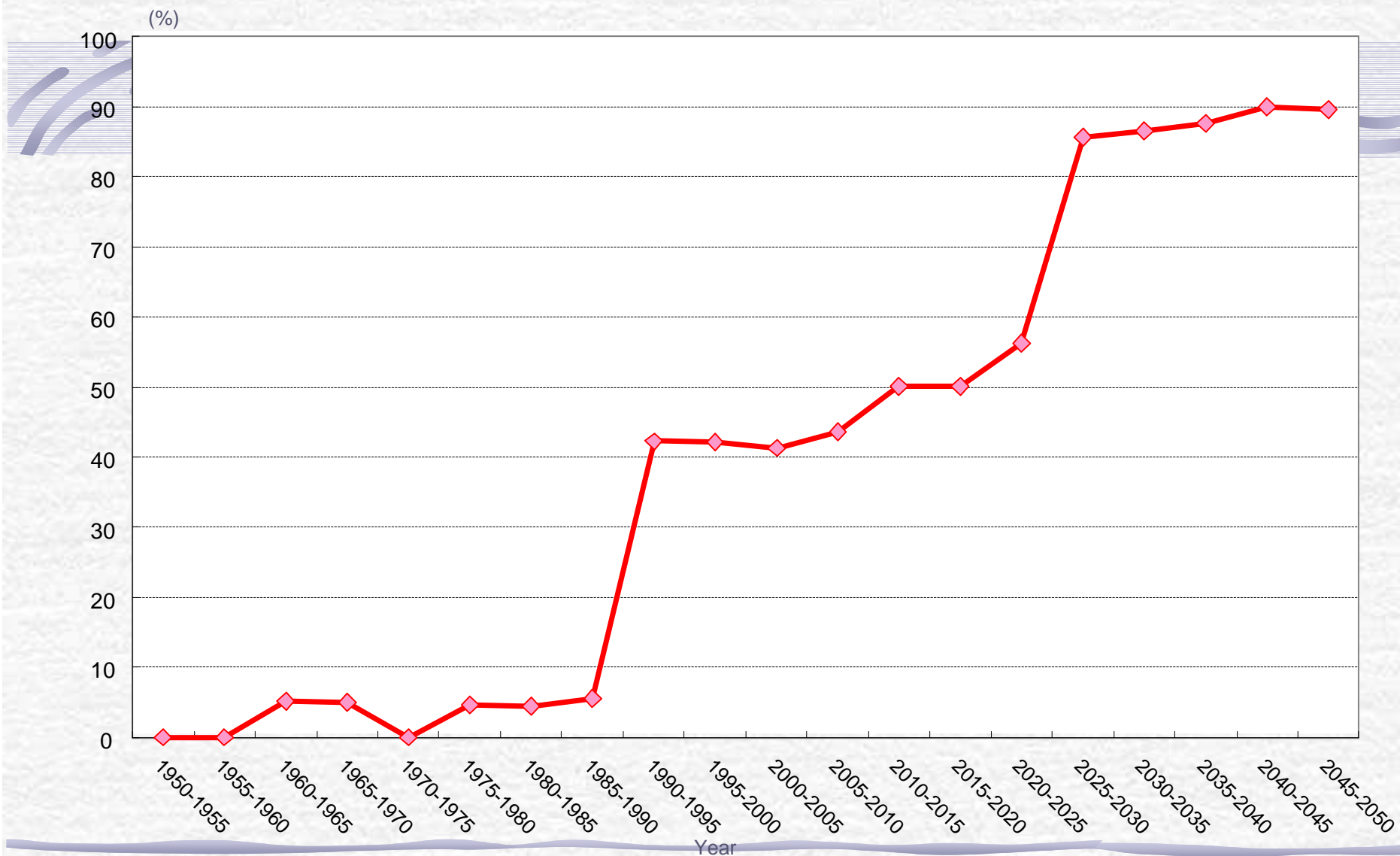


Declining Fertility and Rising Cost of Children and the Elderly in East Asian Countries

**Naohiro Ogawa
Andrew Mason
Rikiya Matsukura
Amonthep Chawla
An-Chi Tung**

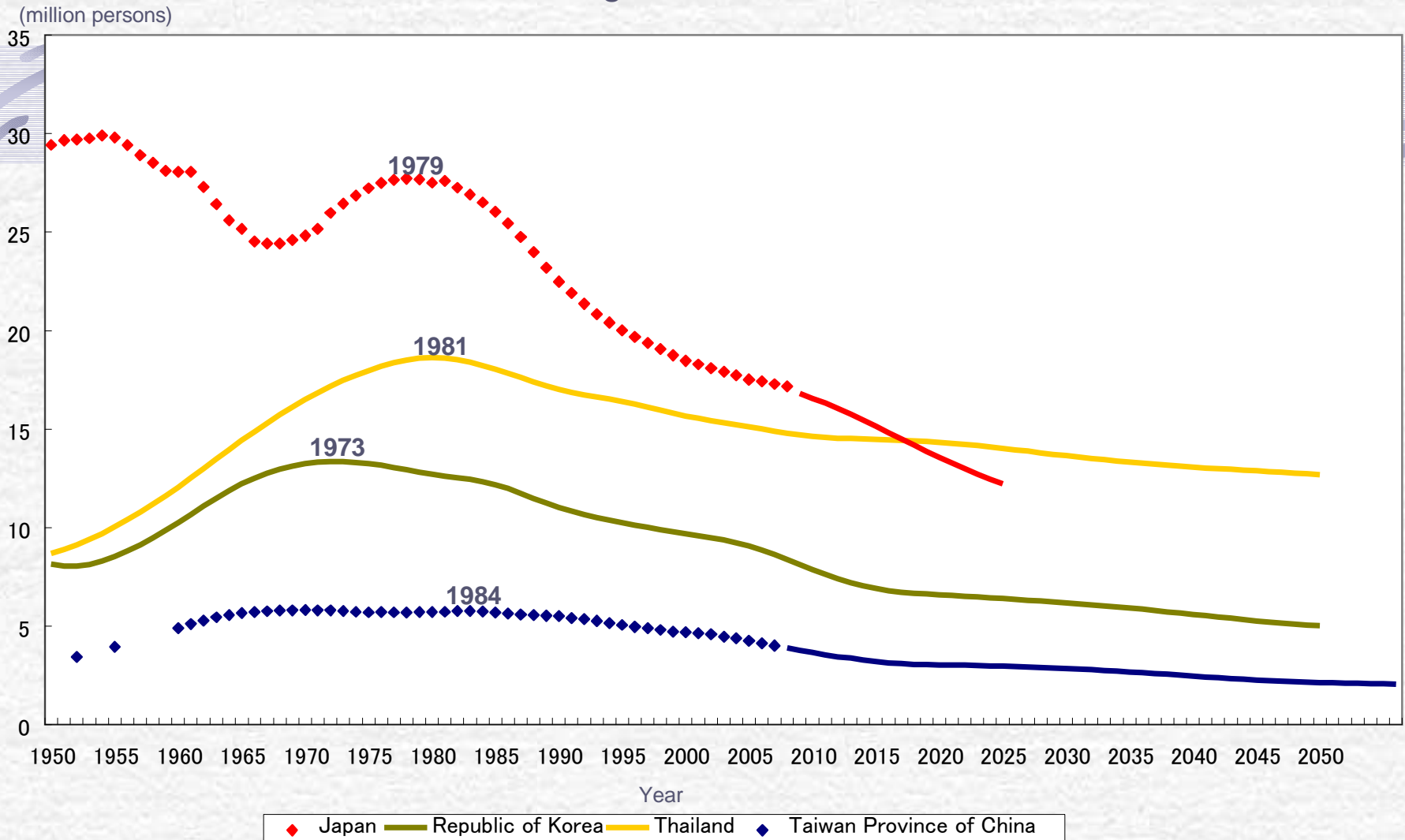
*7th Global NTA Meeting: Population Aging and the Generational Economy,
June 11-12, 2010, Honolulu, Hawaii*

Figure 1. Proportion of the population with below replacement-level fertility in Asia's total population



Source: United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2008 Revision*, New York, 2009 (advanced Excel tables).

Fluctuation in the number of children in four selected Asian countries and regions, 1950-2056

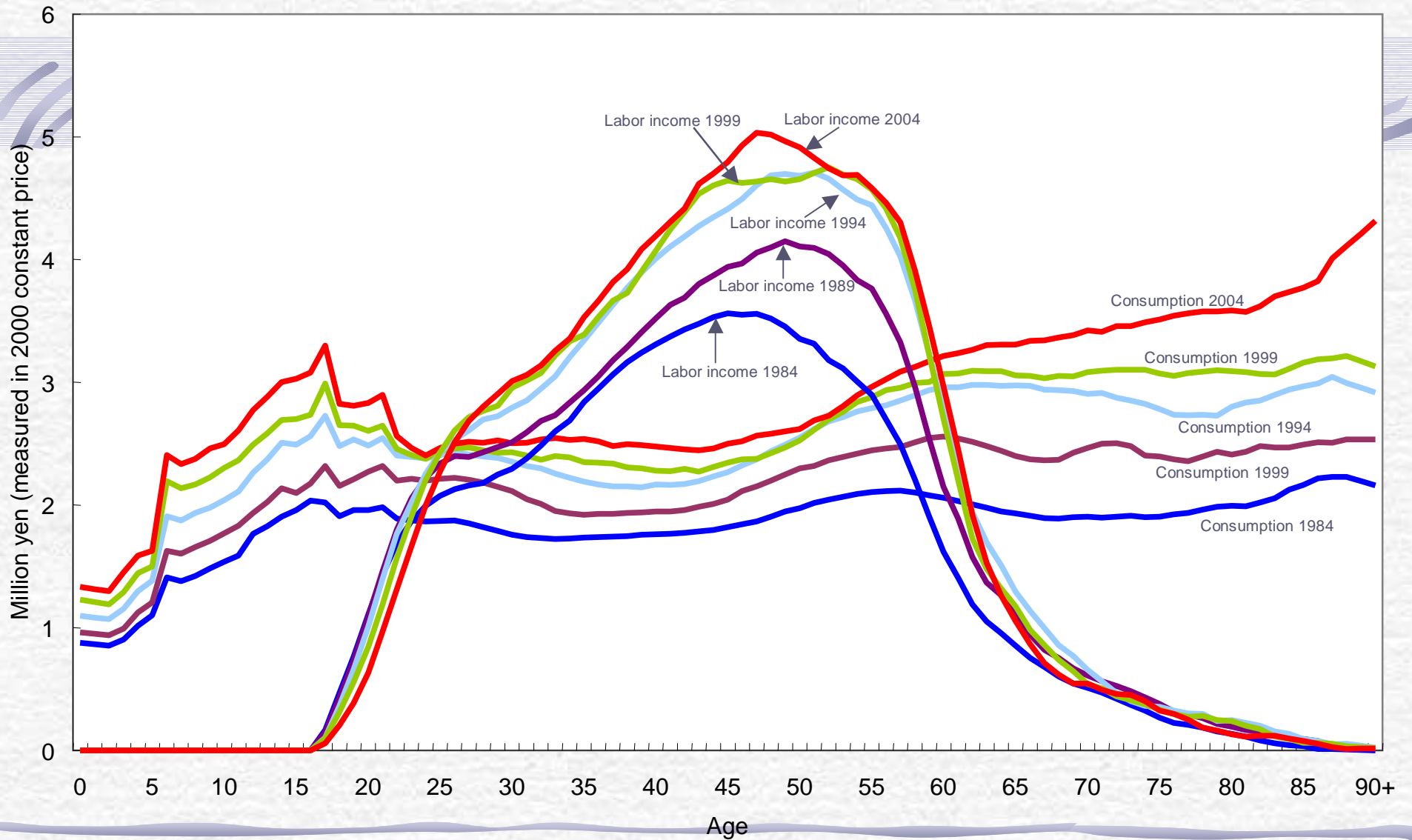


Data for Japan for 1950-2008: Statistics Bureau of Japan, various years, *Population estimates*; and 2009-2025 Ogawa et al. (2003) *NUPRI Population Projection*.

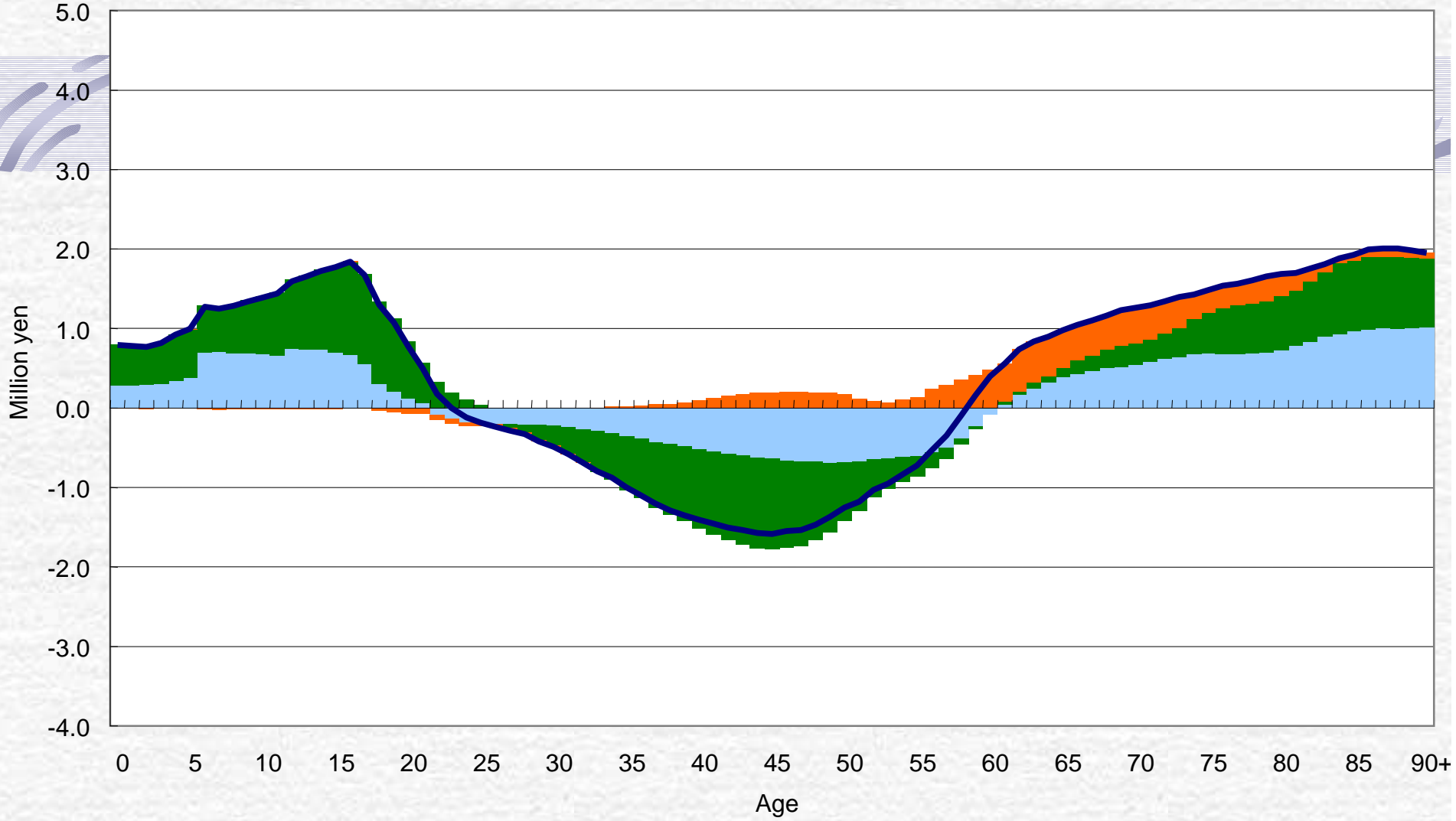
Data for Republic of Korea, and Thailand: United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2008 Revision*, New York, 2009 (advanced Excel tables).

Data for Taiwan Province of China until 2007: Council for Economic Planning and Development of Taiwan, *Taiwan Statistical Data Book 2002 and 2009*. Data for the period 2008-2056: Council for Economic Planning and Development of Taiwan, *Population Projections for Taiwan Areas: 2008-2056*.

Figure 6. Age-specific profiles of per capita consumption and production: Japan, 1984-2004

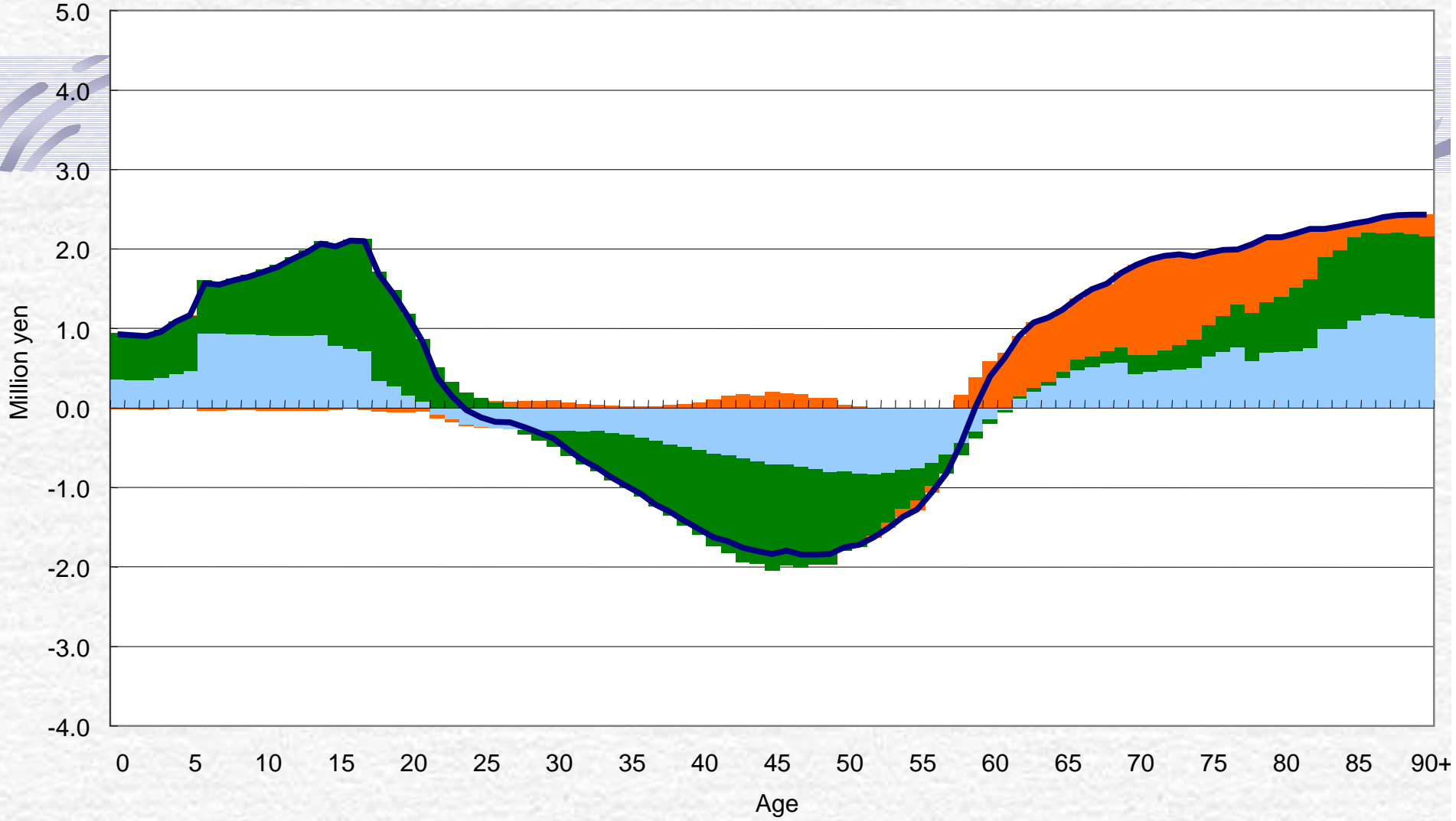


1984



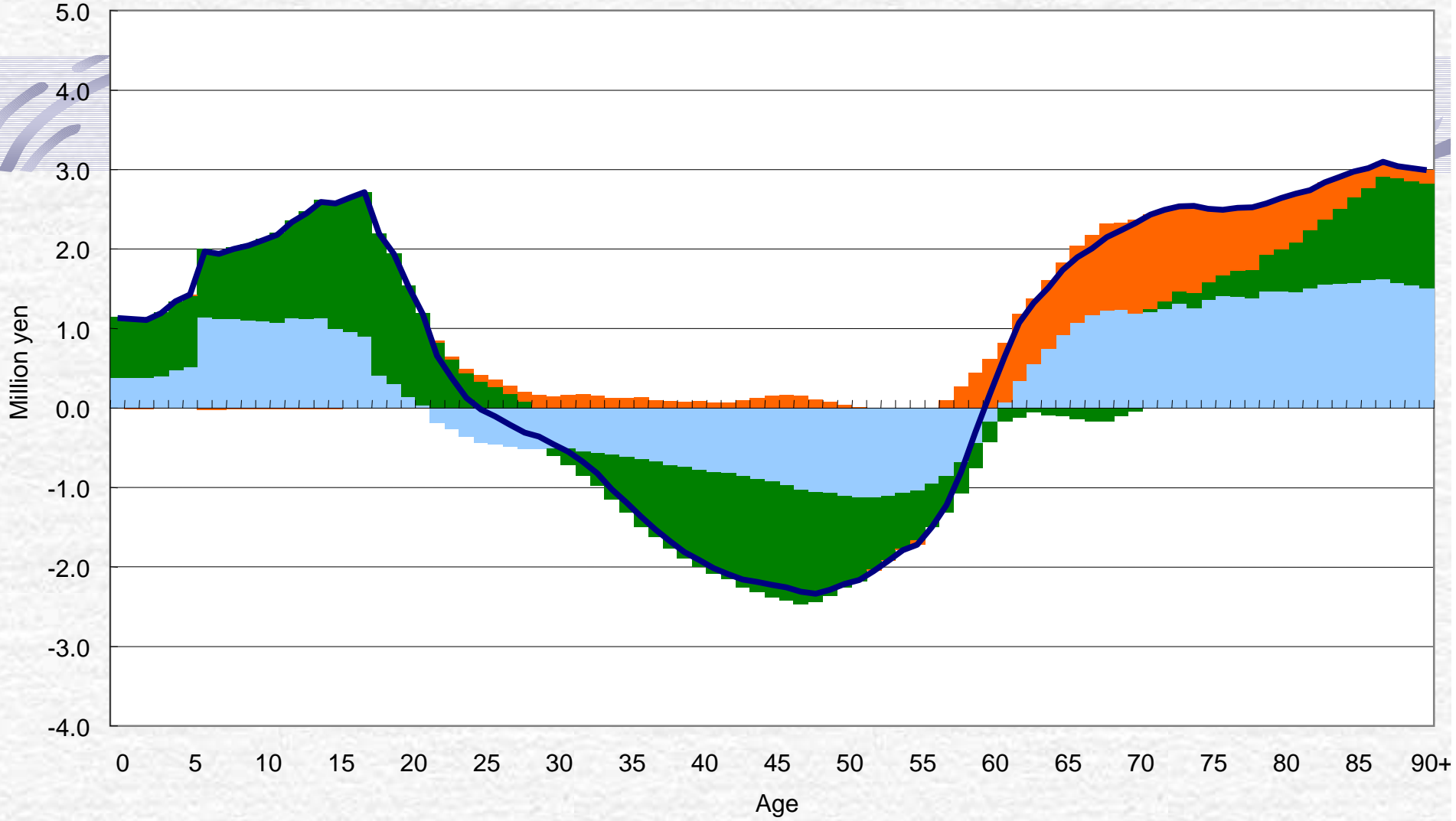
Public transfers Private transfers Asset based reallocations Life cycle deficits

1989



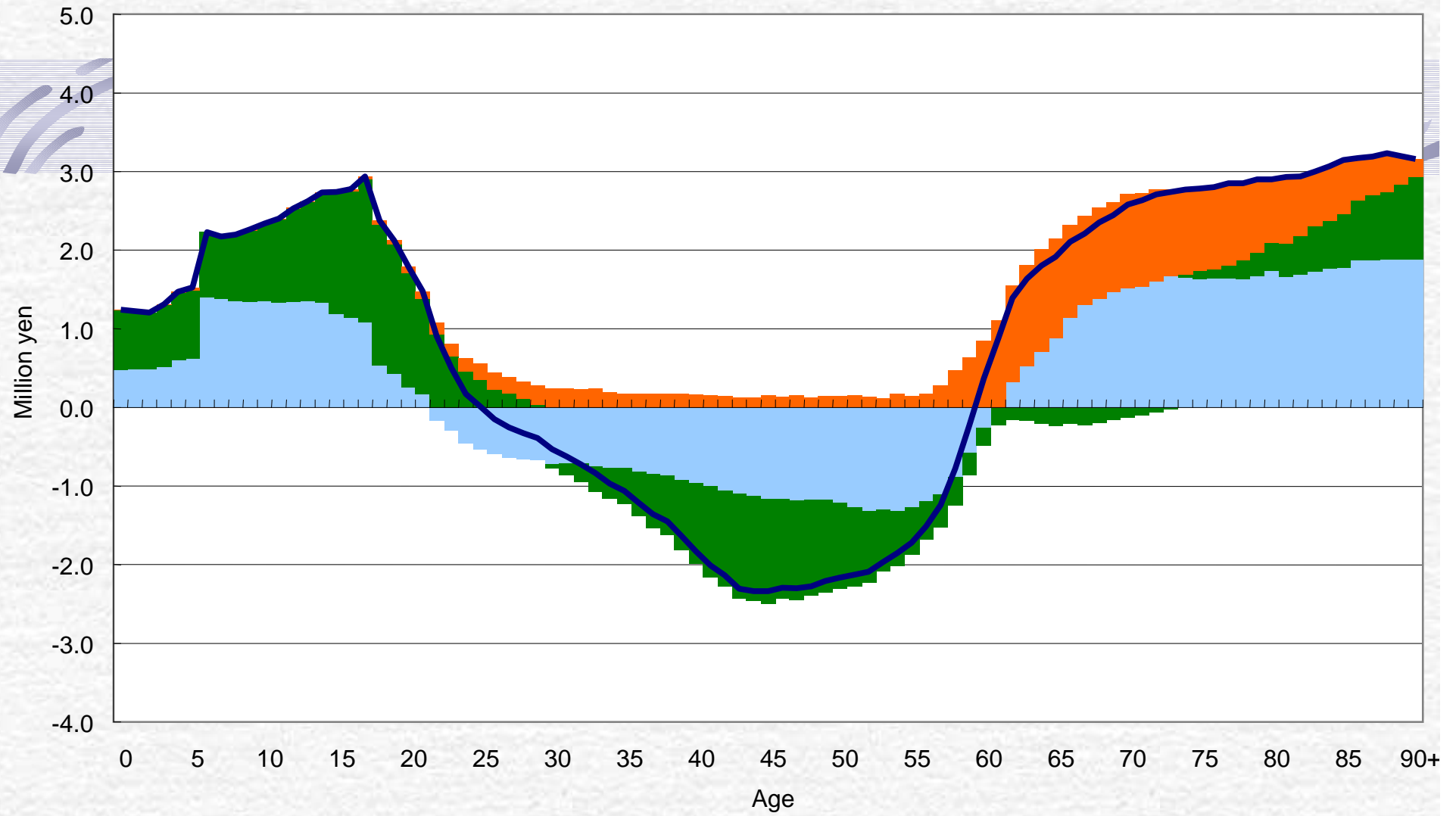
Public transfers Private transfers Asset based reallocations Life cycle deficits

1994



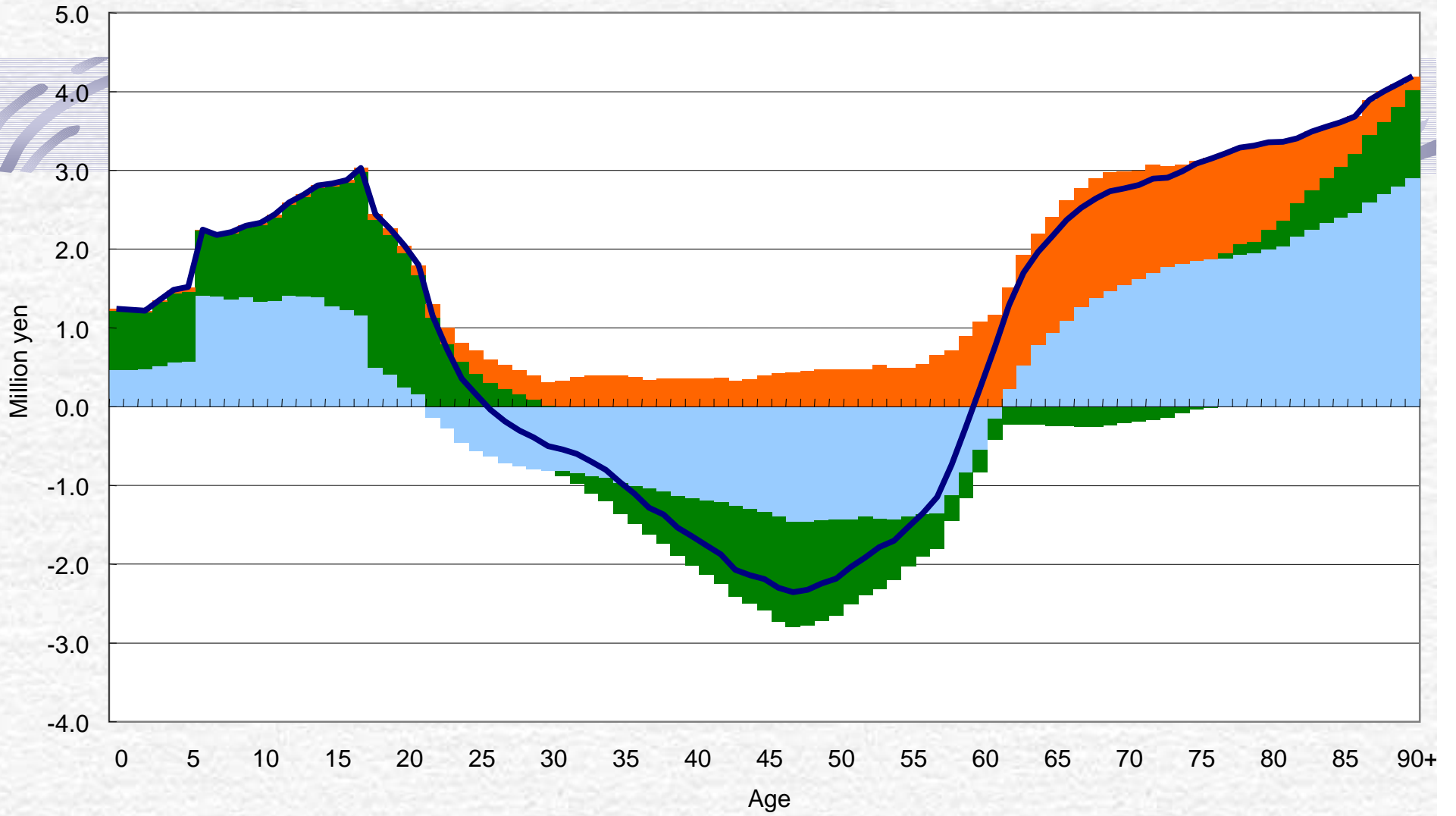
Public transfers Private transfers Asset based reallocations Life cycle deficits

1999



Public transfers Private transfers Asset based reallocations Life cycle deficits

2004



Public transfers Private transfers Asset based reallocations Life cycle deficits

**Our recent work on the
declining fertility and the
rising cost of children in East
Asian countries**

***Asian Population Studies,*
Vol.5, No.3, 2009, by the
same authors**

Calculation of child cost

- ① Lifecycle deficit (LCD) from age 0 to the self-supporting age (24 years old for 1984 and 26 years old for 2004)
- ② Standardized by mean labor income age 30-49 (for international comparison)
- ③ 13.0 years for Japan in 2004 compared with 9.6 years for 1984
- ④ TFR dropped from 1.81 to 1.29

Sampled countries

- The same computation was applied to NTA's Asian countries (1977-2004, 47 observed values)
- Taiwan has the highest value of the per capita normalized LCD for children: 14 years in 2003
- East Asian group: Japan, South Korea, Taiwan, and **Thailand**

Figure 5. TFR vs. normalized per capita LCD for children in selected Asian countries

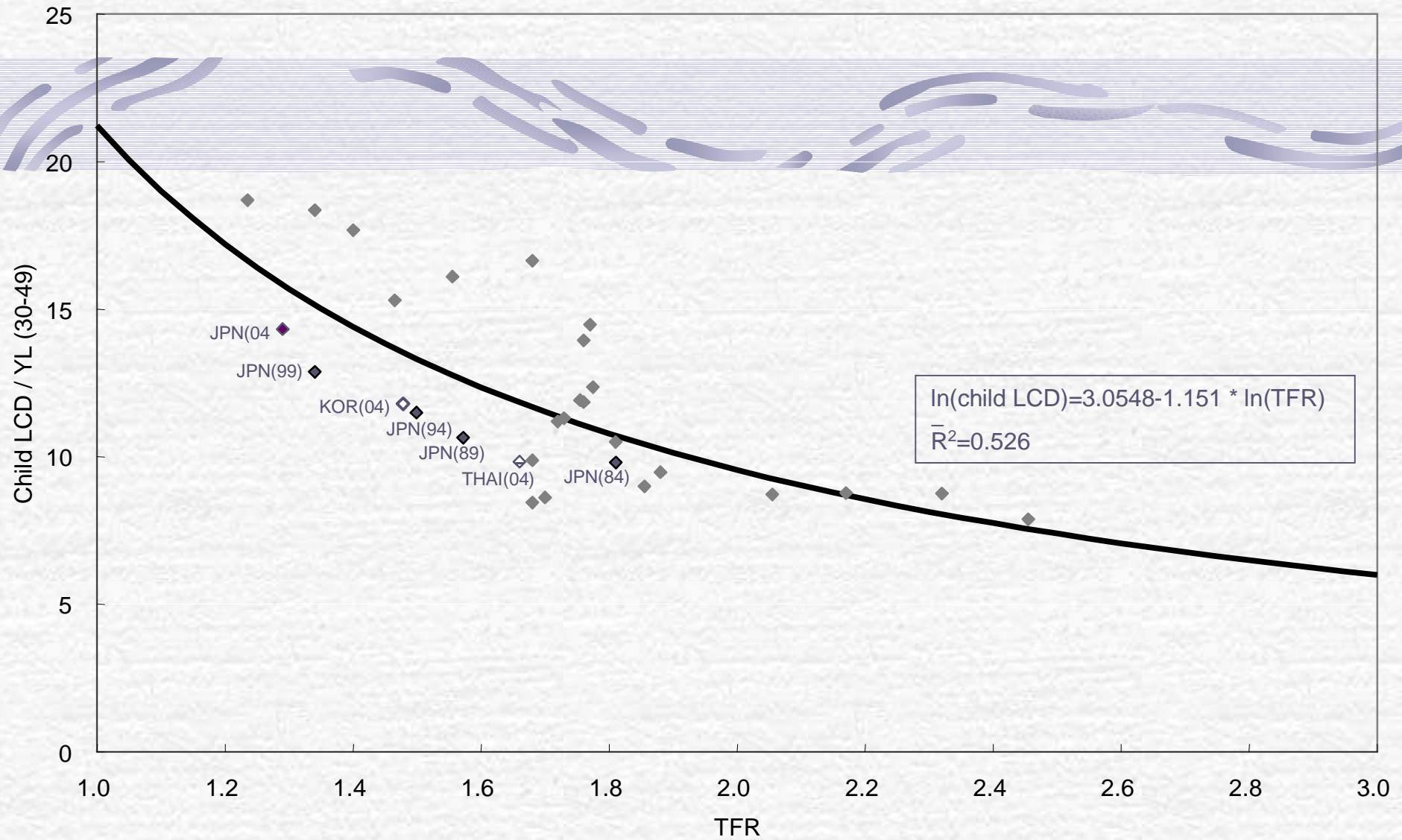


Figure 6. TFR vs. normalized per capita LCD for children in Japan, 1984-2004

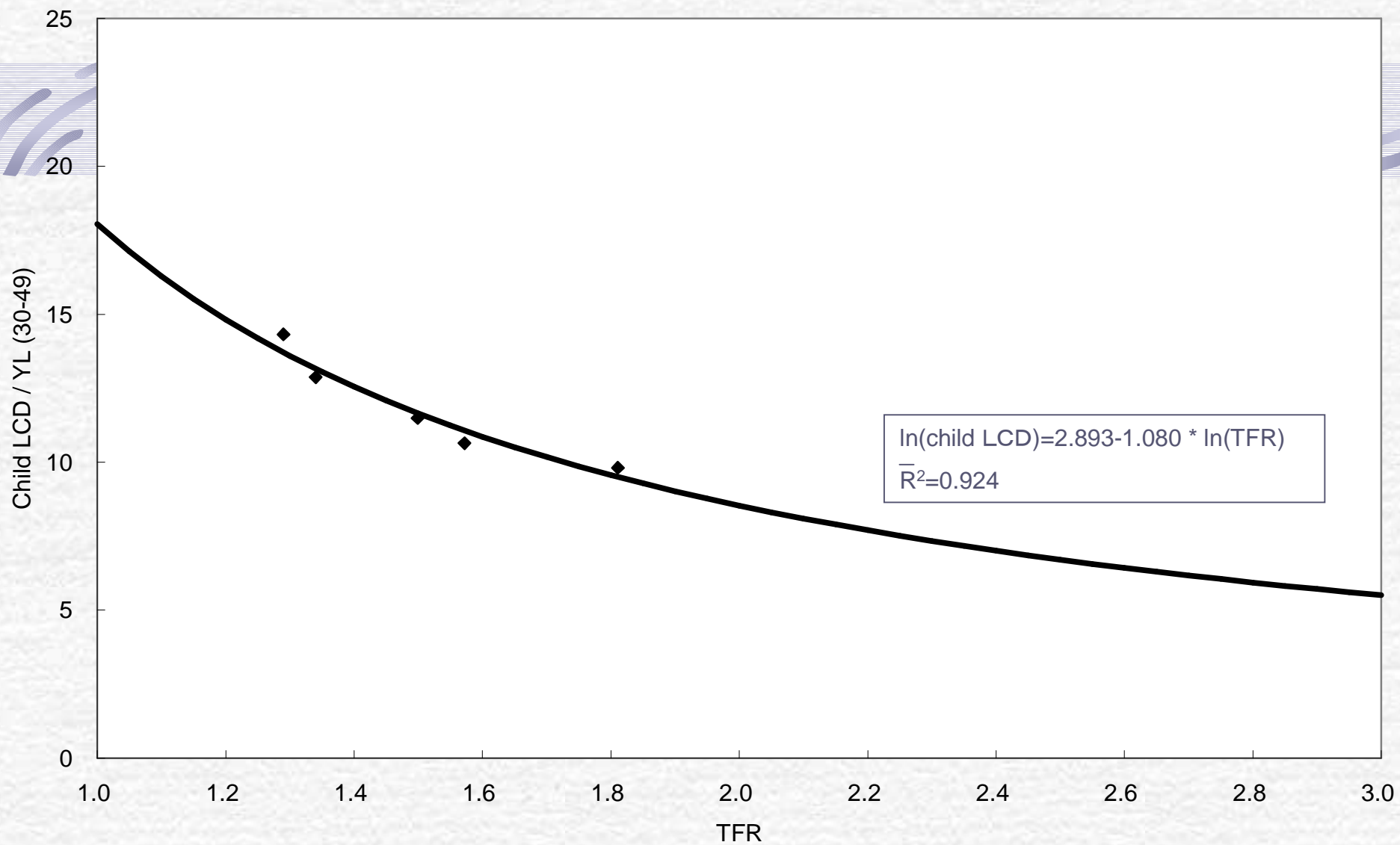
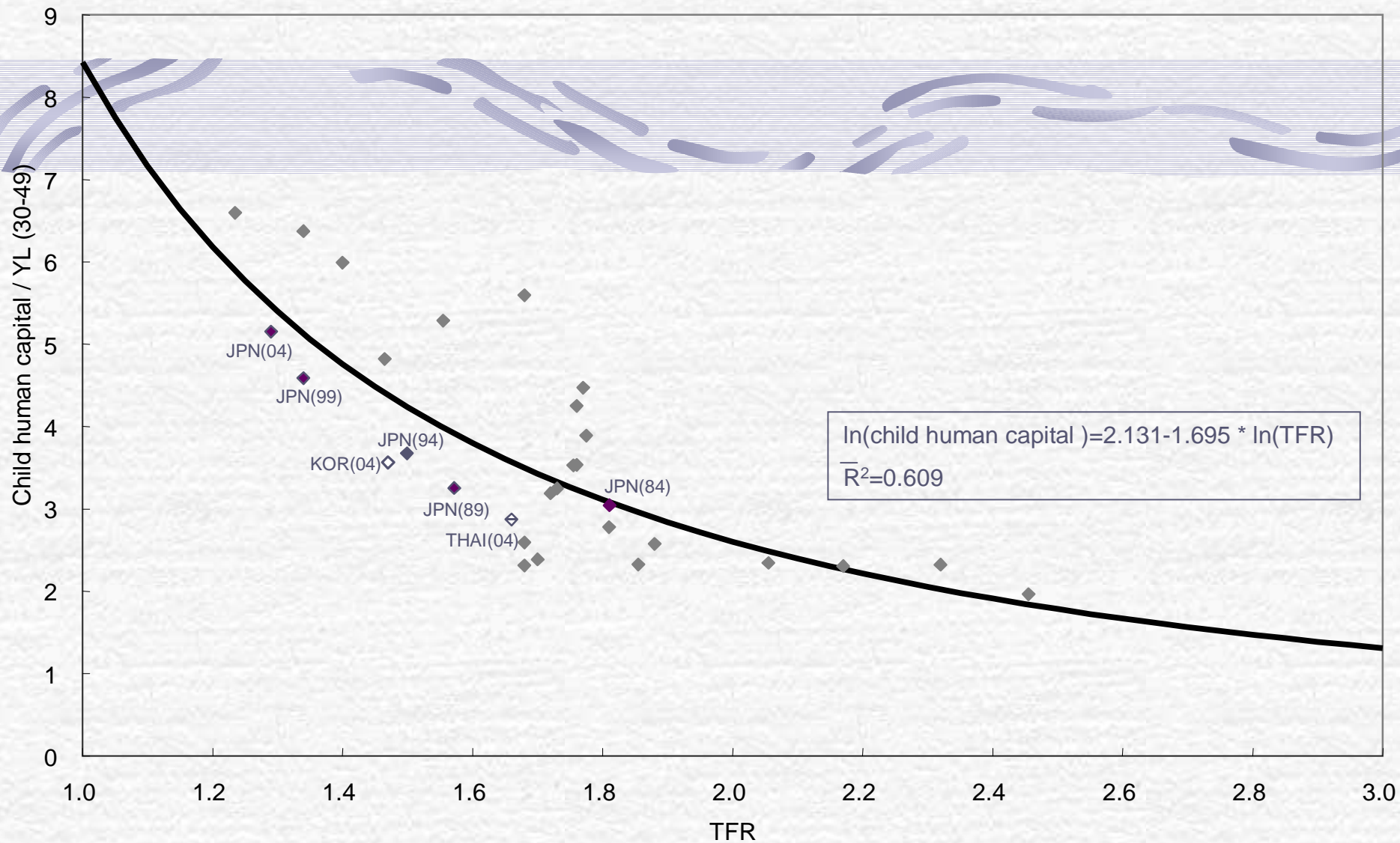


Figure 7. TFR vs. normalized per capita human capital spending for children in selected Asian countries



Quantity-Quality Tradeoff: interpretation of elasticities

- $\ln C = b_0 + b_1 \ln N$
where C =cost per child and
- N =number of children

- $\ln CN$ (cost per adult) =
- $b_0 + (b_1 + 1) \ln N$
- **KEY: $b_1 > -1$ or < -1**

**One of the major criticisms
we encountered was:**

**“The amount of resources allocated
to children must be heavily
dependent upon the amount of
resources allotted to the elderly”**

**In this new paper, therefore,
we examine both the cost of
children and the elderly in
the context of declining
fertility in East Asia**

**Is the amount of resources
allocated to children **crowded out** by
the increasing amount of resources
for the elderly?**

Asian Data

East Asia

South Korea 2000

Japan 1984 1989 1994 1999 2004

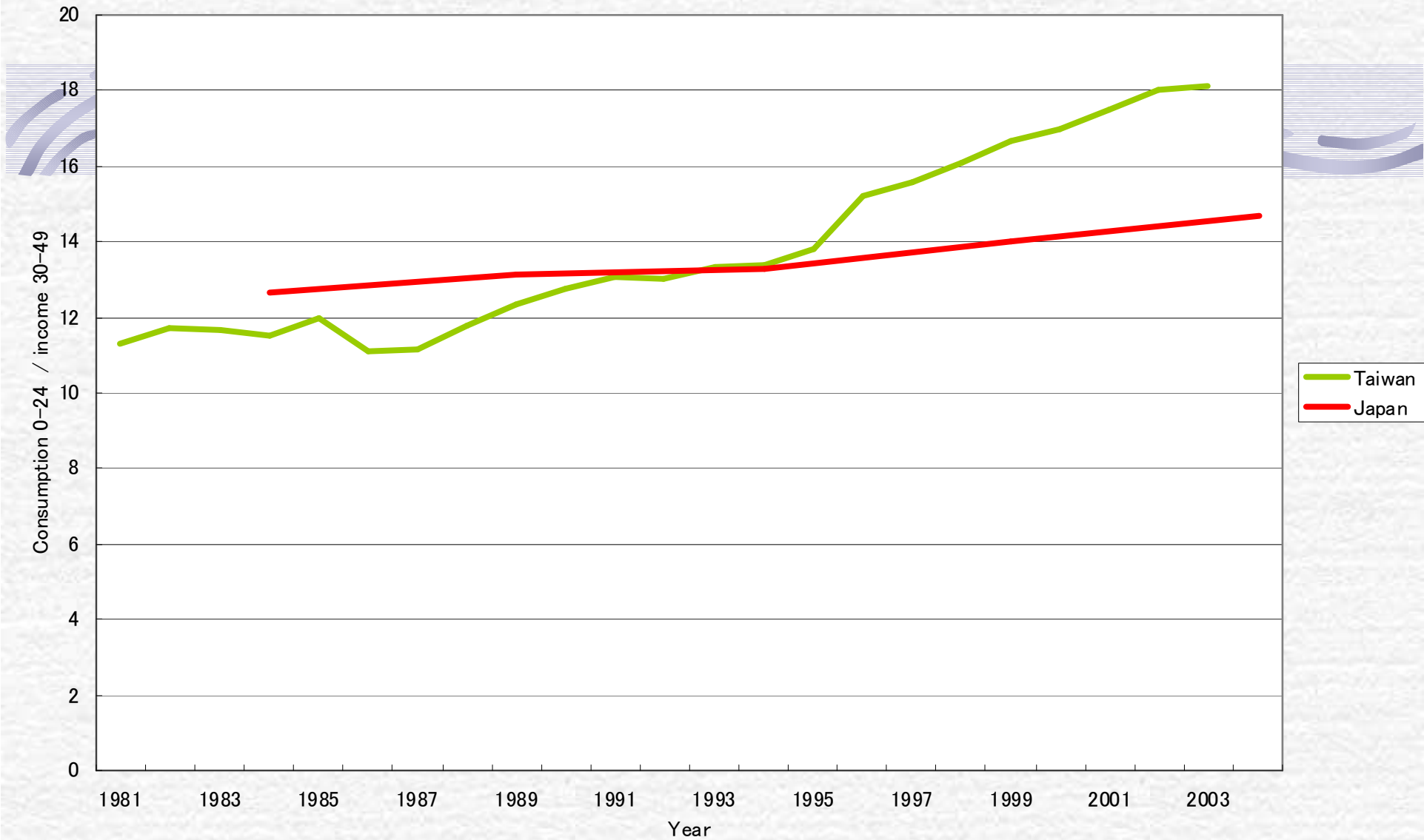
Taiwan 1981 1982 1983 1984 1985 1986 1987 1988
1989 1990 1991 1992 1993 1994 1995 1996 1997
1998 1999 2000 2001 2002 2003

Other Asian countries

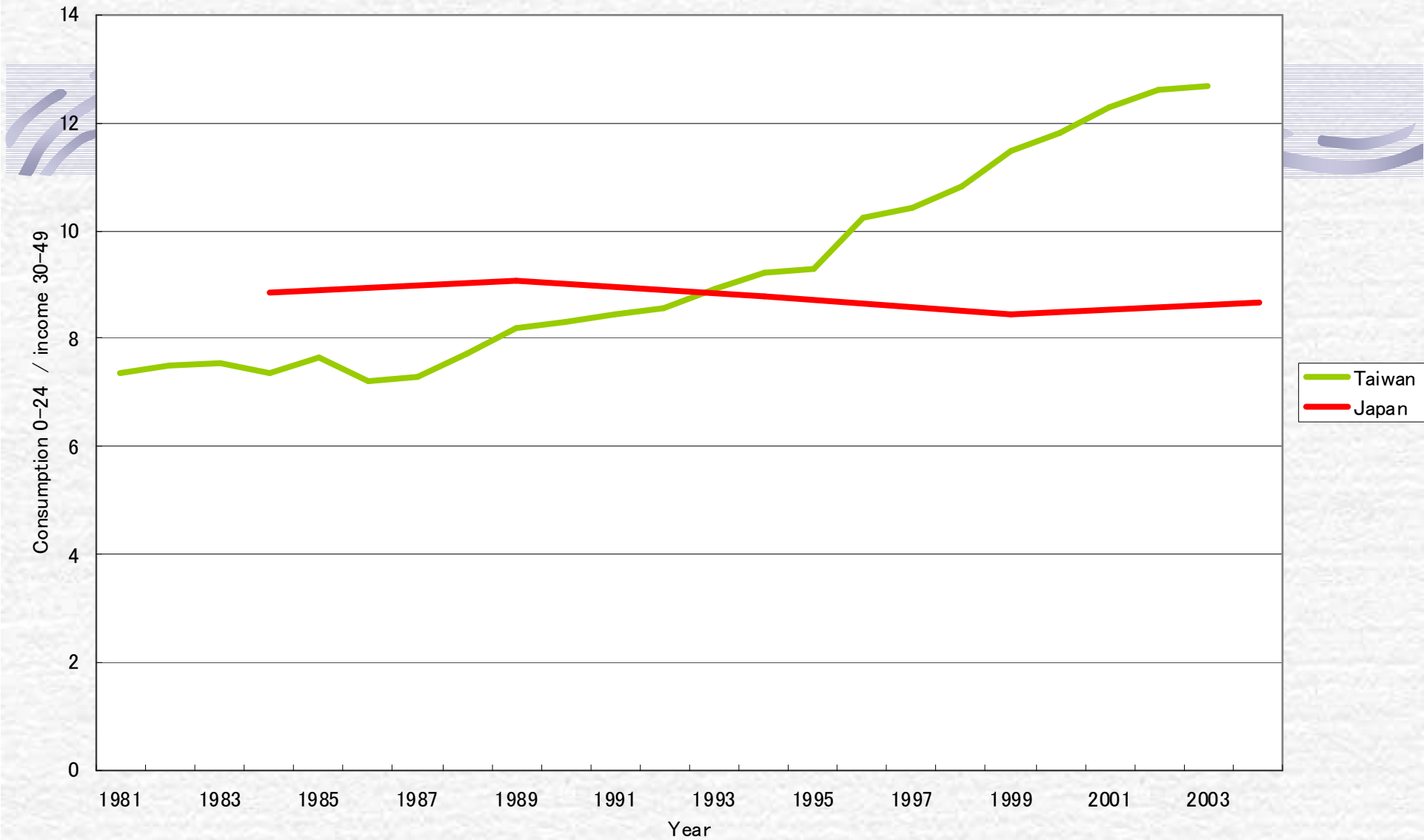
Thailand 1981 1986 1988 1990 1992 1994 1996 1998
2000 2002 2004

Philippines 1999

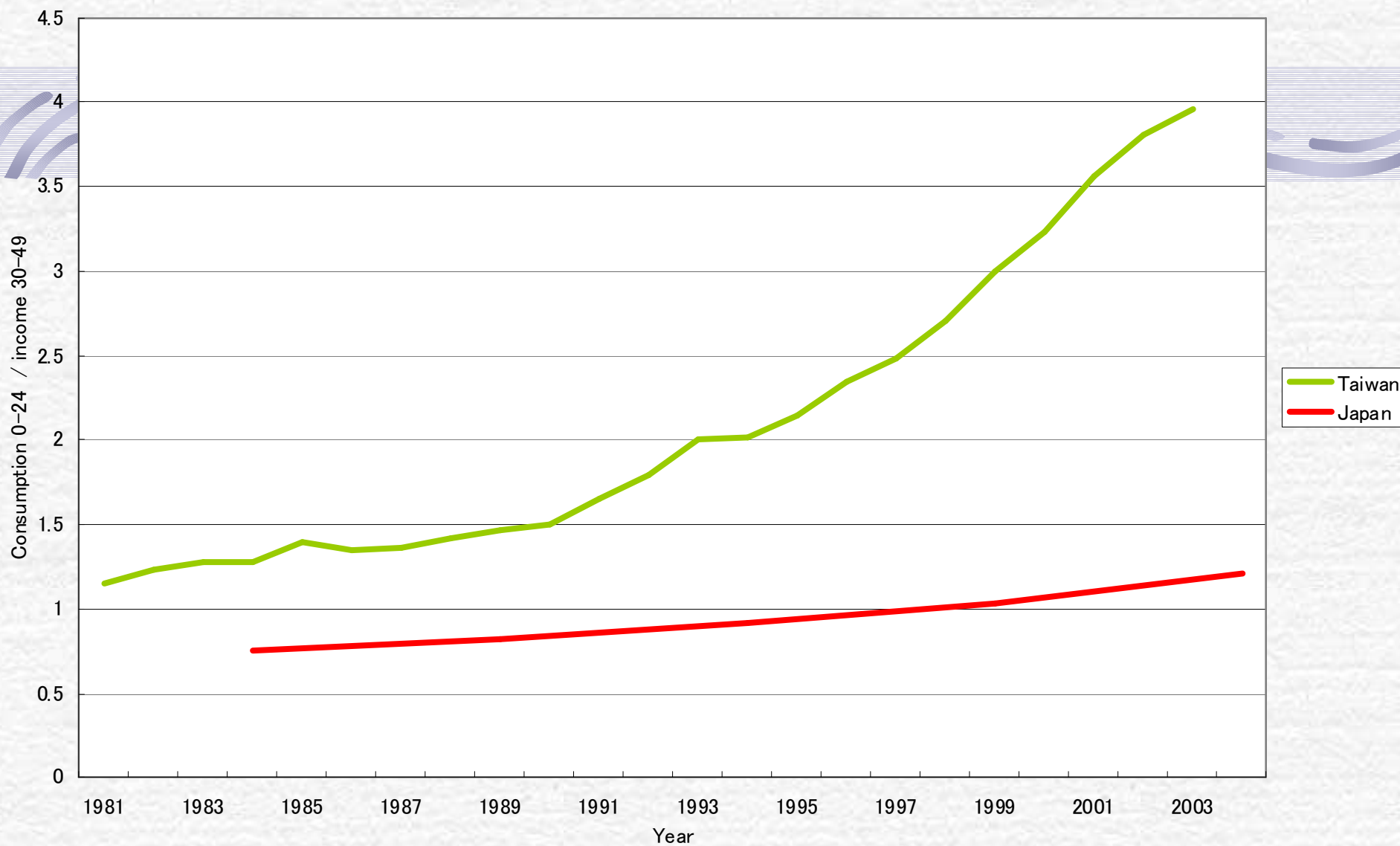
Consumption 0-24



Private Consumption 0-24



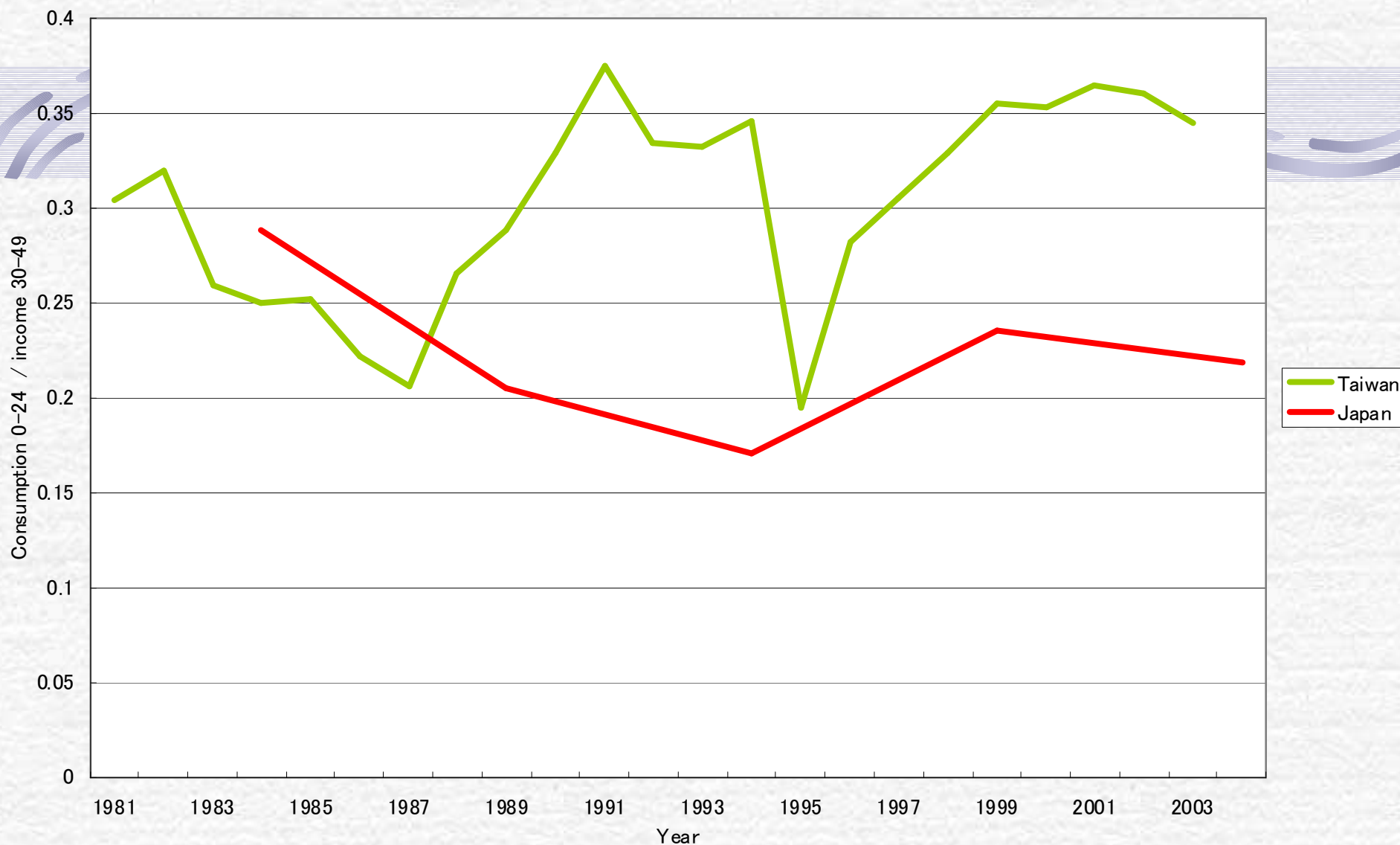
Private Consumption, education 0-24



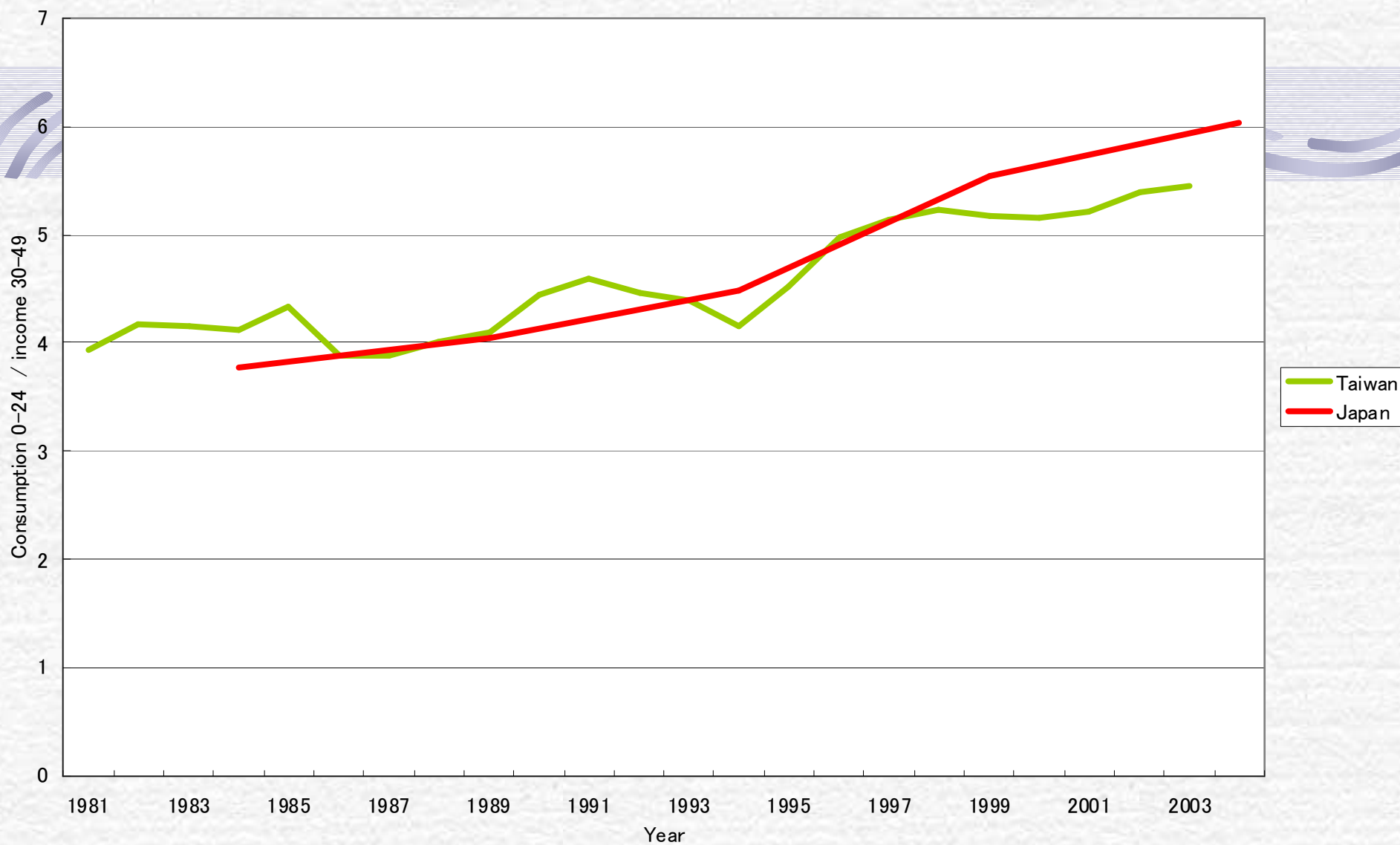
Proportion of private spending in per capita educational costs for children aged 0-24 in selected countries

Country	Year	(%)
Sweden	2003	3.1
France	2001	5.0
Austria	2000	5.8
Slovenia	2004	8.7
Hungary	2005	11.1
United States	2003	17.0
Costa Rica	2004	22.3
Japan	2004	26.0
Chile	1997	39.4
Indonesia	2004	39.6
Uruguay	1994	46.4
The Philippines	1999	48.2
Republic of Korea	2000	54.2
Taiwan	2003	66.8

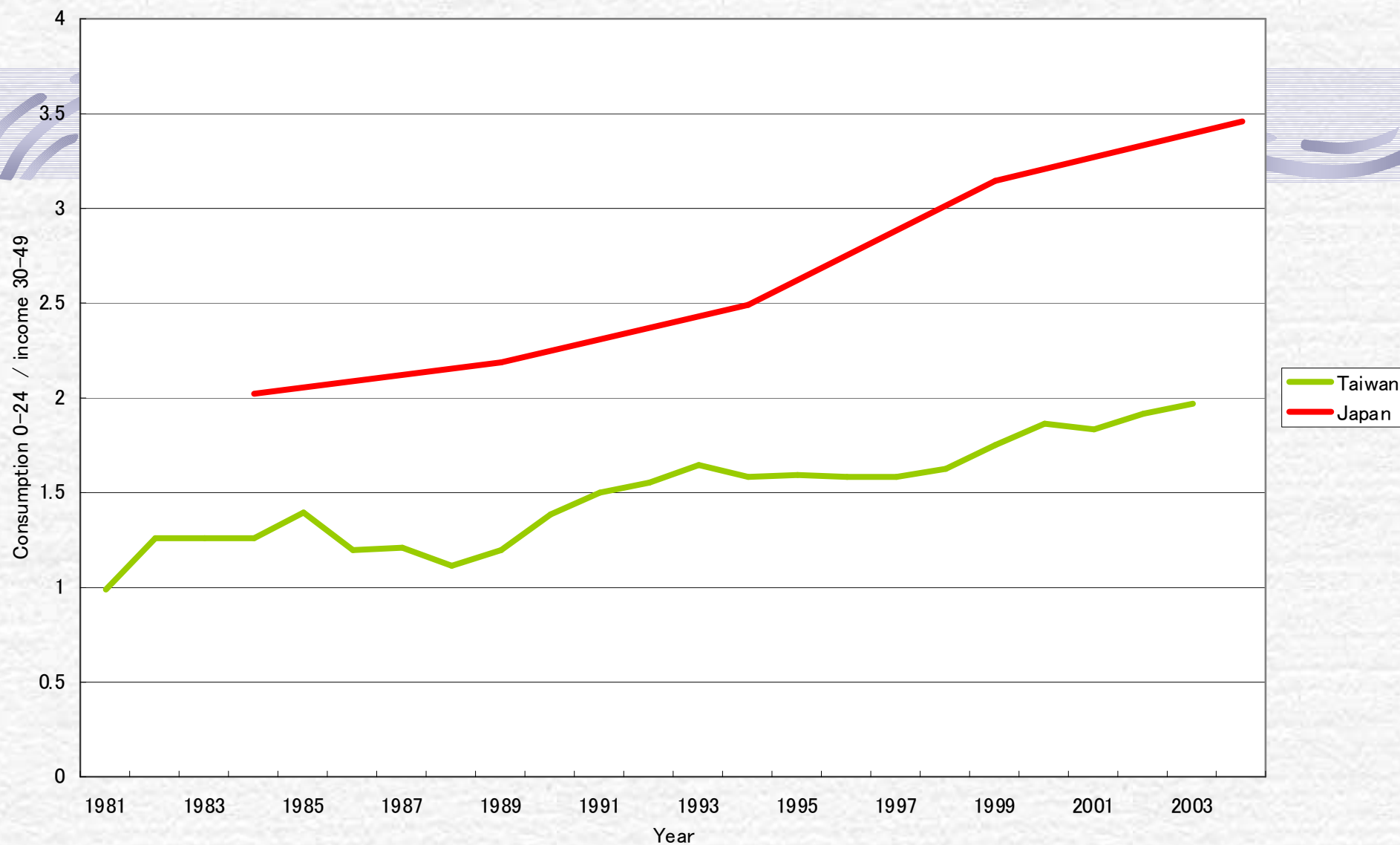
Private Consumption, health 0-24



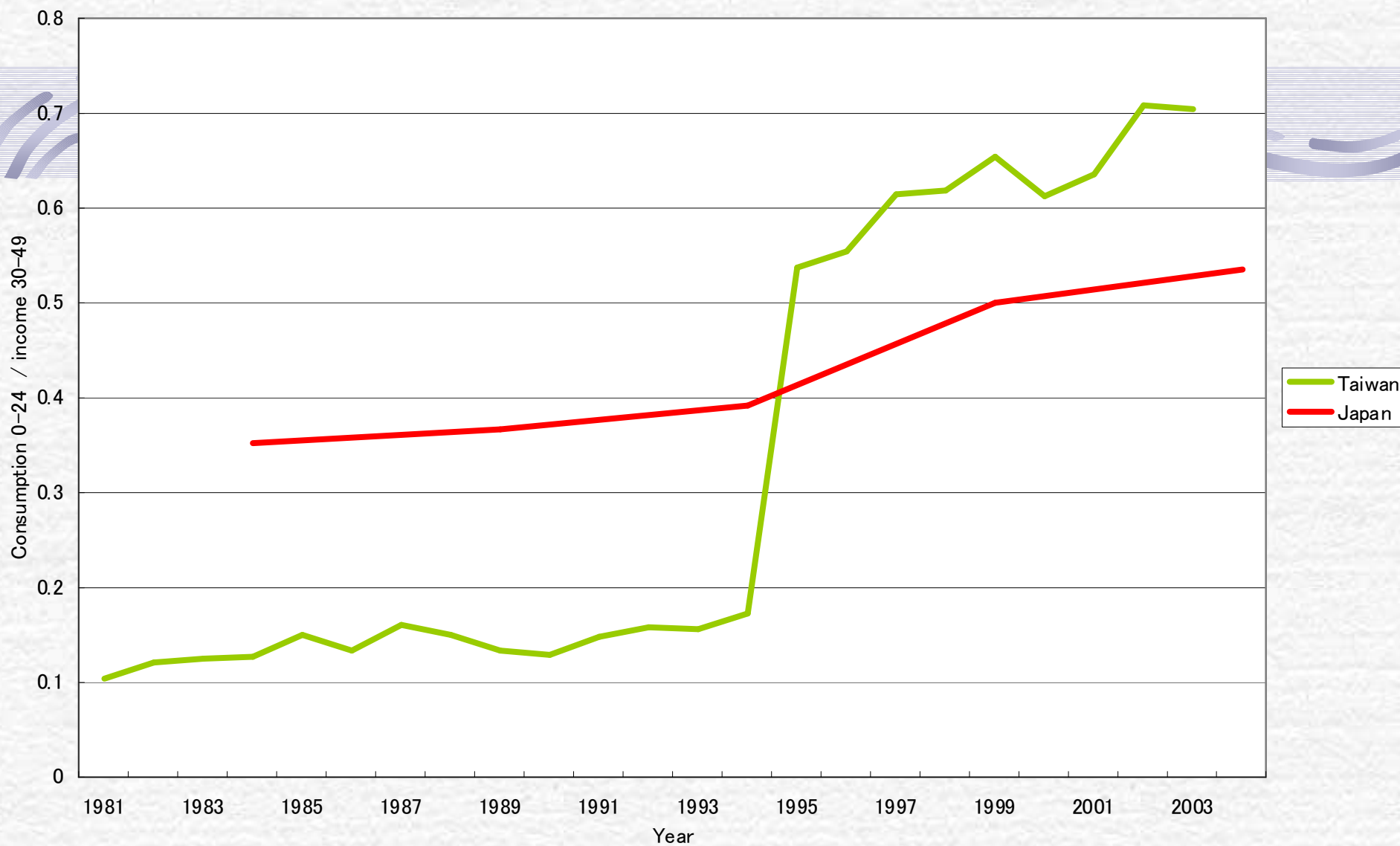
Public Consumption 0-24



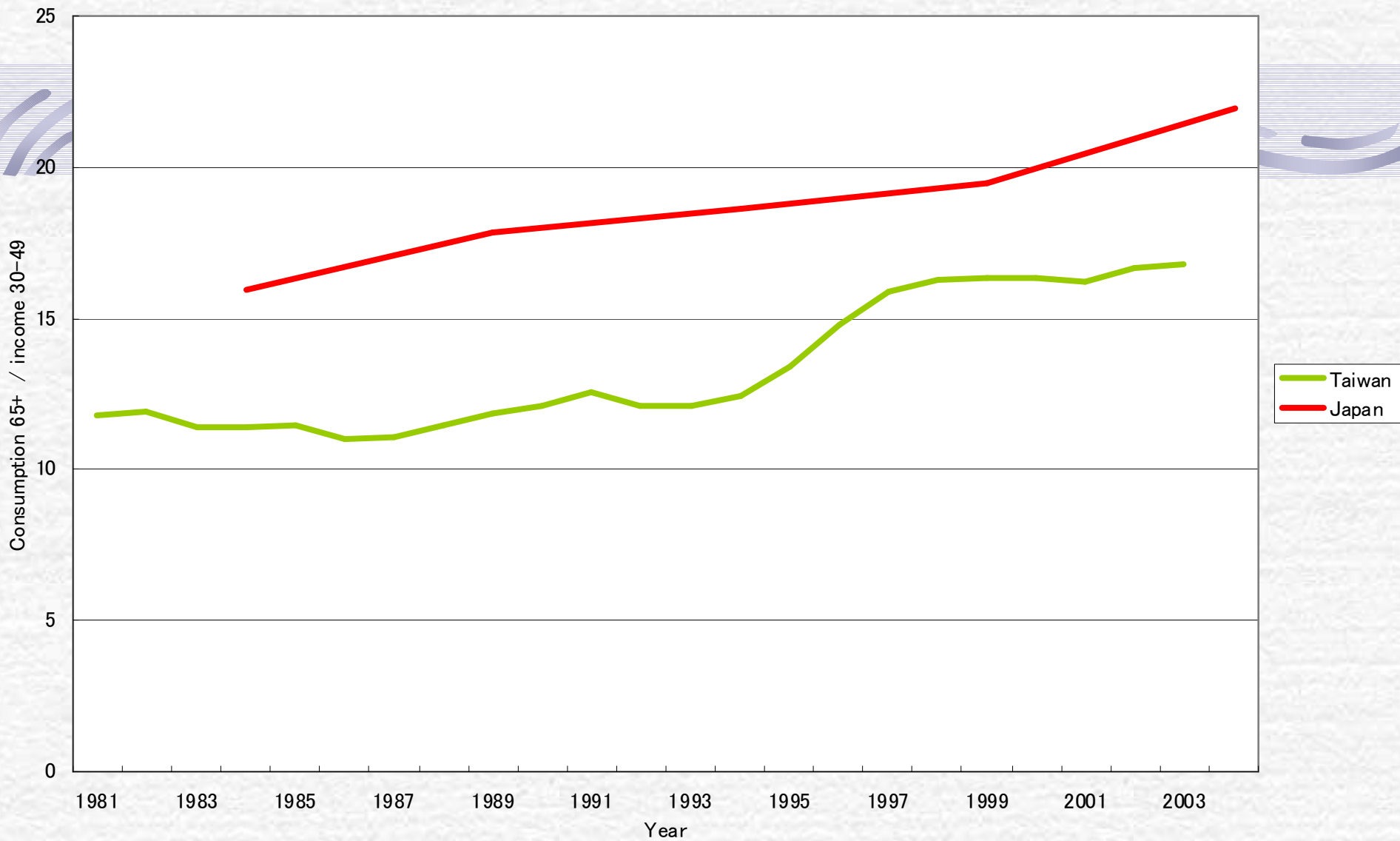
Public Consumption, education 0-24



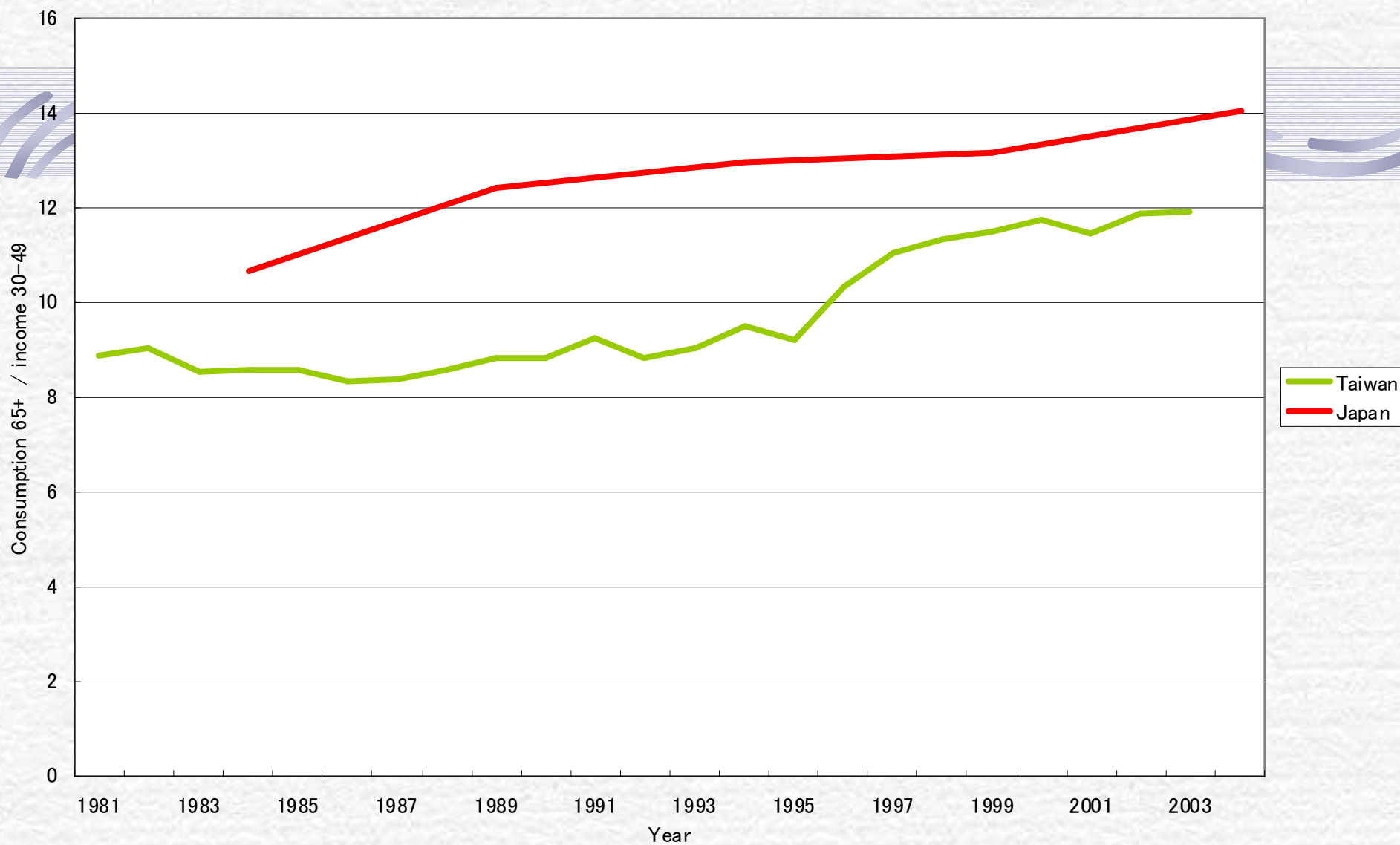
Public Consumption, health 0-24



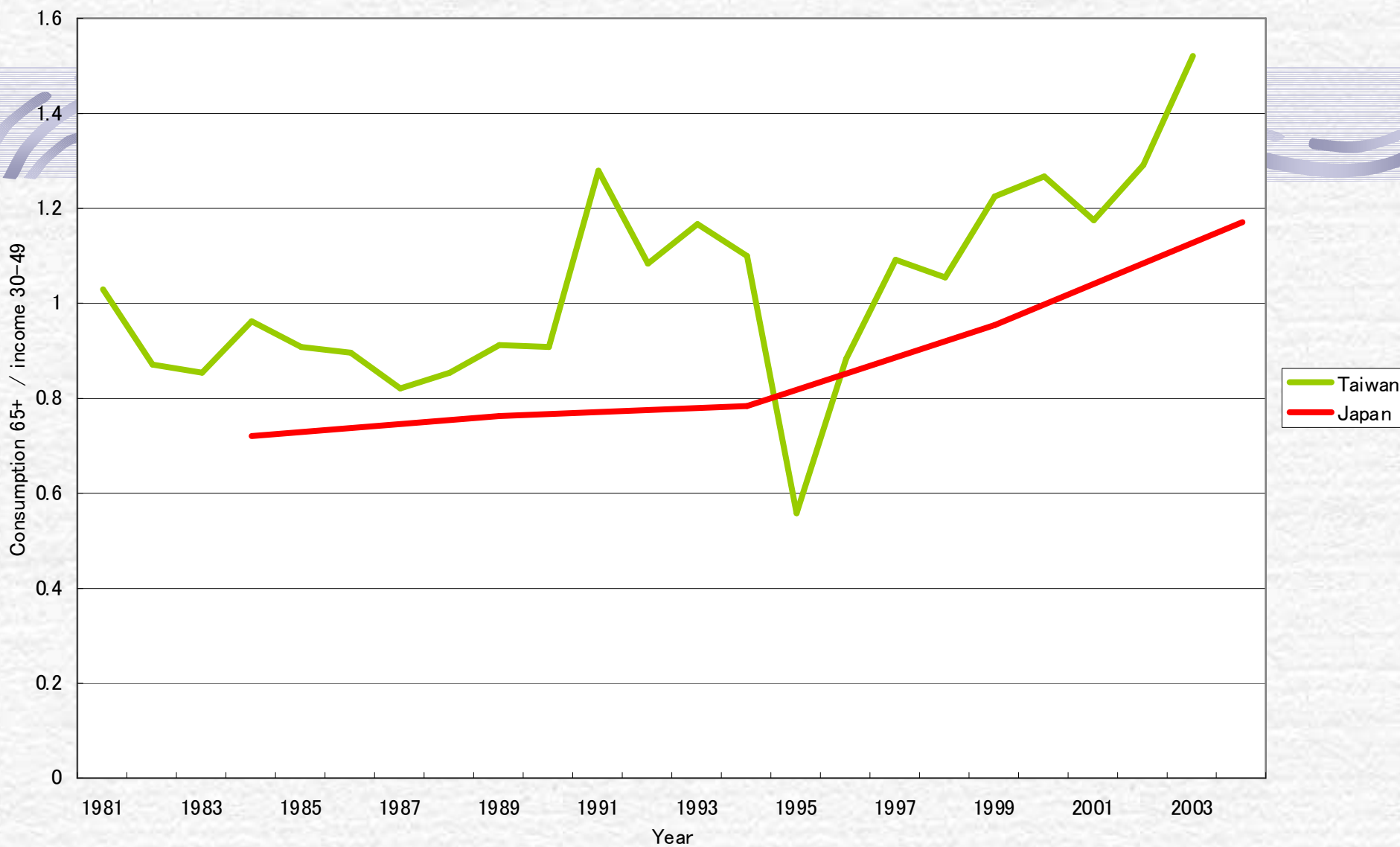
Consumption 65+



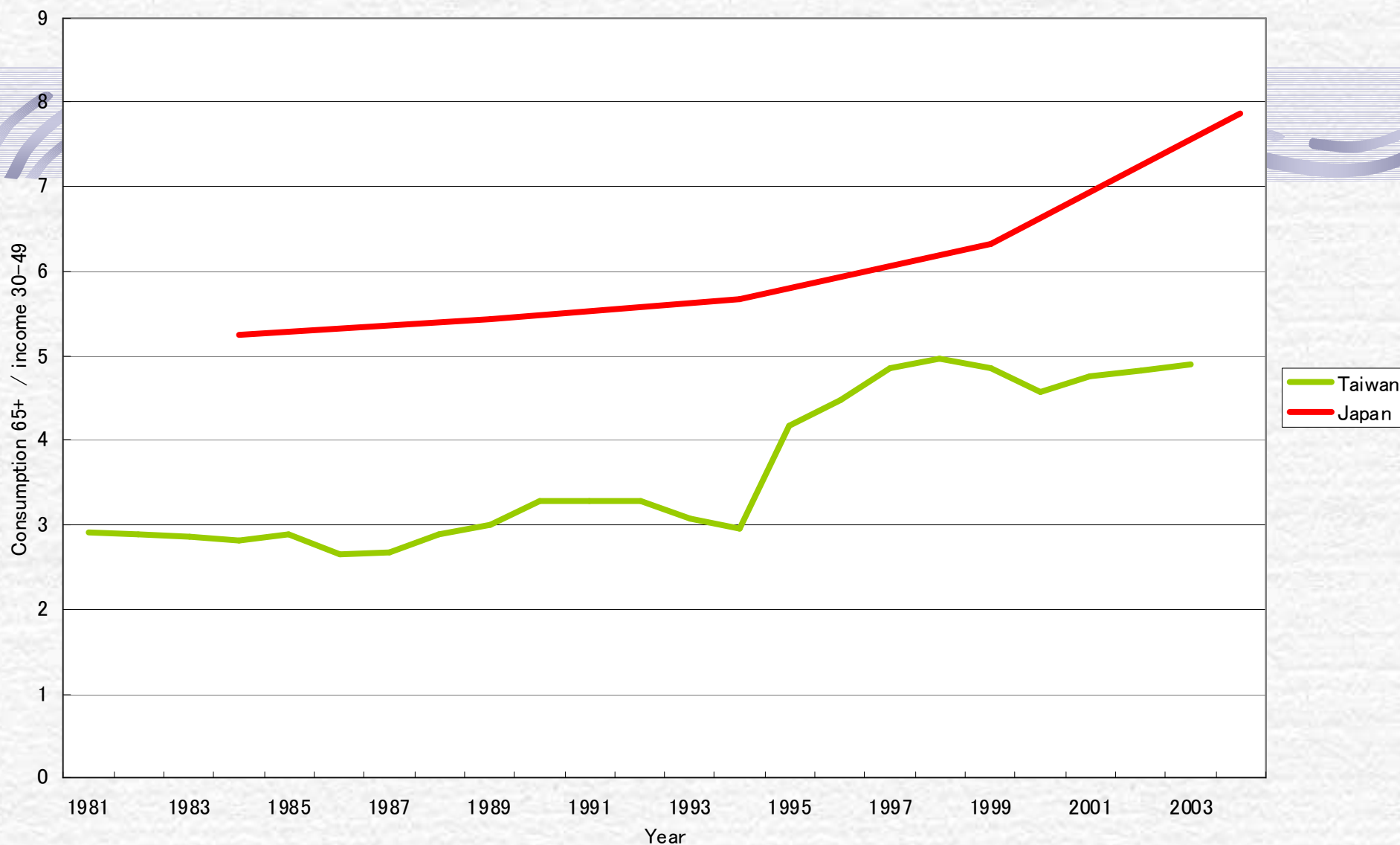
Private Consumption 65+



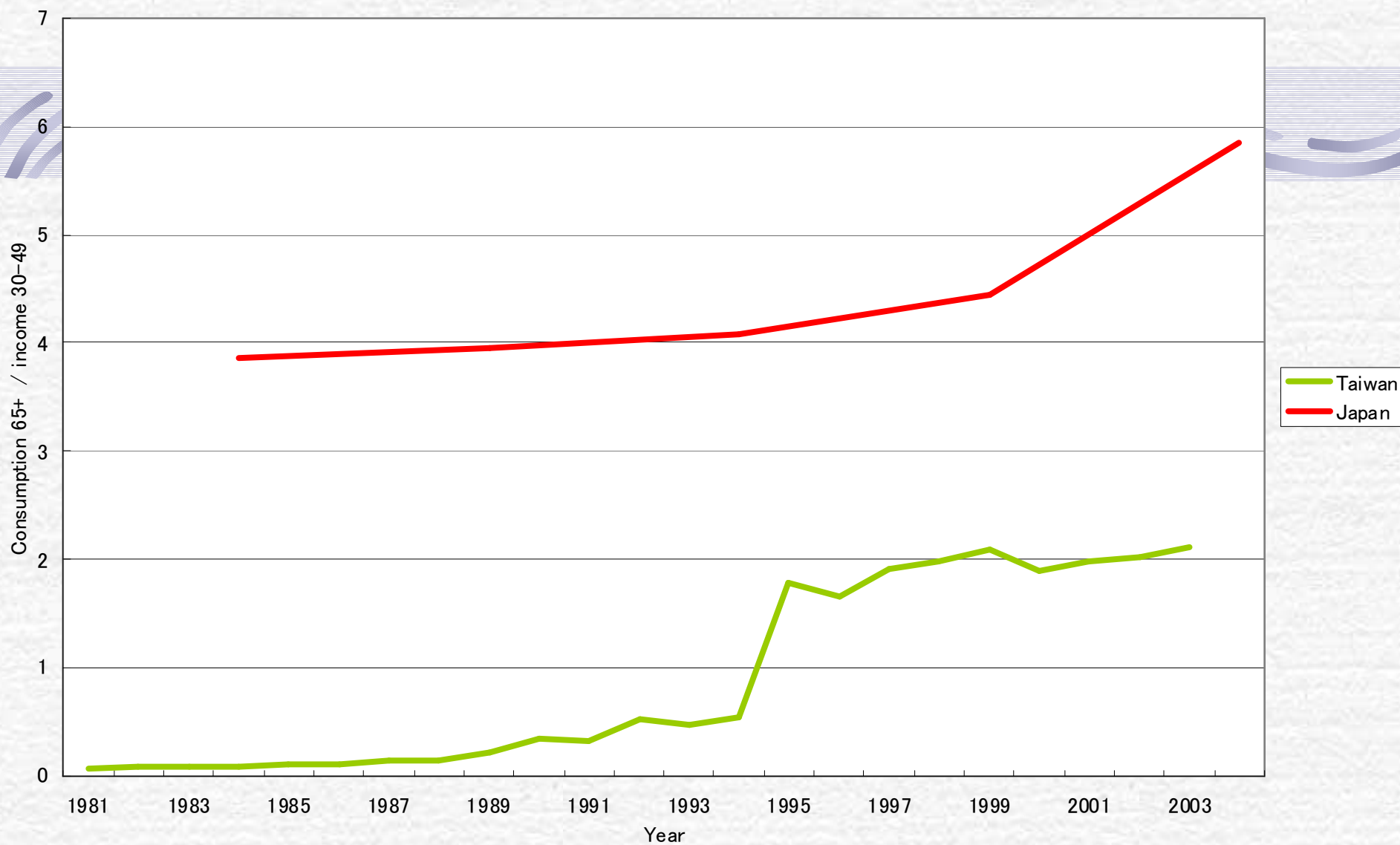
Private Consumption, health 65+



Public Consumption 65+



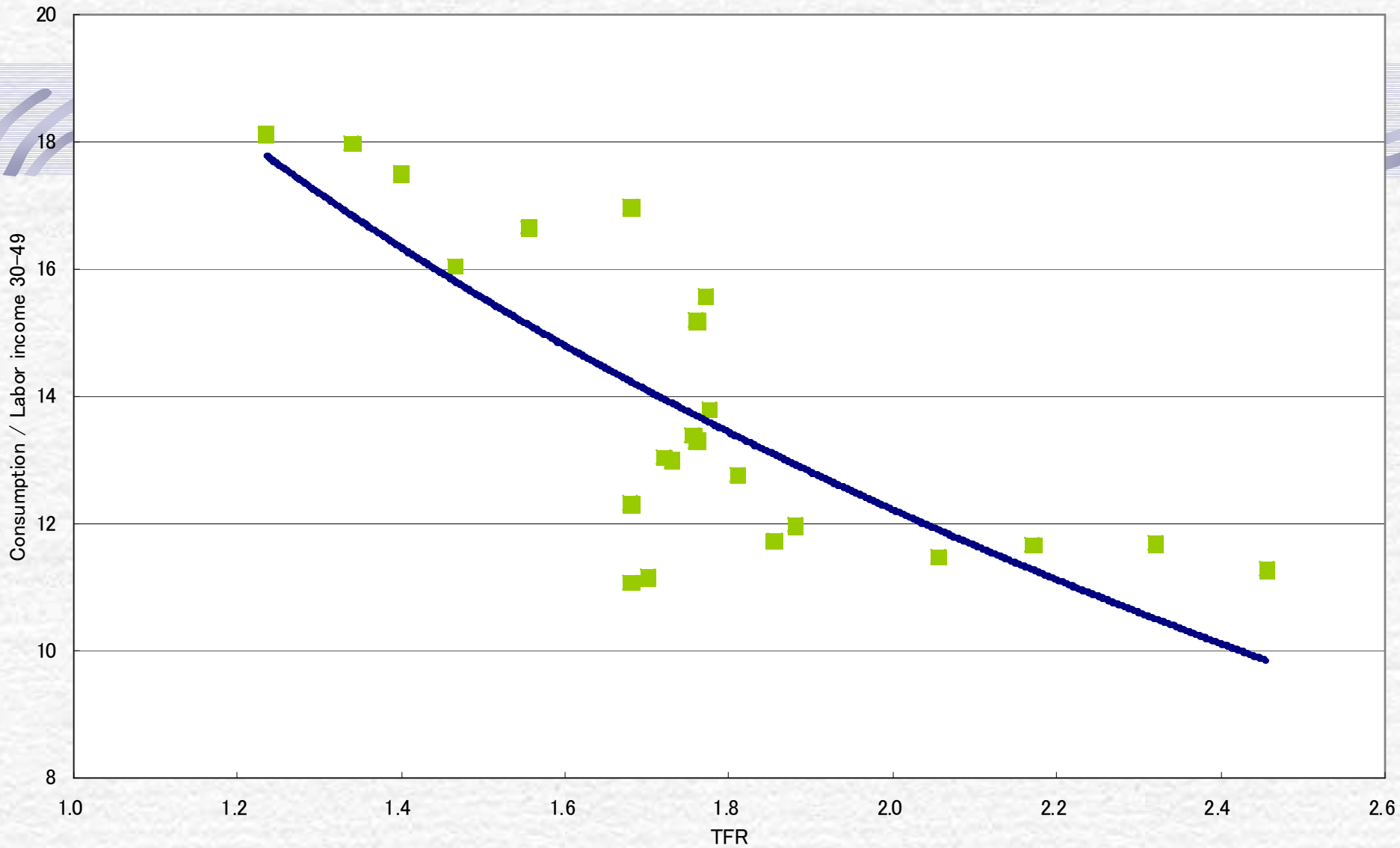
Public Consumption, health 65+



JAPAN



TAIWAN



ALL ASIA

Dependent variable	TFR				Taiwan dummy		ADJ. RSQ
Consumption 0-24	-0.0951						-0.019
Private consumption 0-24	0.0527						-0.023
Private education consumption 0-24	-1.8495	*					0.307
Private health consumption 0-24	0.7054	*					0.037
Public consumption 0-24	-0.4693	*					0.108
Public education consumption 0-24	-0.7915	*					0.084
Public health consumption 0-24	-1.7345	*					0.352

EAST ASIA

Dependent variable	TFR				Taiwan dummy		ADJ. RSQ
Consumption 0-24	-0.7578	*			0.1254	*	0.553
Private consumption 0-24	-0.8256	*			0.1508	*	0.479
Private education consumption 0-24	-2.2651	*			1.1164	*	0.711
Private health consumption 0-24	0.0135				0.1839	*	-0.007
Public consumption 0-24	-0.6069	*			0.0834	*	0.469
Public education consumption 0-24	-0.9578	*			-0.3515	*	0.751
Public health consumption 0-24	-3.1033	*			0.0170	*	0.486

TAIWAN

Dependent variable	TFR				Taiwan dummy		ADJ. RSQ
Consumption 0-24	-0.8009	*					0.573
Private consumption 0-24	-0.9461	*					0.587
Private education consumption 0-24	-2.0378	*					0.669
Private health consumption 0-24	-0.3944	*					0.071
Public consumption 0-24	-0.5037	*					0.476
Public education consumption 0-24	-0.8797	*					0.555
Public health consumption 0-24	-3.3417	*					0.482

JAPAN

Dependent variable	TFR			Taiwan dummy		ADJ. RSQ
Consumption 0-24	-0.4216	*				0.889
Private consumption 0-24	0.1286	*				0.263
Private education consumption 0-24	-3.8887	*				0.806
Private health consumption 0-24	3.1263	*				0.341
Public consumption 0-24	-1.4369	*				0.899
Public education consumption 0-24	-1.6401	*				0.902
Public health consumption 0-24	1.2989	*				0.832

ALL ASIA

Dependent variable	TFR		Consumption 65+		Taiwan dummy		ADJ. RSQ
Consumption 0-24	-0.0978	*	0.7813	*			0.857
Private consumption 0-24	0.0499		0.8341	*			0.839
Private education consumption 0-24	-1.8469	* *	-0.7642	* *			0.433
Private health consumption 0-24	0.7006	*	1.4202	*			0.641
Public consumption 0-24	-0.4715	* *	0.6640	* *			0.757
Public education consumption 0-24	-0.8128	* *	1.0785	* *			0.628
Public health consumption 0-24	-1.7481	* *	0.6886	* *			0.502

EAST ASIA

Dependent variable	TFR		Consumption 65+		Taiwan dummy		ADJ. RSQ
Consumption 0-24	-0.3713	*	0.3084	*			0.535
Private consumption 0-24	-0.4410	*	0.2769	*			0.417
Private education consumption 0-24	-2.0071	*	-0.9852	*			0.128
Private health consumption 0-24	0.5107	*	0.3706	*			-0.032
Public consumption 0-24	-0.2251	*	0.3514	*			0.563
Public education consumption 0-24	-0.3825	*	1.0799	*			0.822
Public health consumption 0-24	-1.0840	*	2.3472	*			0.724

EAST ASIA

Dependent variable	TFR		Consumption 65+		Taiwan dummy		ADJ. RSQ
Consumption 0-24	-0.3591	*	0.5803	*	0.2233	*	0.799
Private consumption 0-24	-0.4273	*	0.5796	*	0.2486	*	0.653
Private education consumption 0-24	-1.9414	*	0.4710	*	1.1958	*	0.713
Private health consumption 0-24	0.5277	*	0.7482	*	0.3101	*	0.063
Public consumption 0-24	-0.2152	*	0.5700	*	0.1795	*	0.792
Public education consumption 0-24	-0.3942	*	0.8202	*	-0.2132	*	0.885
Public health consumption 0-24	-1.0555	*	2.9800	*	0.5196	*	0.783

TAIWAN

Dependent variable	TFR		Consumption 65+		Taiwan dummy		ADJ. RSQ
Consumption 0-24	-0.1904	*	0.9022	*			0.969
Private consumption 0-24	-0.2555	*	1.0207	*			0.959
Private education consumption 0-24	-0.8260	*	1.7906	*			0.946
Private health consumption 0-24	0.0892		0.7148	*			0.232
Public consumption 0-24	-0.0570	*	0.6602	*			0.928
Public education consumption 0-24	-0.4104	*	0.6935	*			0.731
Public health consumption 0-24	-0.4904	*	4.2136	*			0.903

JAPAN

Dependent variable	TFR		Consumption 65+		Taiwan dummy		ADJ. RSQ
Consumption 0-24	-0.1016		0.3816	*			0.910
Private consumption 0-24	0.4242	*	0.3526	*			0.238
Private education consumption 0-24	-3.7897	*	0.1180				0.709
Private health consumption 0-24	3.5069		0.4538				0.013
Public consumption 0-24	-1.1470	*	0.3458				0.853
Public education consumption 0-24	-1.3002	*	0.4054				0.859
Public health consumption 0-24	-1.0970	*	0.2409				0.751

Does the crowding out effect exist in East Asia?

Miller's comment: Asian countries are different from Latin American countries

Lee's comment: East Asians have strong altruistic values toward their children, which are distinctively different from parents in other regions

Becker's quality-quantity tradeoff



The decline in numbers may be offset by an increase in human capital and, hence, productivity.

International comparison of students' mathematics literacy in PISA study: Mean scores

Rank	Country	2000	Country	2003	Country	2006
1	Japan	557	Hong Kong-China	550	Taiwan	549
2	Korea	547	Finland	544	Finland	548
3	New Zealand	537	Korea	542	Hong Kong-China	547
4	Finland	536	Netherlands	538	Korea	547
5	Australia	533	Liechtenstein	536	Netherlands	531
6	Canada	533	Japan	534	Switzerland	530
7	Switzerland	529	Canada	532	Canada	527
8	United Kingdom	529	Belgium	529	Macao-China	525
9	Belgium	520	Macao-China	527	Liechtenstein	525
10	France	517	Switzerland	527	Japan	523
11	Austria	515	Australia	524	New Zealand	522
12	Denmark	514	New Zealand	523	Bergium	520
13	Iceland	514	Czech Republic	516	Australia	520
14	Liechtenstein	514	Iceland	515	Estonia	515
15	Sweden	510	Denmark	514	Denmark	513
16	Ireland	503	France	511	Czech Republic	510
17	Norway	499	Sweden	509	Iceland	506
18	Czech Republic	498	Austria	506	Austria	505
19	United States	493	Germany	503	Slovenia	504
20	Germany	490	Ireland	503	Germany	504

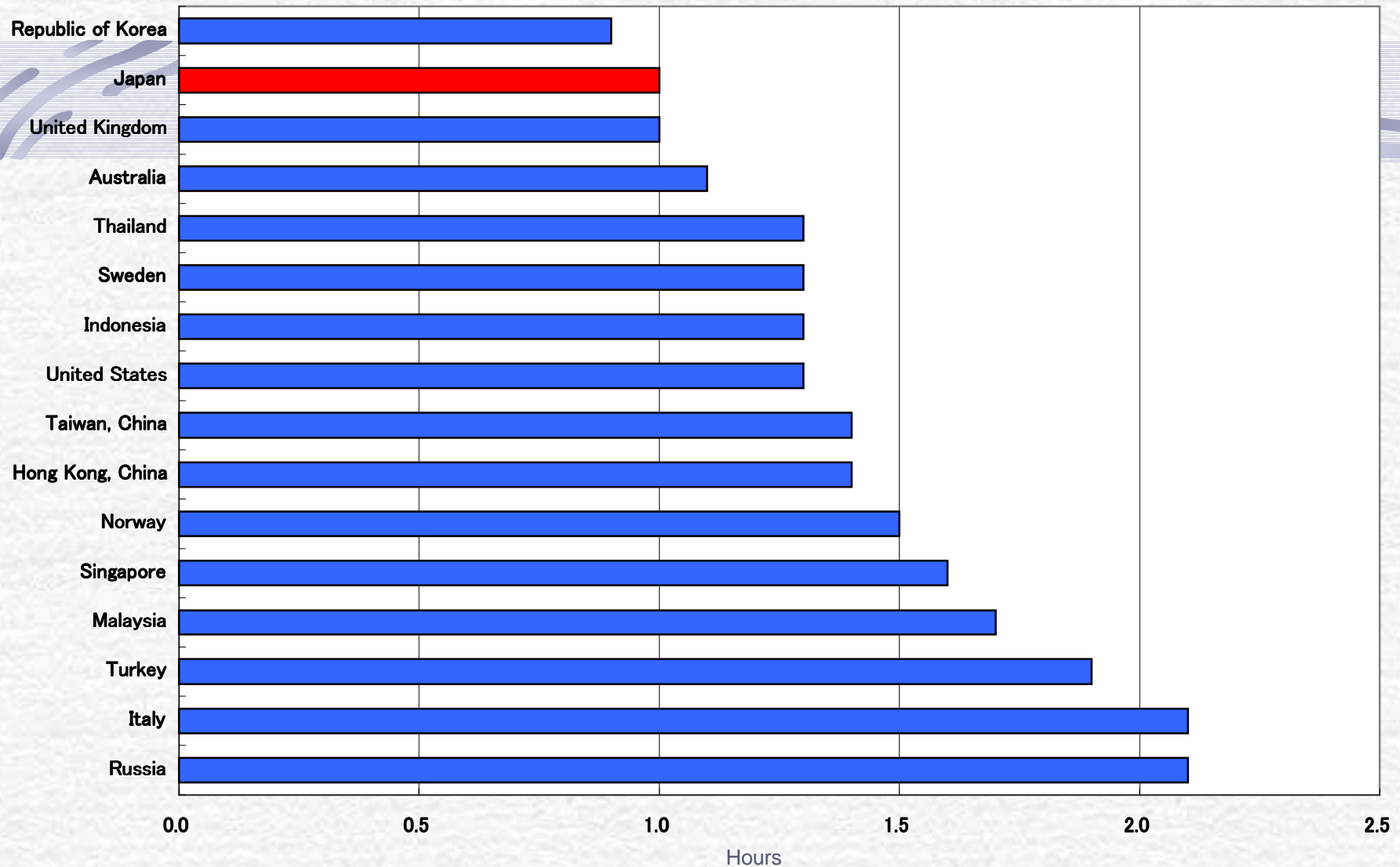
Source: Ministry of Education, Culture, Sports, Science and Technology (2007). *OECD Programme for International Student Assessment (PISA): Summary of the 2006 International Study Results*, http://www.mext.go.jp/a_menu/shotou/gakuryoku-chousa/sonota/071205/001.pdf. (Last accessed on December 24, 2009).

Average daily time spent by 8th graders on watching TV and video in selected countries in 2007



Source: National Institute for Educational Policy Research (2007). *The 2007 Trends in International Mathematics and Science Study (TIMSS 2007): Report on the Findings of the International Study (Overview)*, <http://www.nier.go.jp/timss/2007/gaiyou2007.pdf>. (Last accessed on December 28, 2009).

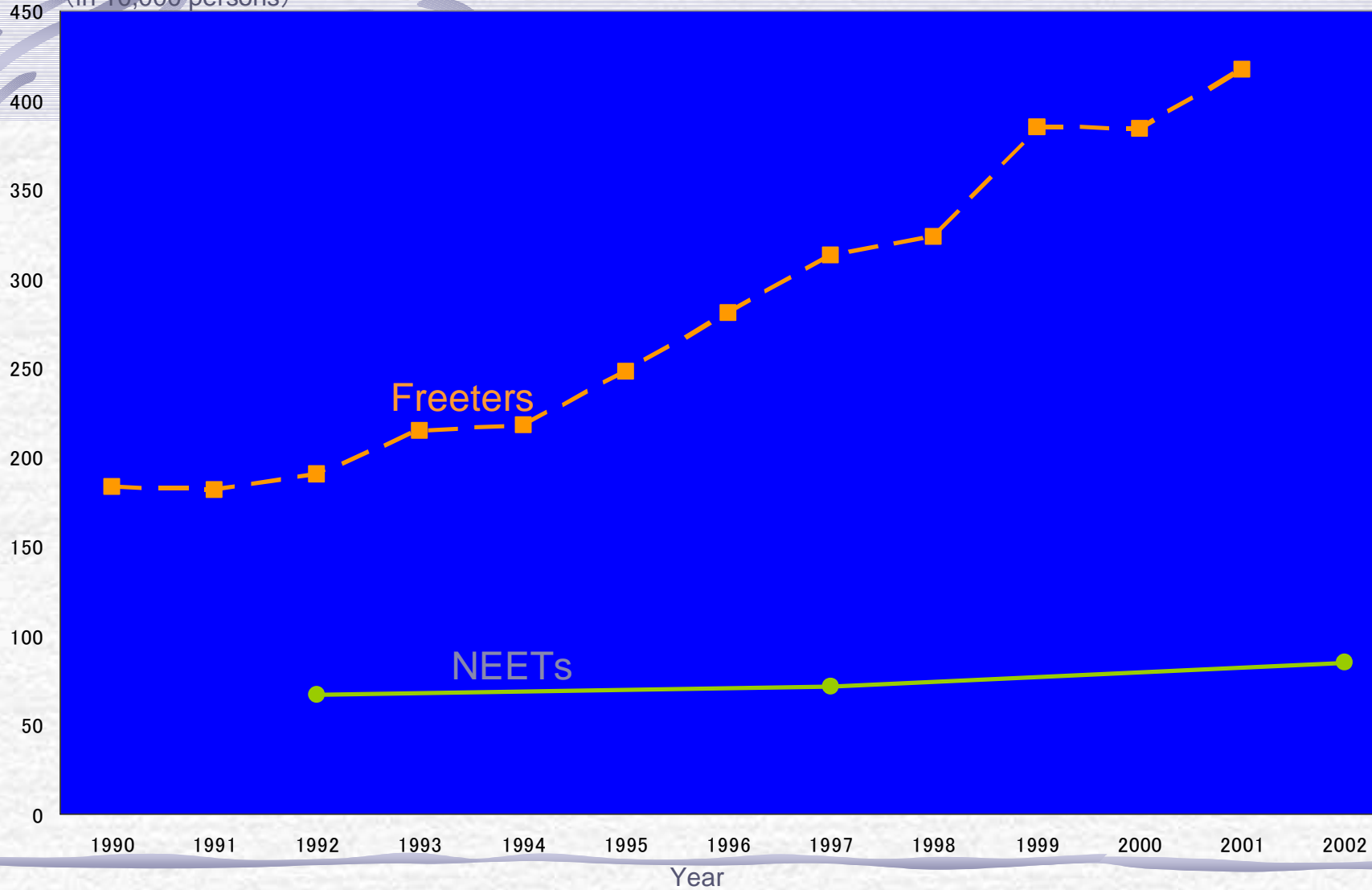
Average daily time spent by 8th graders on homework in selected countries in 2007



Source: National Institute for Educational Policy Research (2007). *The 2007 Trends in International Mathematics and Science Study (TIMSS 2007): Report on the Findings of the International Study (Overview)*, <http://www.nier.go.jp/timss/2007/gaiyou2007.pdf>. (Last accessed on December 28, 2009).

Number of freeters and NEETs

(in 10,000 persons)



Source: Cabinet Office, 2003, *White Paper on National Lifestyle 2003*. Cabinet Office, 2005, *Survey on young people not in employment (interim report)*.



Thank you