Japan, and Sweden

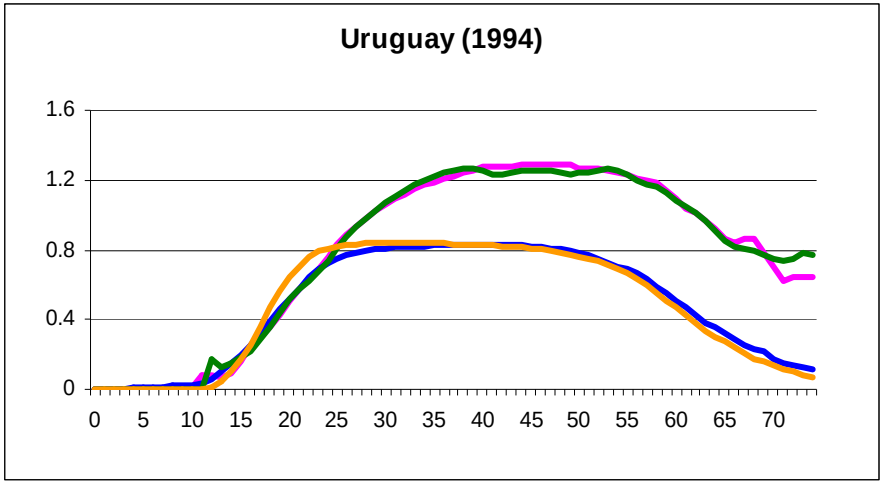


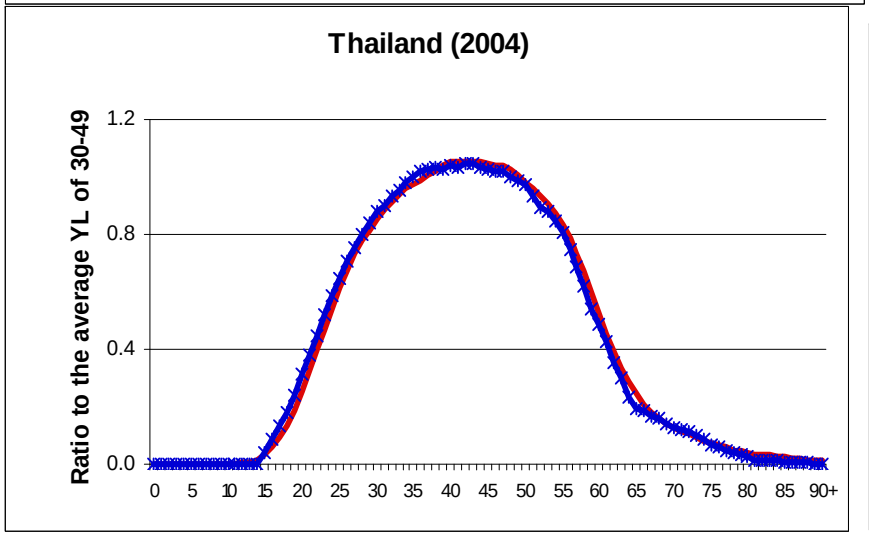


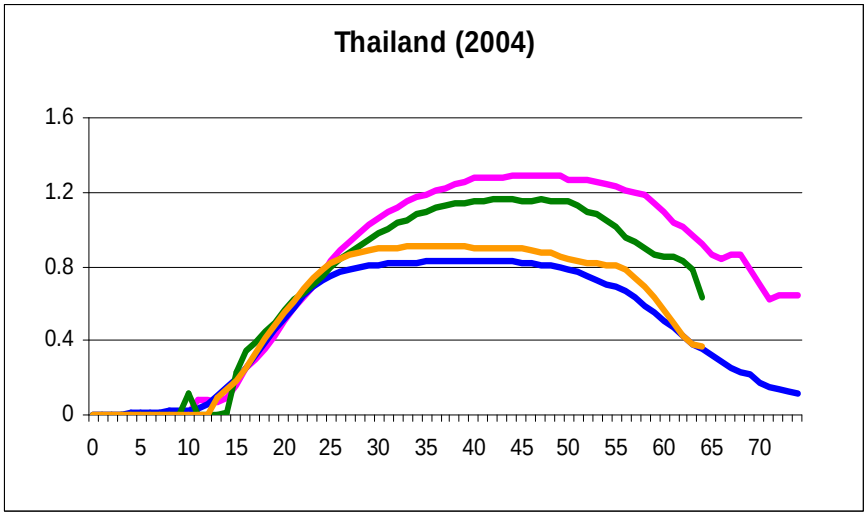


The Winner

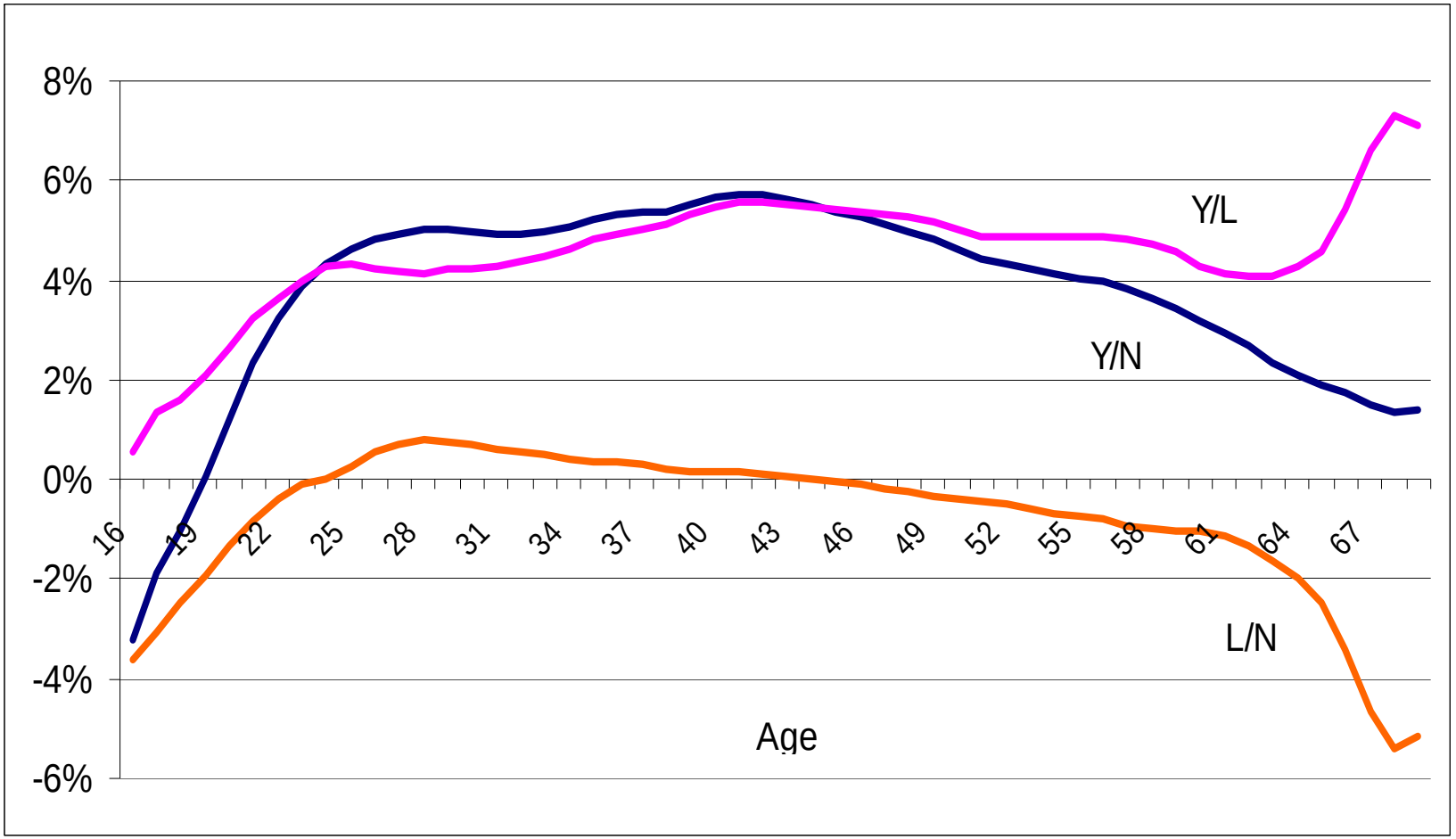

Uruguay (1994)
Ratio to the average YL of 30-49
1.2
0.8
0.4
0.0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90+


Uruguay (1994)
1.6
1.2
0.8
0.4
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70

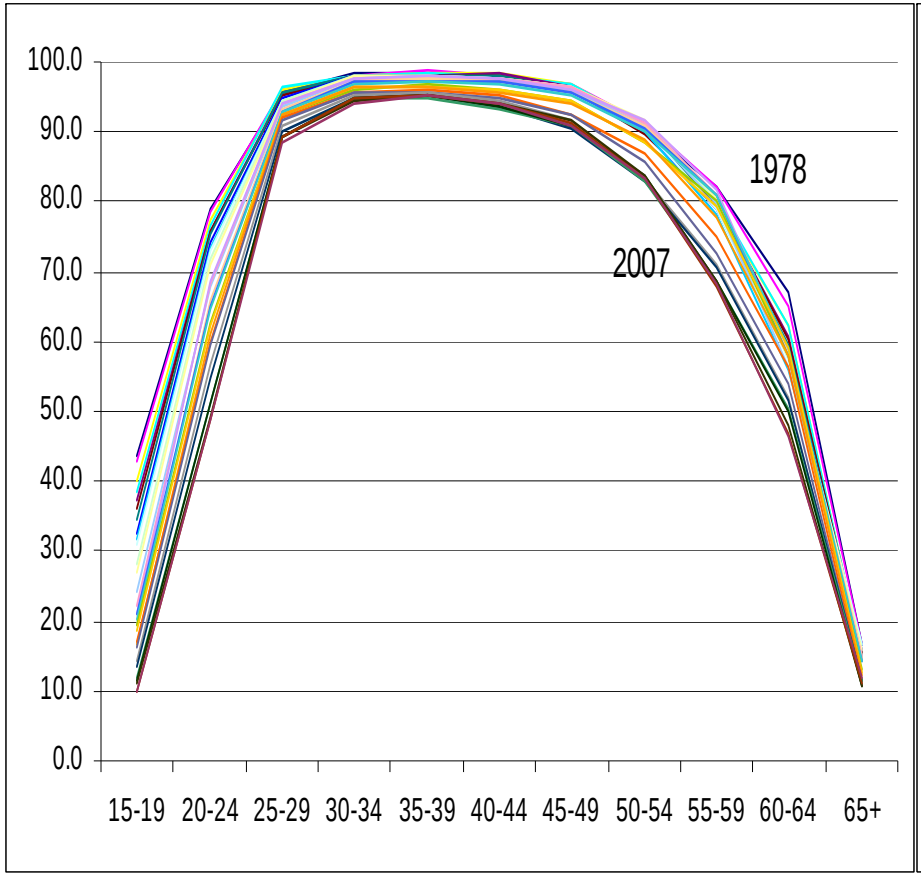

Thailand (2004)
Ratio to the average YL of 30-49
1.2
0.8
0.4
0.0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90+

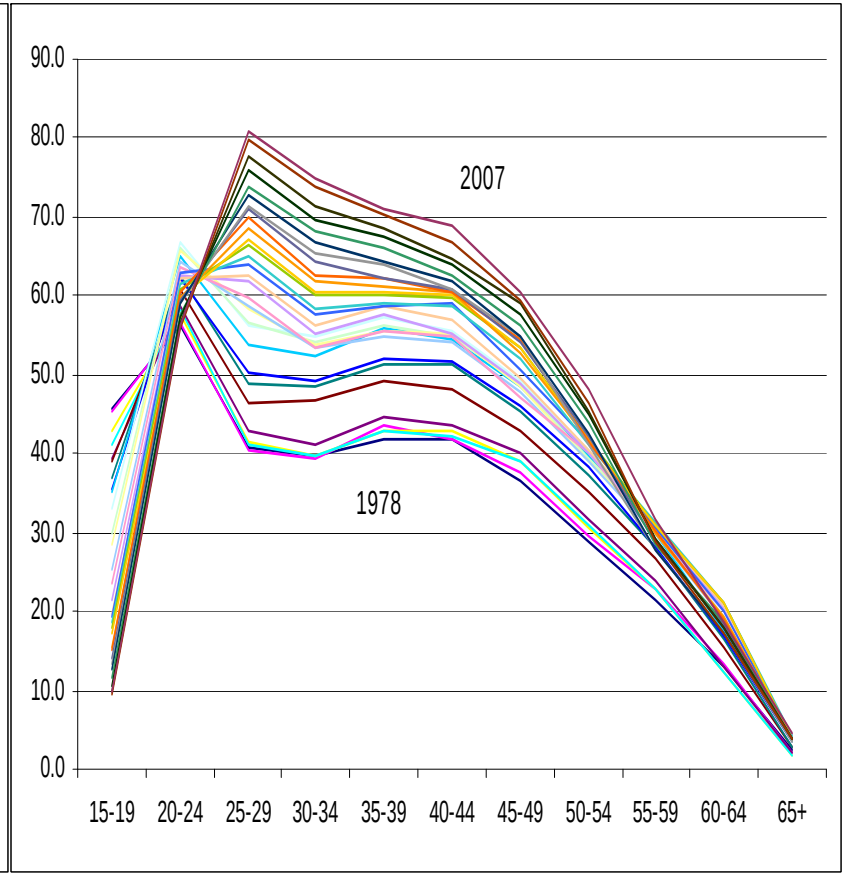

Thailand (2004)
1.6
1.2
0.8
0.4
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70

Decomposition of Annual Growth of Labor Income by Age: Taiwan, Real, 1978-2003

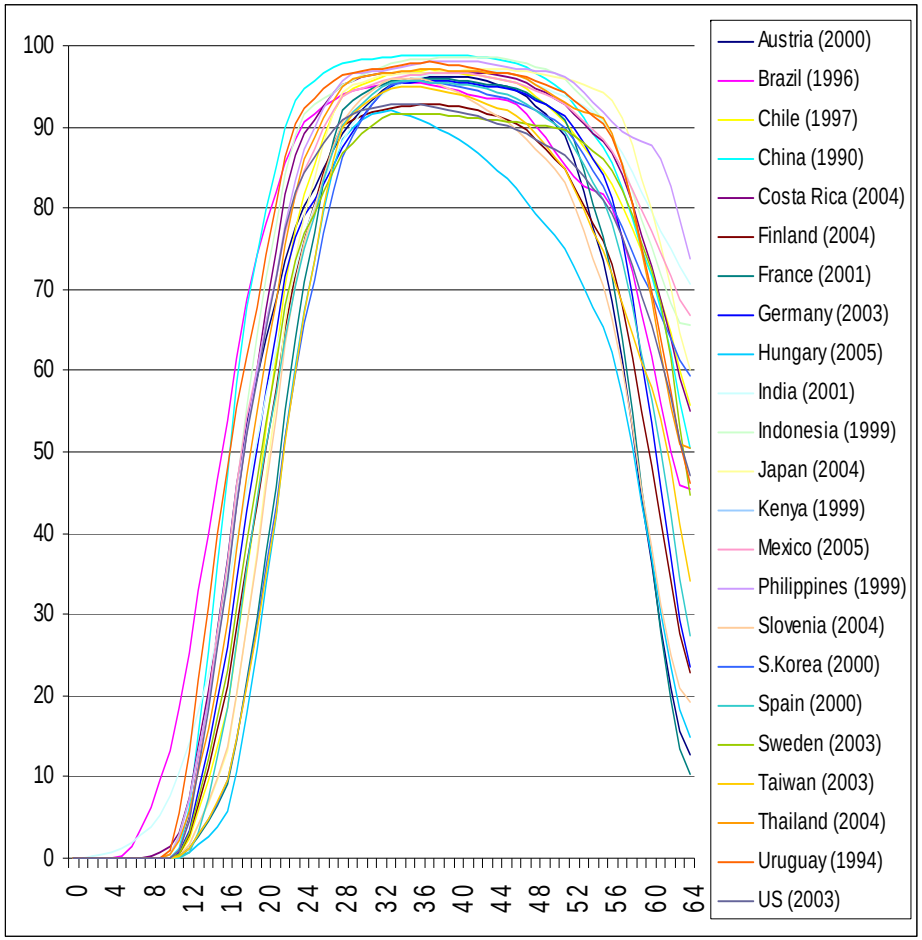


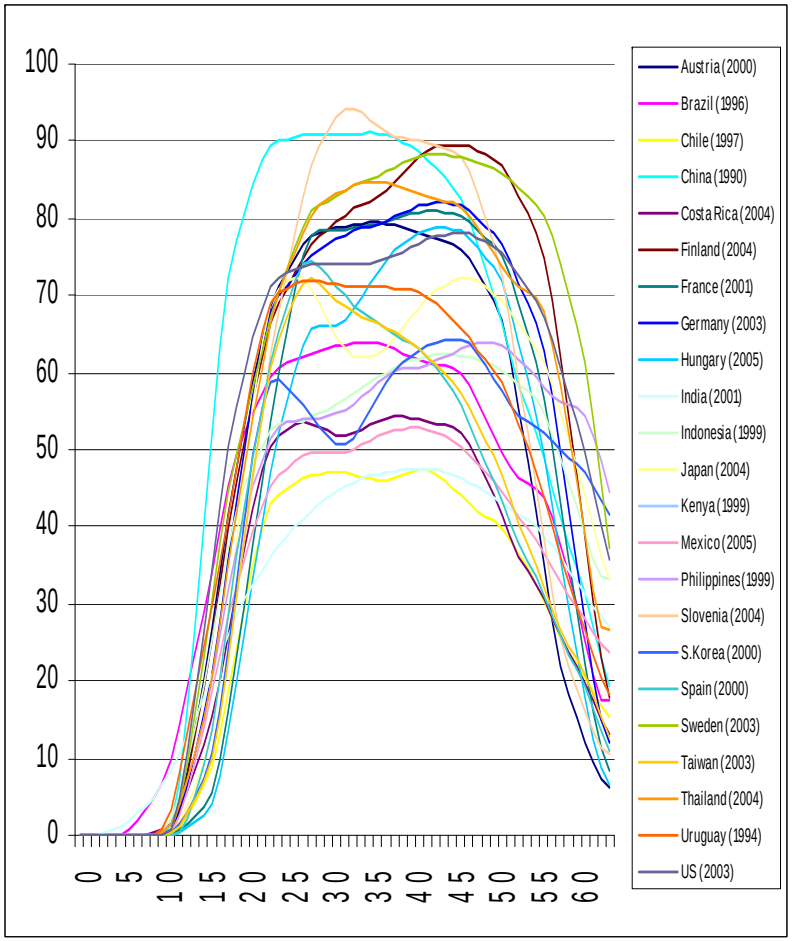
Activity Rate by 5-Year Age Groups: Taiwan, 1977-2007 (Male vs. Female)



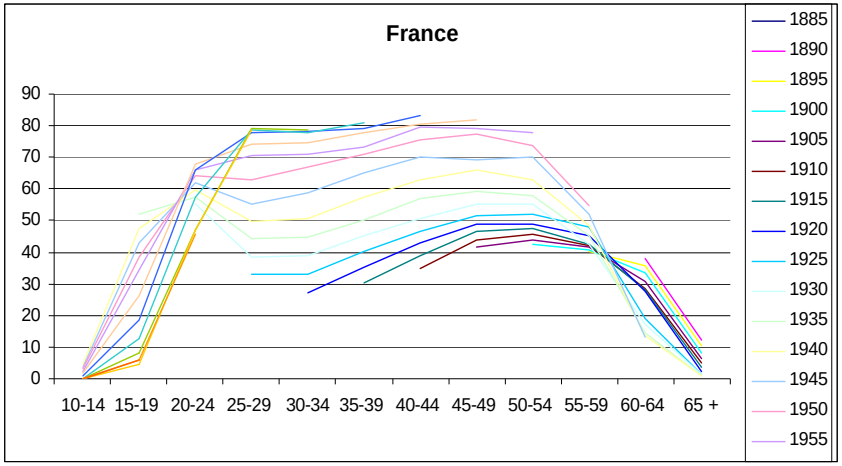


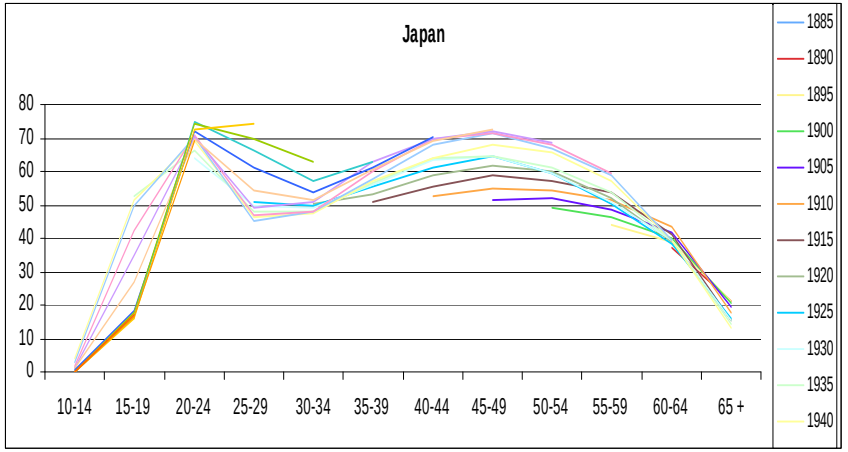
Activity Rate by Age: 22 Countries. (Male vs. Female)

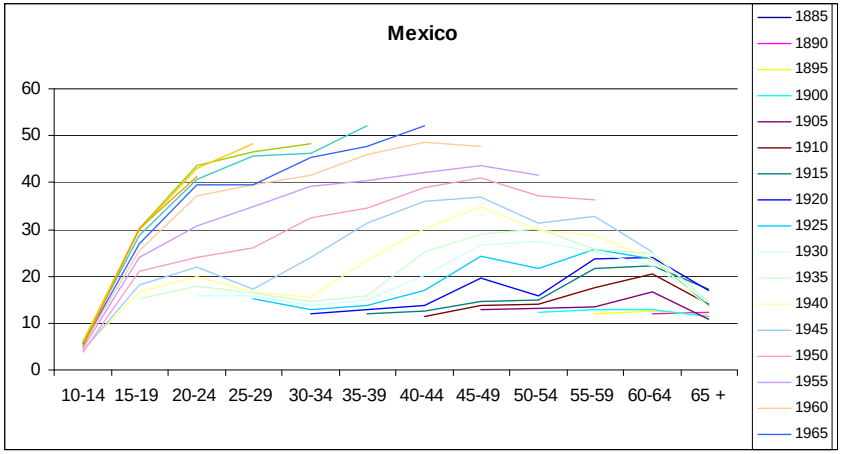


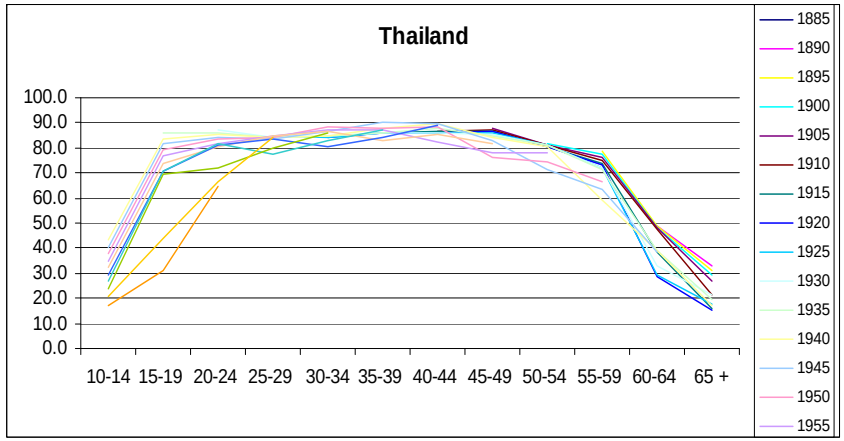


Female Activity Rate by 5-Year Age Groups: 1885-1980 Birth Cohorts









Relationship with Economic Development and Population Structure

- Level of development (per capita GDP) and industry structure
- Schooling/Labor quality
- Social Security Tax Enforcement
- Population Structure

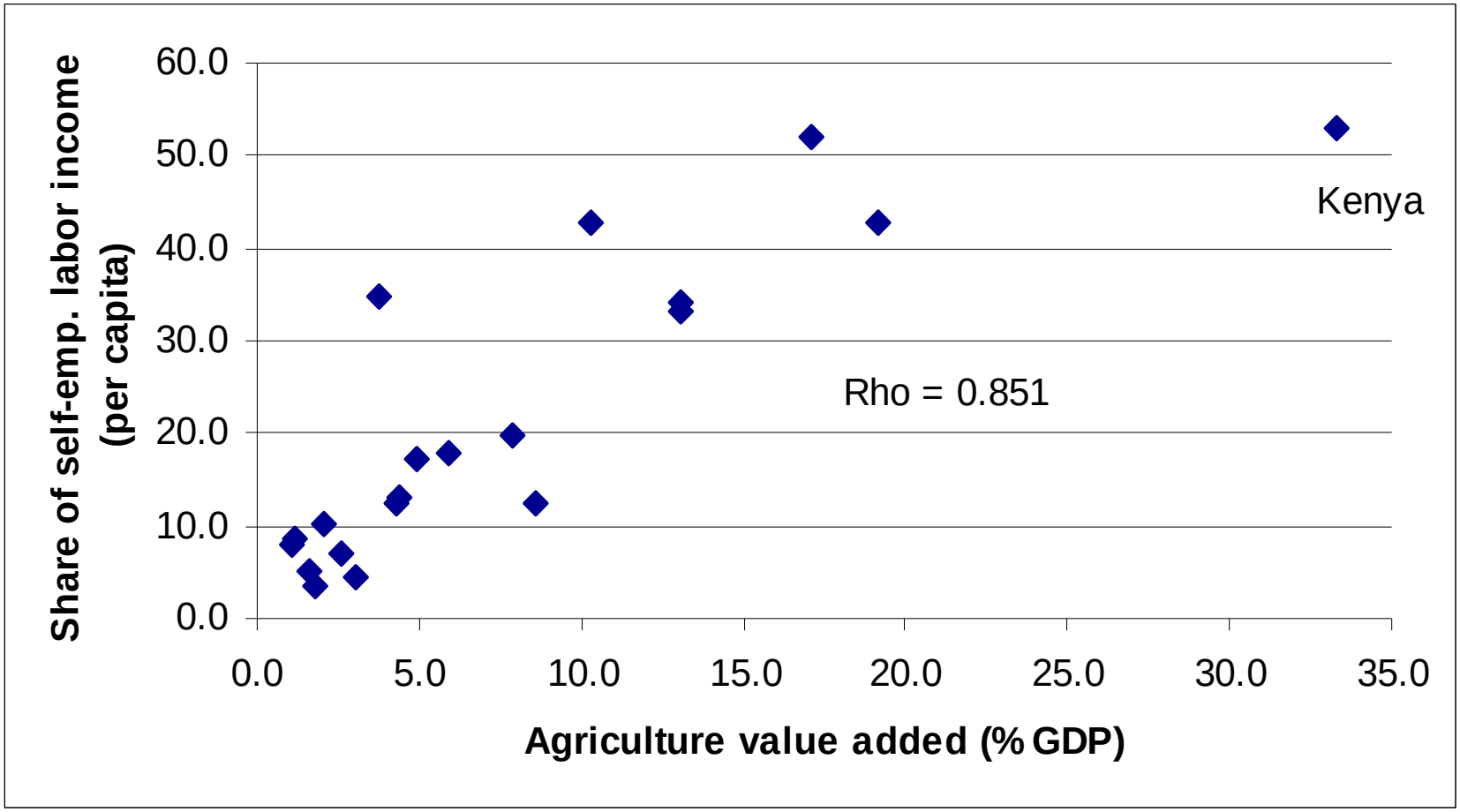
Correlation Coefficients between Quantitative Measures

	Mean age	Share self	Share 0-19	Share 65+	Source 0-19	Source 65+
Mean age	1.000					
Share self	0.099	1.000				
Share 0-19	-0.218	0.416	1.000			
Share 65+	0.580	0.638	0.423	1.000		
Source 0-19	-0.278	0.466	0.935	0.385	1.000	
Source 65+	0.322	0.829	0.357	0.865	0.458	1.000

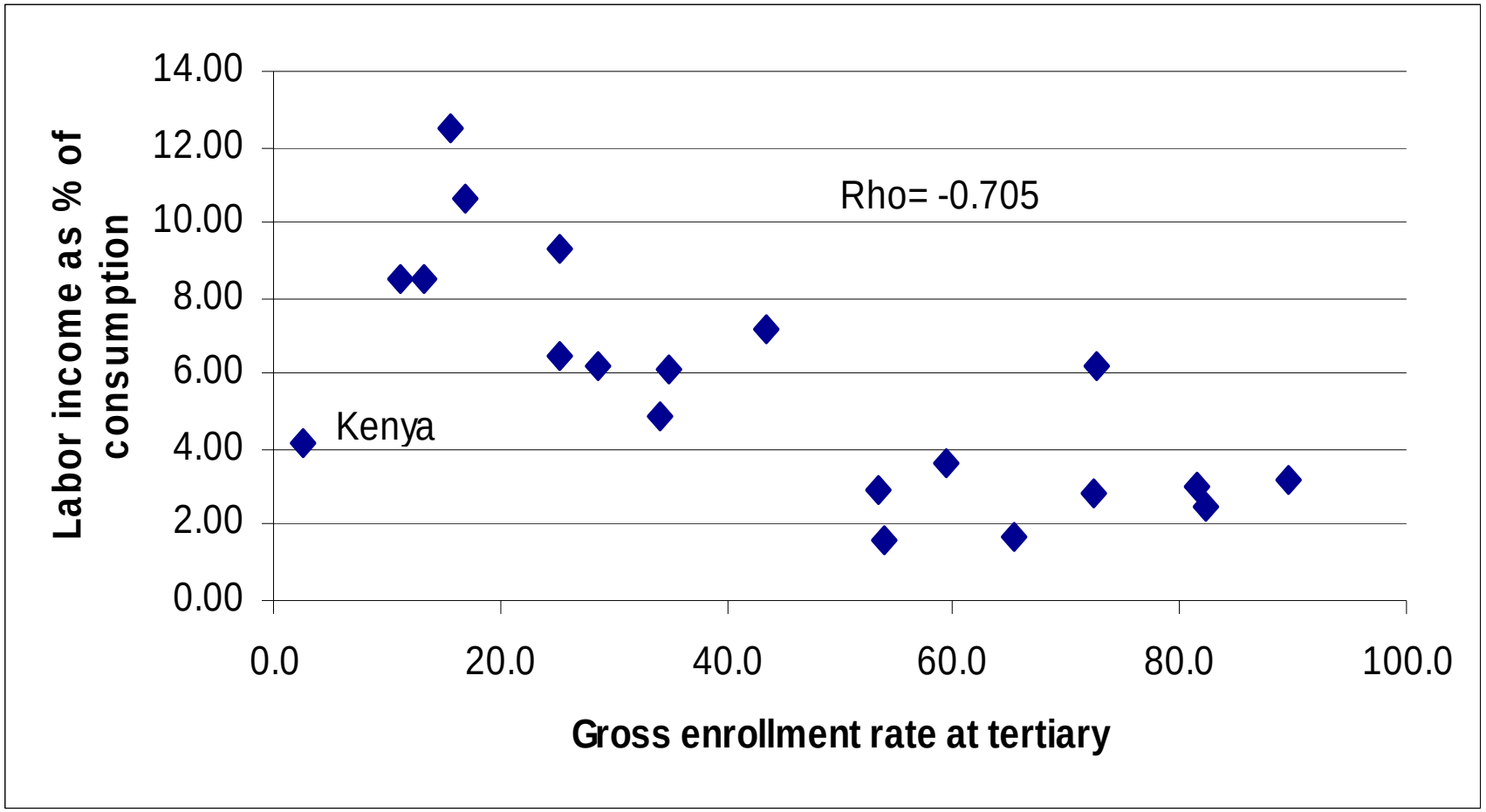
Correlation Coefficients with Macro/Pop Indicators

	Mean age	Share self-emp	Share 0-19	Share 65+	Source 0-19	Source 65+
	Economic Development (23 obs)					
% rural	0.024	0.486	0.198	0.119	0.387	0.364
% agri. value added	0.036	0.851	0.116	0.436	0.267	0.738
Per capita GDP	-0.038	-0.835	-0.470	-0.621	-0.526	-0.789
	Education/Labor Quality(15 obs)					
% secondary labor	-0.259	-0.381	-0.558	-0.606	-0.617	-0.454
% tertiary labor	0.538	-0.291	-0.476	0.069	-0.491	-0.103
Enroll-secondary	0.014	-0.819	-0.403	-0.551	-0.530	-0.780
Enroll-tertiary	-0.115	-0.790	-0.645	-0.659	-0.705	-0.755
	Social Security (18 obs)					
% Social Sec. revenue	-0.059	-0.844	-0.346	-0.624	-0.412	-0.847
% Social Sec. GDP	-0.258	-0.855	-0.406	-0.818	-0.444	-0.928
	Demography (23 obs)					
TFR	0.241	0.762	0.157	0.564	0.164	0.654
Old-age dependency	-0.113	-0.839	-0.538	-0.808	-0.572	-0.900
Young-age dependency	0.213	0.821	0.262	0.671	0.263	0.766

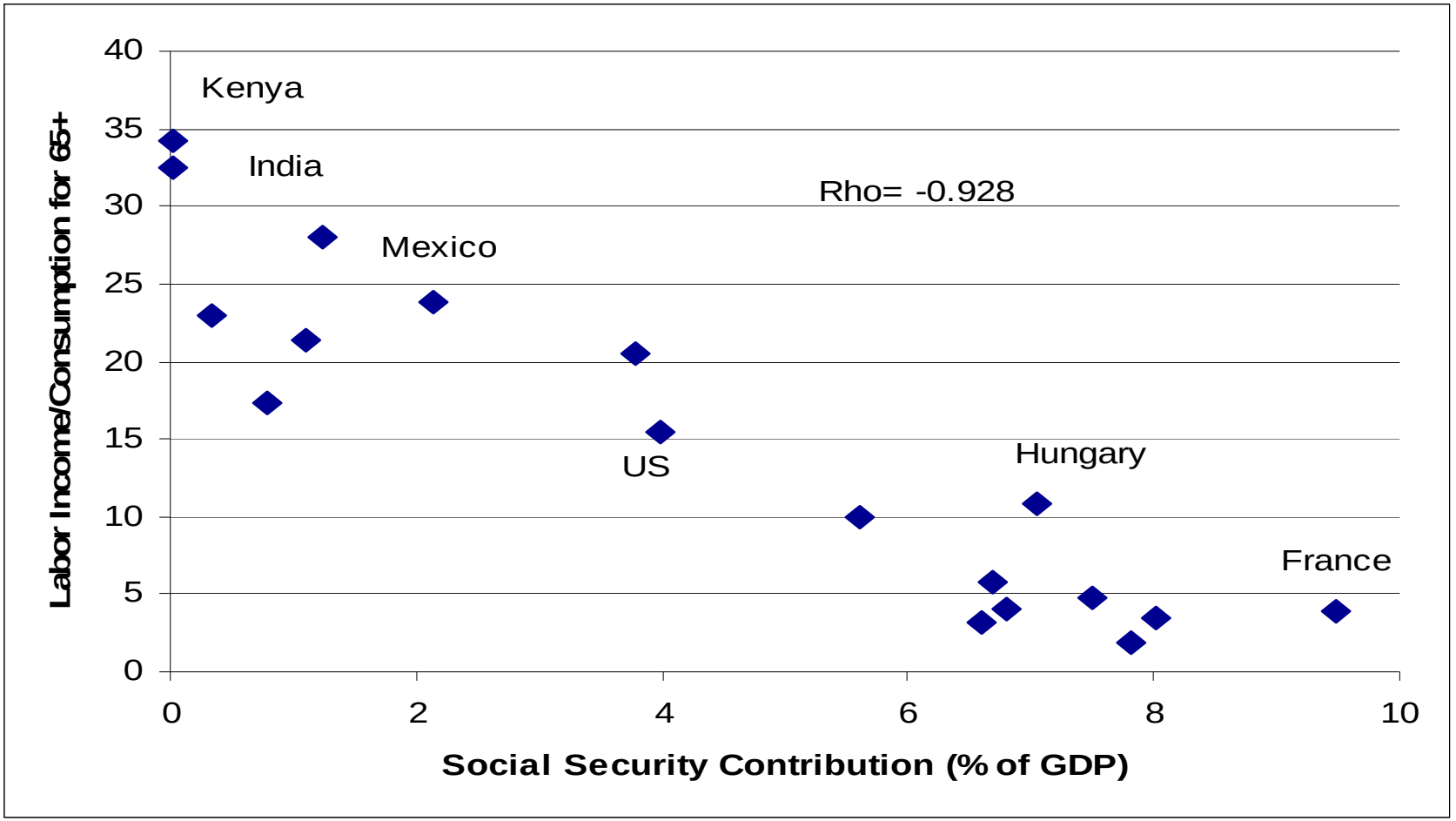
Agriculture Sector Value Added (% of GDP) vs. Share of Self-Employment Income



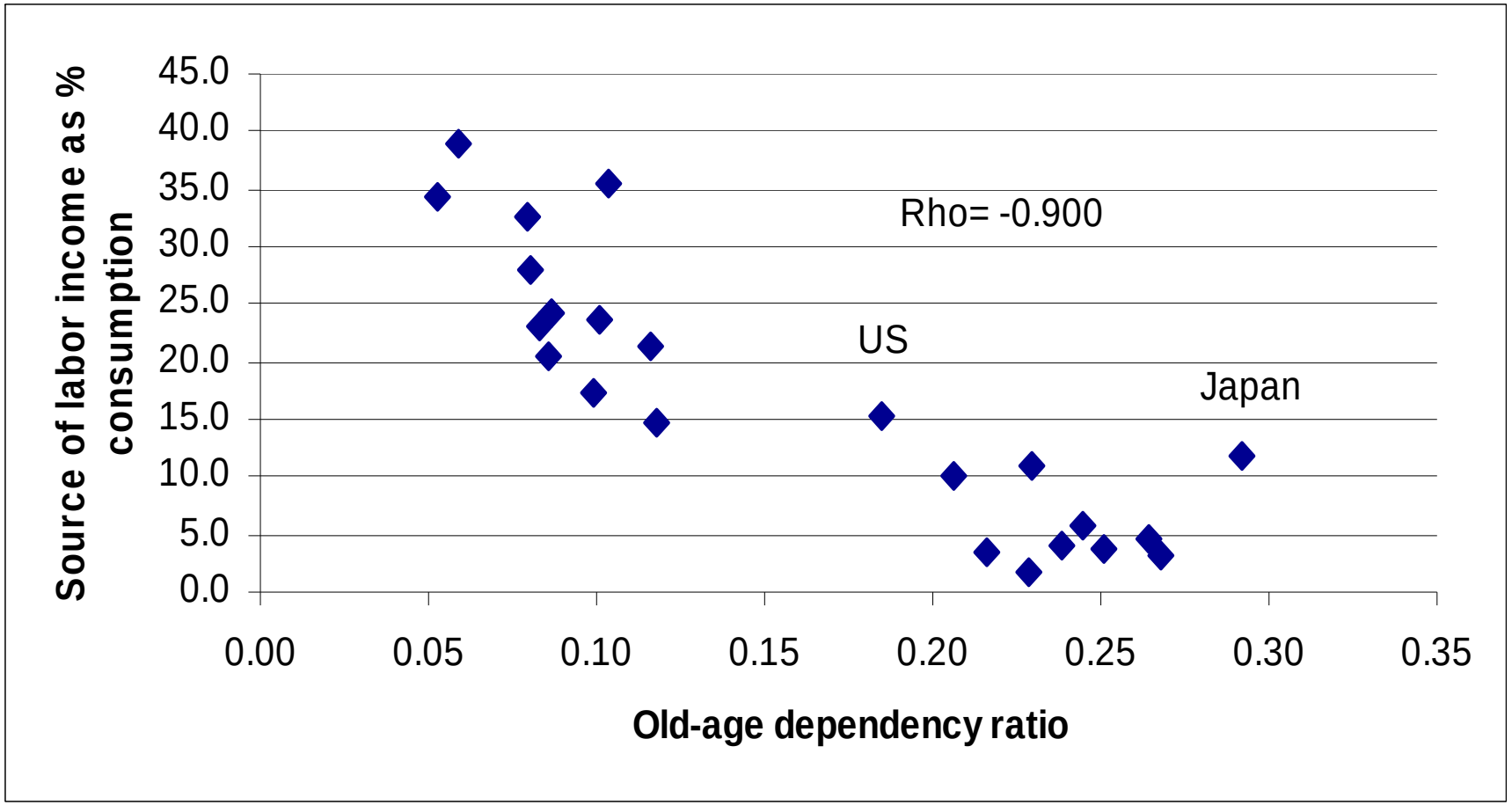
School Enrollment Rate (Tertiary) vs. Labor Income/Consumption for 0-19



Social Security Contribution as a Percent of GDP vs. Labor Income/Consumption for 65+



Old-Age Dependency Ratio vs. Labor Income/Consumption for 65+



Concluding Remarks

- Conventional way of looking at either LFPR or earnings of workers may not provide a comprehensive picture for the economic-life cycle. The labor income profile could be very different for countries with similar LFPR or vice versa.

- Decisions made by elderly, children, and women are important in shaping the labor income profiles across countries and over time.

- The quantitative measures of labor income profile appear to be related with some macroeconomic or demographic indicators.

- Labor income is still important source of financing consumption for elderly in some countries. But it appears to be deteriorate as population age.

The End
Thank you!