Consumption Allocation Estimation

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Table 1. National Transfers Flow Account

	Total	Domestic by age						Foreign
		Total	0-19	20-29	30-49	50-64	65+	
Lifecycle Deficit	141,891	141,891	113,408	36,460	(20,737)	1,801	10,959	
Consumption	361,851	361,851	123,263	84,459	102,396	36,525	15,207	
Public	9,901	9,901	9,102	777	23	-	-	
Private	351,950	351,950	114,161	83,683	102,373	36,525	15,207	
Less: Labor income	(219,960)	(219,960)	(9,855)	(47,999)	(123,133)	(34,724)	(4,248)	
Reallocations								
Asset Reallocations								
Public								
Income on Assets								
Less: Public Saving								
Private								
Income on Assets								
Less: Private Saving								
Transfers								
Public	(0)	(0)	8,576	(2,189)	(5,062)	(1,242)	(83)	
Private								
Intervivos	45,456	45,456	110,142	23,043	(72,616)	(17,454)	2,340	
Bequests	-	-	-	-	-	-	-	

Presentation Outline

- Consumption Allocation
- Consumption Allocation by Sector

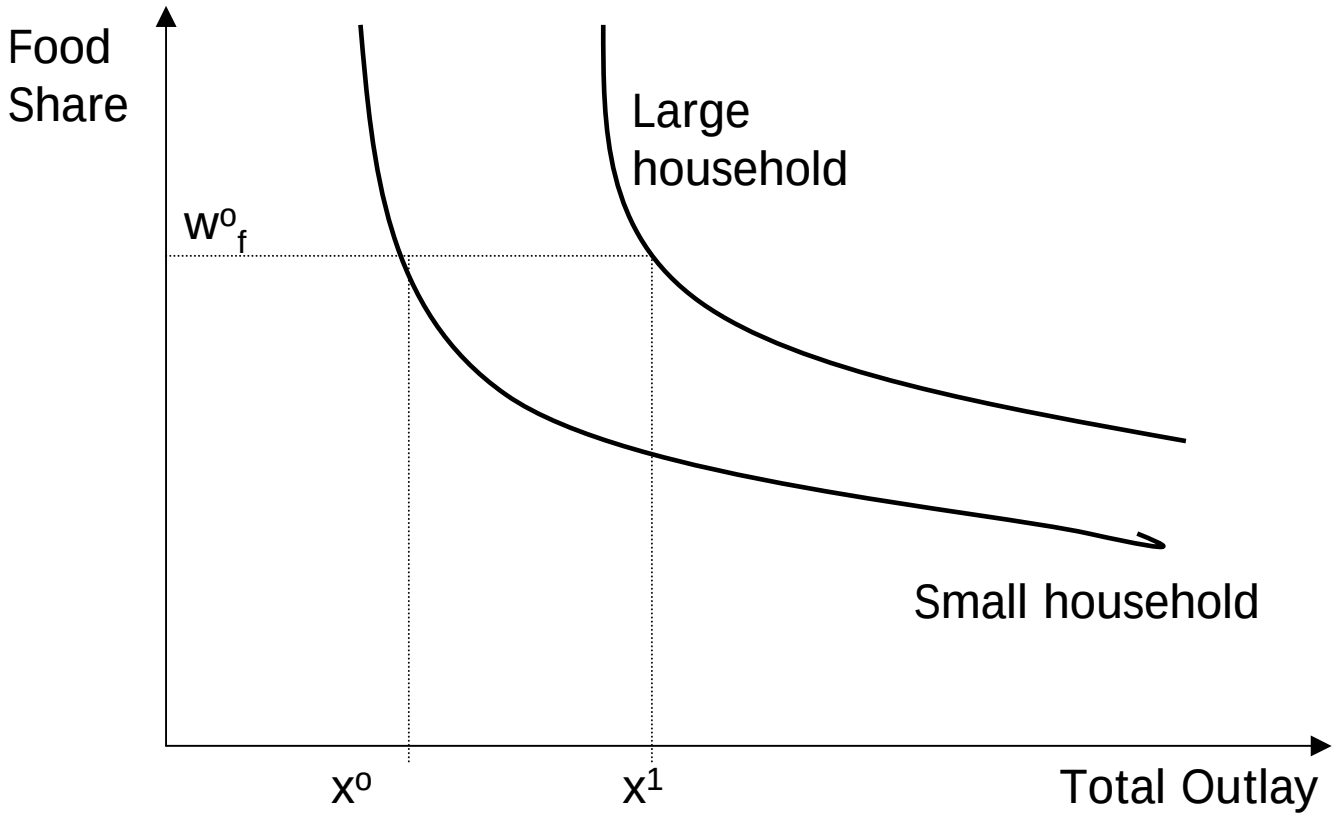
Objectives

- Estimate the cost of children
- Estimate the allocation of consumption to individuals in the household
- Comparison of several methods of estimation

Engel Method

- Food is a normal good and can be used as a means by which to measure welfare
- Compares the expenditures of two families: with child and without child, holding the level of welfare constant
  - Equivalence scale
- Deaton (1986) employs the Engel method to estimate the equivalence scale of a child using *Susenas* 1978 data

Engel Method



Engel Method

Working (1943), Leser (1963), and Deaton (1987) ;

$$w_i = \alpha_i + \beta_i \ln\left(\frac{x}{n}\right) + \eta_i \ln(n) + \sum_{j=1}^{J-1} \gamma_{ij} \left(\frac{n_j}{n}\right) + \tau_i z + \varepsilon_i$$

w_i food share
x expenditure
n household size ;
n_j number of family members in age group j
z control variables

Equivalence Scale

Reference family

$$w^0 = \beta_0 + \beta_1 \ln(x^o) + (\beta_2 - \beta_1)\ln(N^0) + \sum_j \gamma_j^0 / N^0 + Z$$

Family without k^{th}-member

$$w^k = \beta_0 + \beta_1 \ln(x^k) + (\beta_2 - \beta_1)\ln(N^0 - 1) + \sum_j \gamma_j^0 /(N^0 - 1) - \gamma^k /(N^0 - 1) + Z$$

Equivalence Scale (cont ..)

Solving the equations, conditional on maintaining the same welfare level, yields:

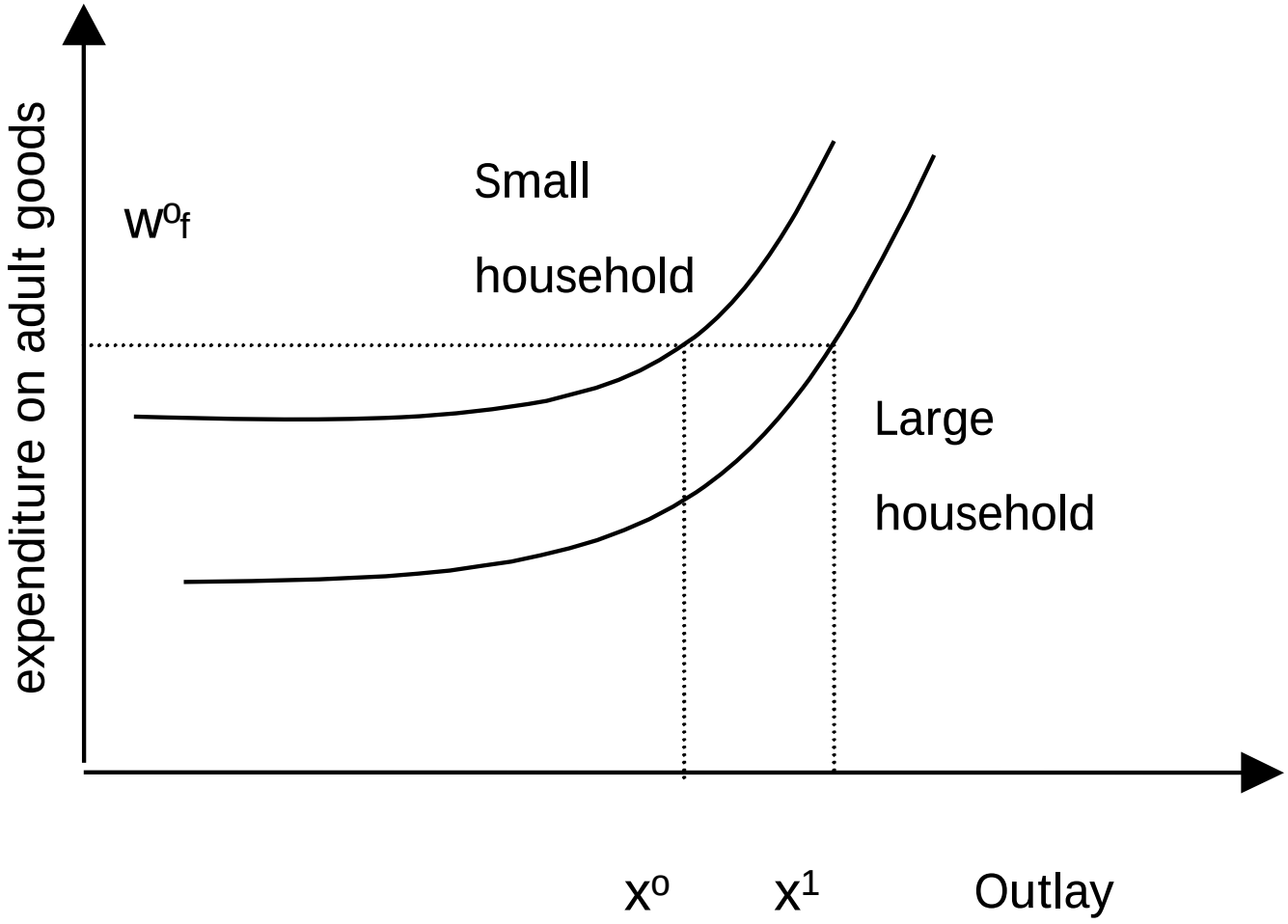
$$\ln\left(\frac{x^0}{x^k}\right)=\frac{(\beta_2-\beta_1)}{\beta_1}\ln\left(\frac{N^0-1}{N^0}\right)+\frac{\sum_j \gamma_j^0}{\beta_0 N^0(N^0-1)}-\frac{\gamma^k}{\beta_0(N^0-1)}$$

Note: $\left(\frac{x^0}{x^k}\right)=equivalence\ scale$

Rothbarth Method

- Using adult goods as a measure for adult welfare
- Similar methodology

Rothbarth Method



Engel vs. Rothbarth Methods

- The Engel method assumes that *food share* is a means by which to measure the adult's well being
- The Rothbarth method assumes that *adult goods* expenditures can reflect the adult's well being
- Both estimation methods are problematic

Ray's Method

$$w_i = a_i + b_i\left(\ln\frac{X}{\varepsilon}\right) + c_i F + u_i$$

where

$$\varepsilon = \sum_j f_j F_j$$

f_j equivalence scale of child of age group *i*

F number of children

F_i number of members of age group *j*

X total expenditures

w_i food share, housing, durable, goods and services

Previous Results

	ROTHBARTH METHOD	ENGEL METHOD
Deaton (Susenas 1978)		
< 5	1.10	1.45
5+	1.12	1.58
Tsaklogou (Europe)		
0 – 5	1.09	1.30
6 – 13	1.13	2.35
Bradbury (Australia)		
0 - 14	1.22* (adult clothing)	1.21

Data Required

- Expenditures of household
- Food share
- Age
- Number of household members
- Other household characteristics for use as control variables

Child Cost*

Method	Age Group			Notes
	0-4	5-9	10-14	
Engel	114%	144%	152%	
Rothbarth	<0	22%	64%	Adult clothing
Rothbarth	<0	<0	38%	Adult food
Ray's	94%	96%	88%	Food-share, housing, goods and services and durable goods

*** Reference adults: 30-34**

Split Method

- Separate estimation on assignable goods
  - Education
  - Health
- Alternatives for allocating non-assignable goods:
  - Engel Method
  - A priori allocation (0.5 for children, 1 for adult or any other proportion, or other allocation rule)

Private Consumption

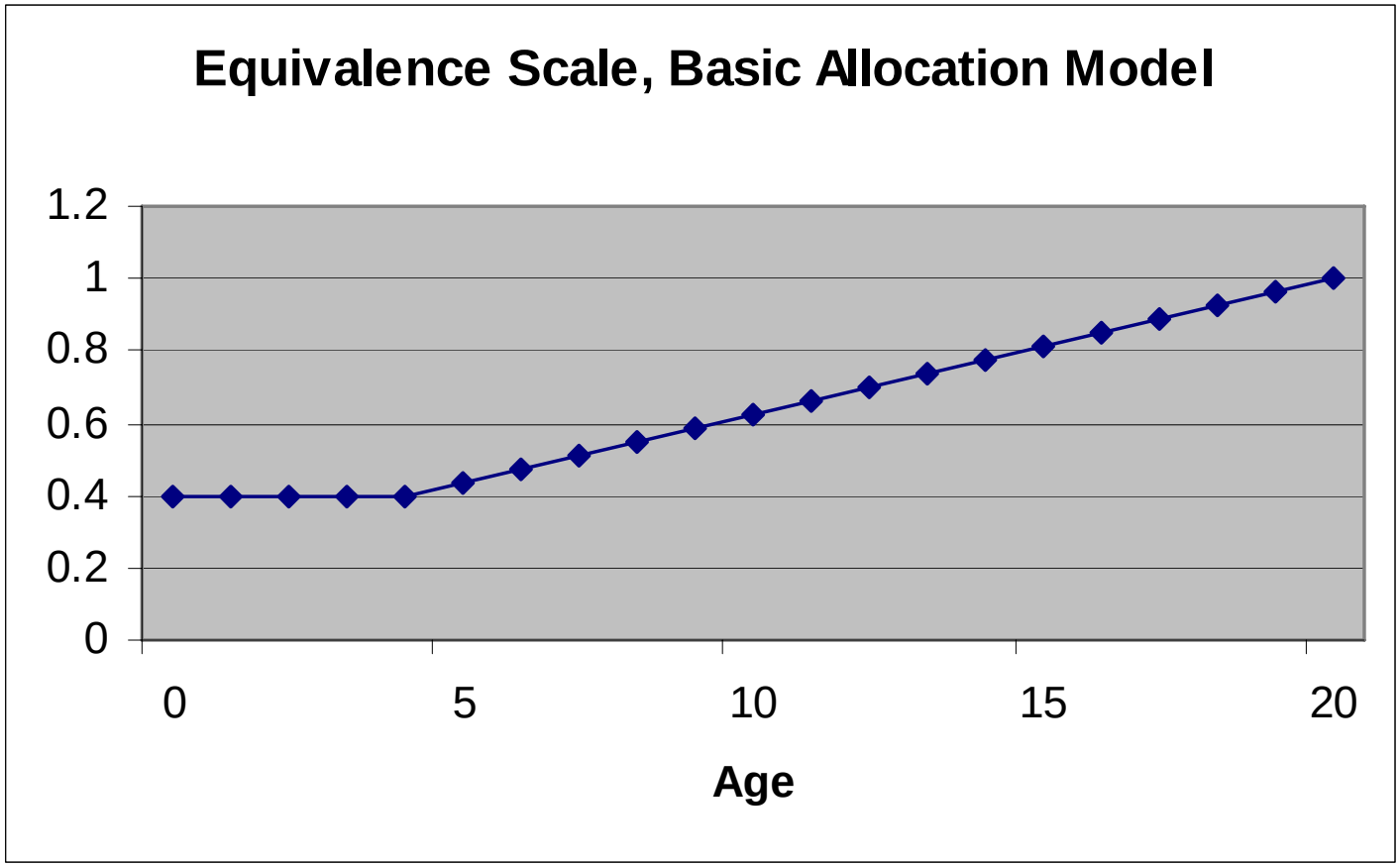
- Education
- Health
- Current consumption
  - Without education, health, durable, and housing
- Asset consumption
  - Durable consumption without housing
- Housing consumption

Equivalence Scale Formula (A priori)

$$\alpha(a) = 1 - 0.6 \times (4 < a < 20) \times \left[\frac{20 - a}{16} \right] - 0.6 \times (a \leq 4)$$

α(a) = equivalence scale of age group *a*

Other Current Consumption Sectors: Excluding housing and durable goods



Source: Comfort Sumida

Estimation of Education Transfers

$$\tau_{jx}^{e+} = \sum_{f} \beta_f N_{fj}$$

N_{fj} number of enroll members in age group *f* in the household *j*

τ_{jx}^{e+} sector *x* (education) expenditure of household *j*

β_f average expenditure of age group *f*

Predicting education expenditure for enrolled household member

$$\hat{\tau}_{ijx}^{e+} = \left(\tau_{jx}^{e+}\right)\left(\hat{\beta}_f D_{fij}^{e} \Big/ \sum_f \hat{\beta}_f N_{fj}^{e}\right)$$

N_{fj} number of enroll members in age group *f* in the household

$\hat{\tau}_{ijx}^{e+}$ sector *x* (education) expenditure of household member *i*

$\hat{\beta}_f$ average expenditure of age group *f*

D_{fij}^{e} dummy variable indicating if member of household *j* is enrolled at school

Special Case: Taiwan

- Report on household education expenditure only limited to elementary to higher education
- Preschooler (private and expensive) are not allocated education consumption under previous methodology
- Part-time students are not reported as enrolled
- Previous methodology under estimate the allocation

Modified Methodology

$$\tau_{jx}^{e+} = \sum_{f=6}^{f=50} \beta_f N_{fj} + \sum_{f=6}^{f=7} \alpha_f NE_{fj} + \sum_{f=3}^{f=5} \varphi_f P_{fj}$$

N_{fj} number of enrolled members

NE_{fj} number of non-enrolled members

P_{fj} number of members whose age from 3 to 5

Estimation of Health Transfer

Estimate average health expenditure by age:

$$\tau_{jx}^{e+} = \sum_{f} \beta_f N_{fj}^{e}$$

N_{fj}^{e} number of household members in age group *f*

τ_{jx}^{e+} sector *x* (health) expenditures of household *j*

β_f average expenditure for age group *f*

Health Expenditure (cont ..)

Predicted health expenses for each member

$$\hat{\tau}_{ijx}^{e+} = \left(\tau_{jx}^{e+}\right)\left(\hat{\beta}_f \Big/ \sum_f \hat{\beta}_f N_{fj}^{e}\right)$$

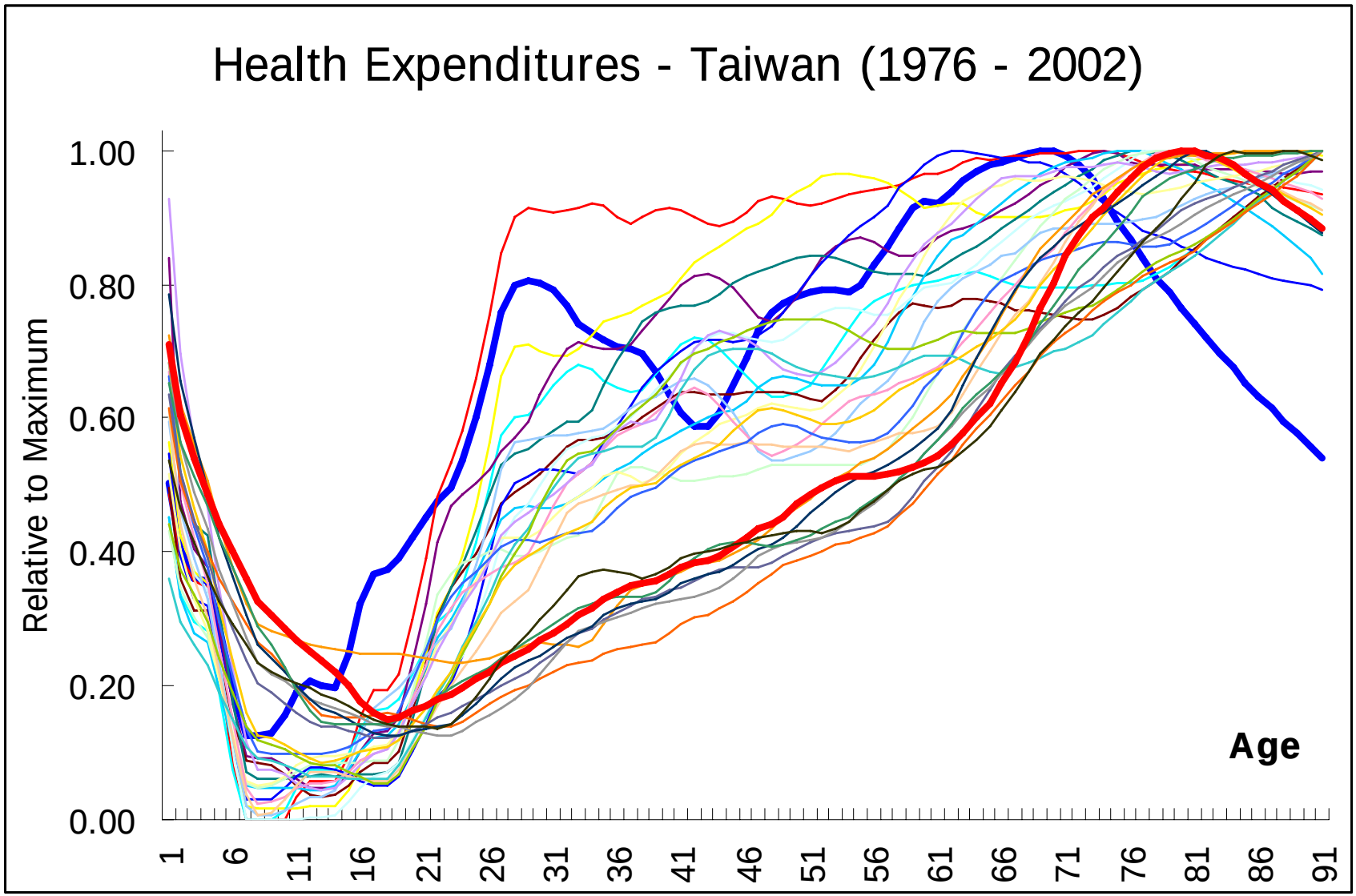
N_{fj}^{e} number of household members in age group *f*

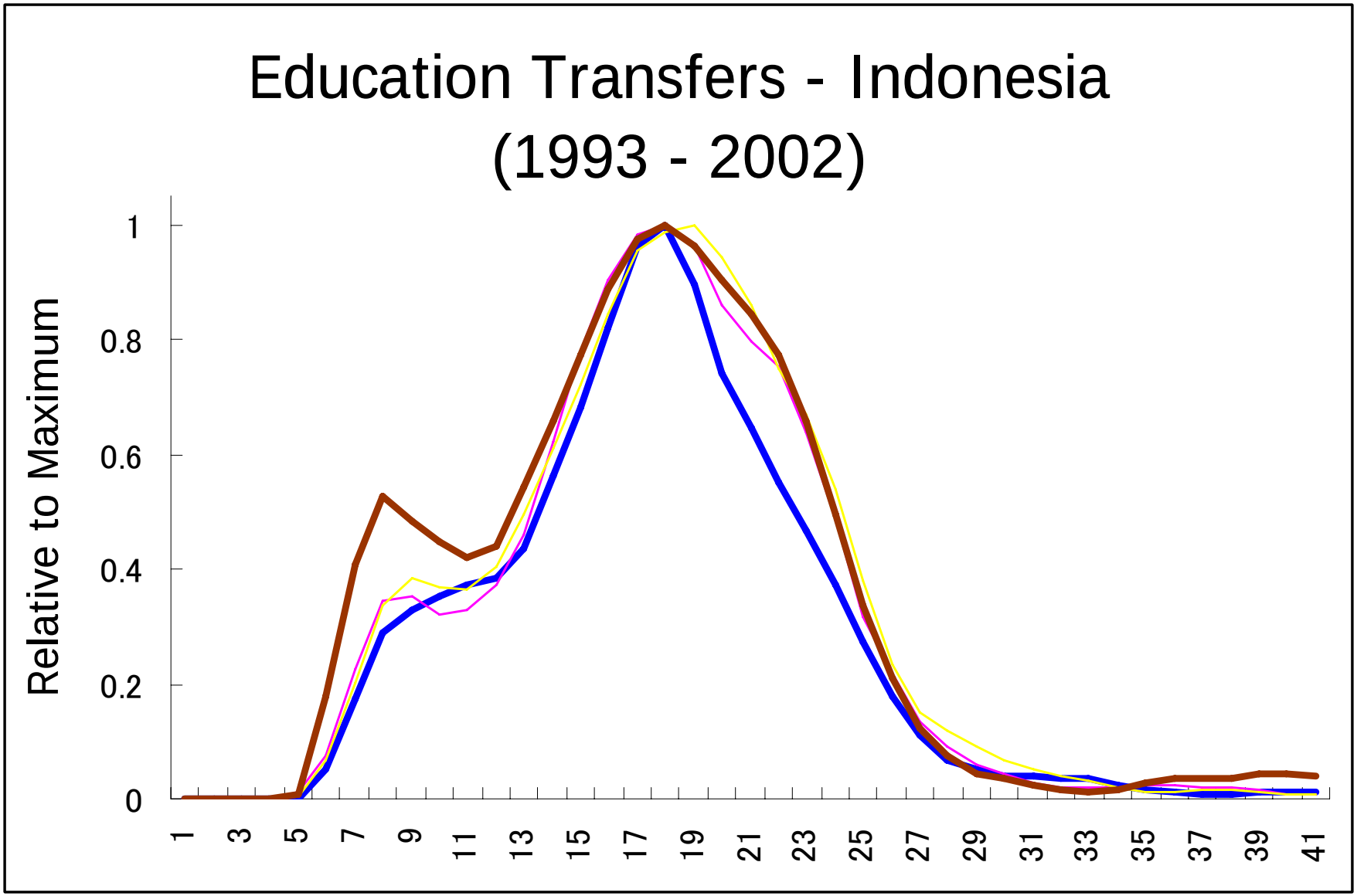
τ_{ijx}^{e+} health (sector *x*) expenditures of household member *i*

β_f average expenditure for age group *f*

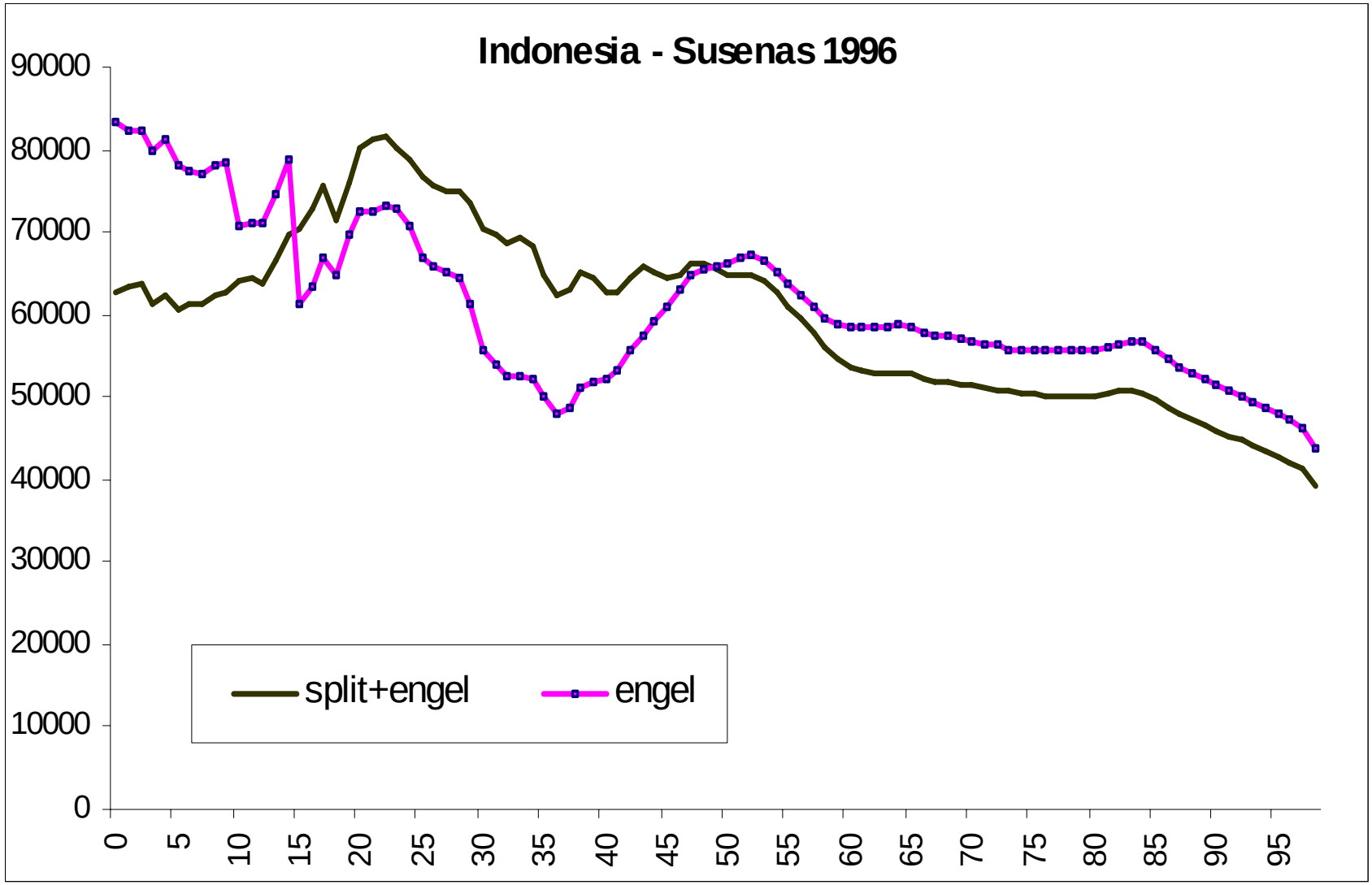
Illustrations

Members	Age	School	Beta	Total Education	Share	Individual Education
1	45	0		10000	0	0
2	40	0	45	10000	0	0
3	15	1	70	10000	0.55	5500
4	12	1	65	10000	0.45	4500
	$\sum$ Beta*School		135			

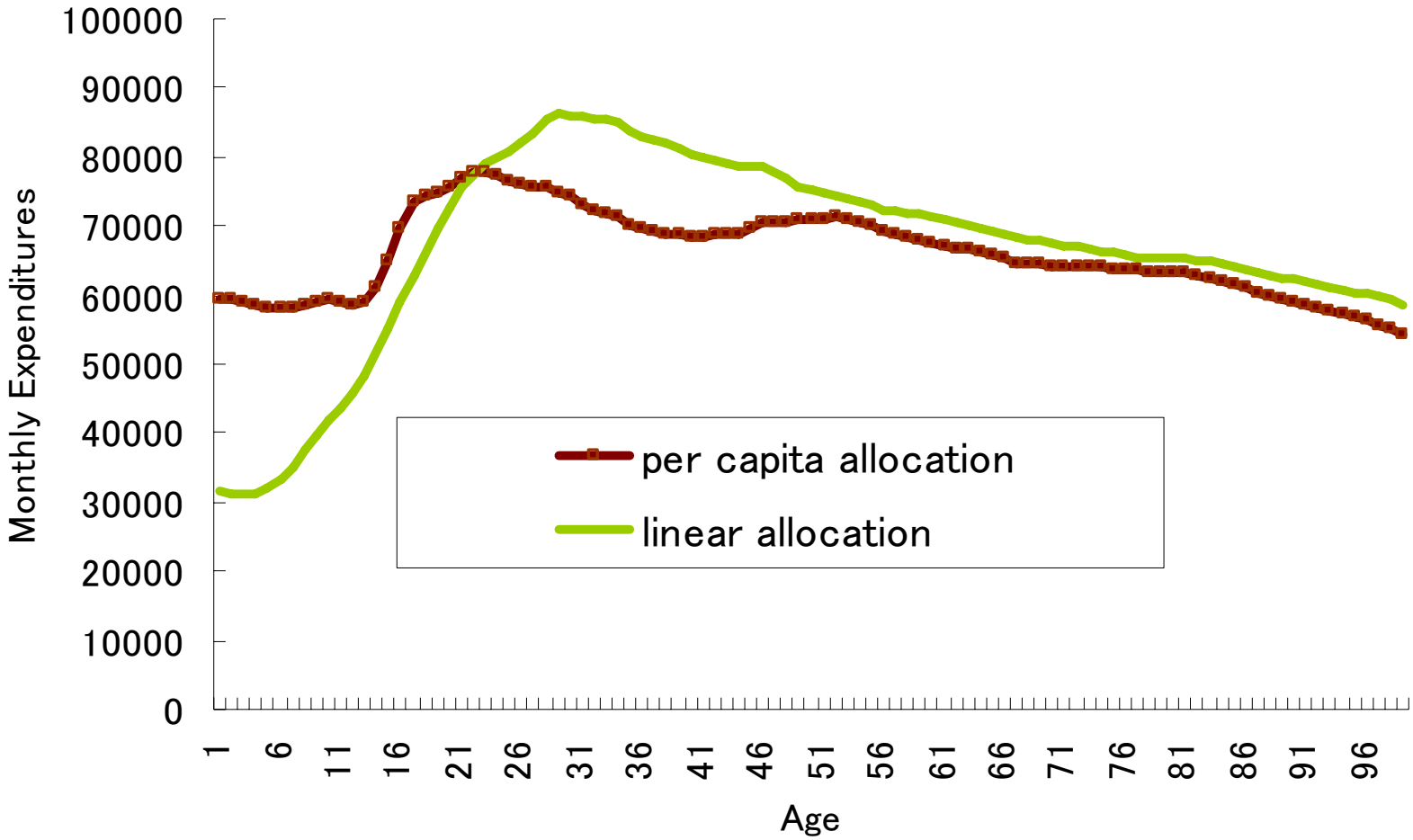

Health Expenditures - Taiwan (1976 - 2002)
Relative to Maximum
1.00
0.80
0.60
0.40
0.20
0.00
Age
1
6
11
16
21
26
31
36
41
46
51
56
61
66
71
76
81
86
91

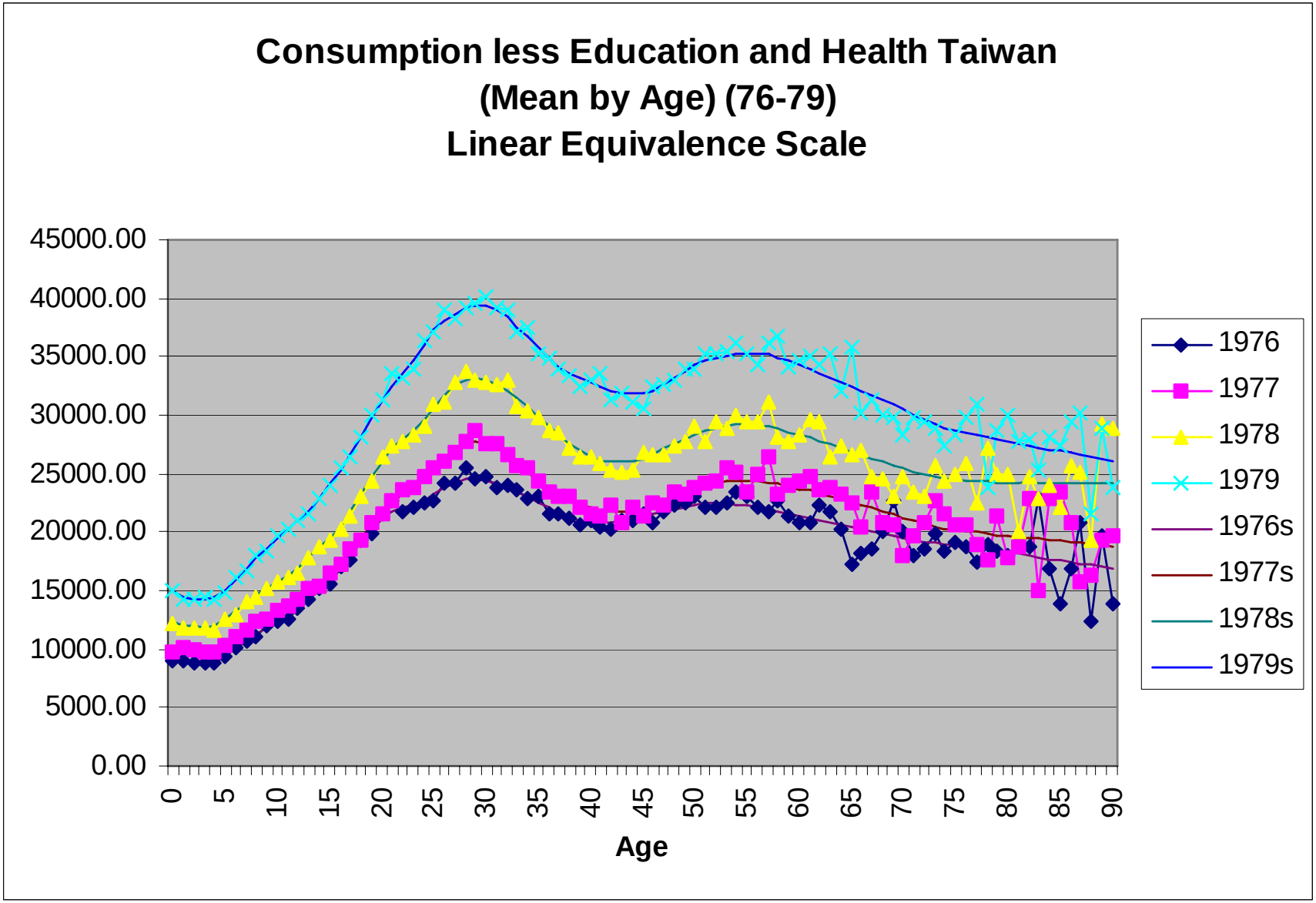

Education Transfers - Indonesia
(1993 - 2002)
Relative to Maximum
0
0.2
0.4
0.6
0.8
1
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41

Consumption Allocation



Split Method
Susenas 1996




Consumption less Education and Health Taiwan
(Mean by Age) (76-79)
Linear Equivalence Scale
45000.00
40000.00
35000.00
30000.00
25000.00
20000.00
15000.00
10000.00
5000.00
0.00
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
Age
1976
1977
1978
1979
1976s
1977s
1978s
1979s

What`s next?

Adjust to National Level

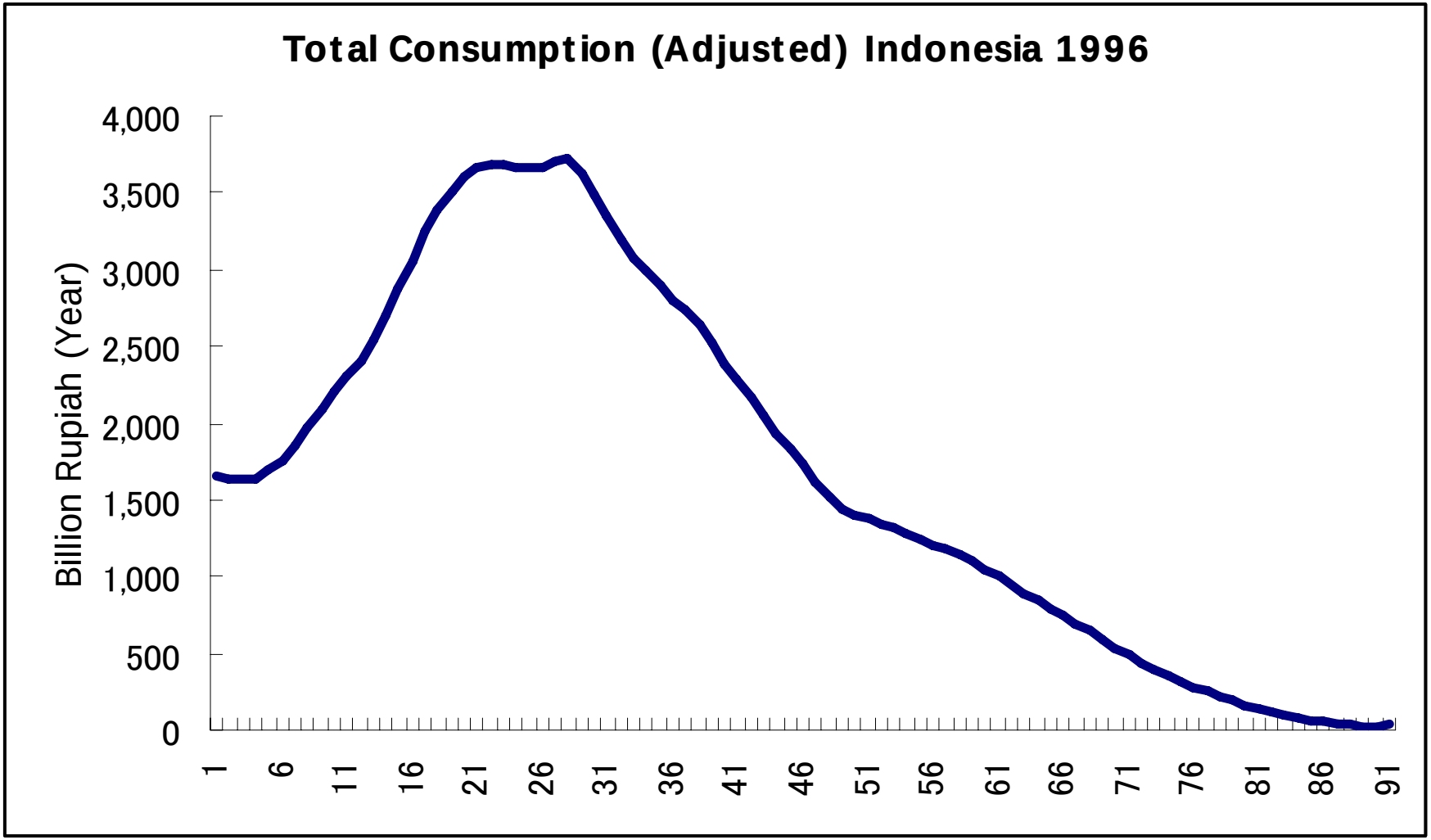
1. Estimate the age profile

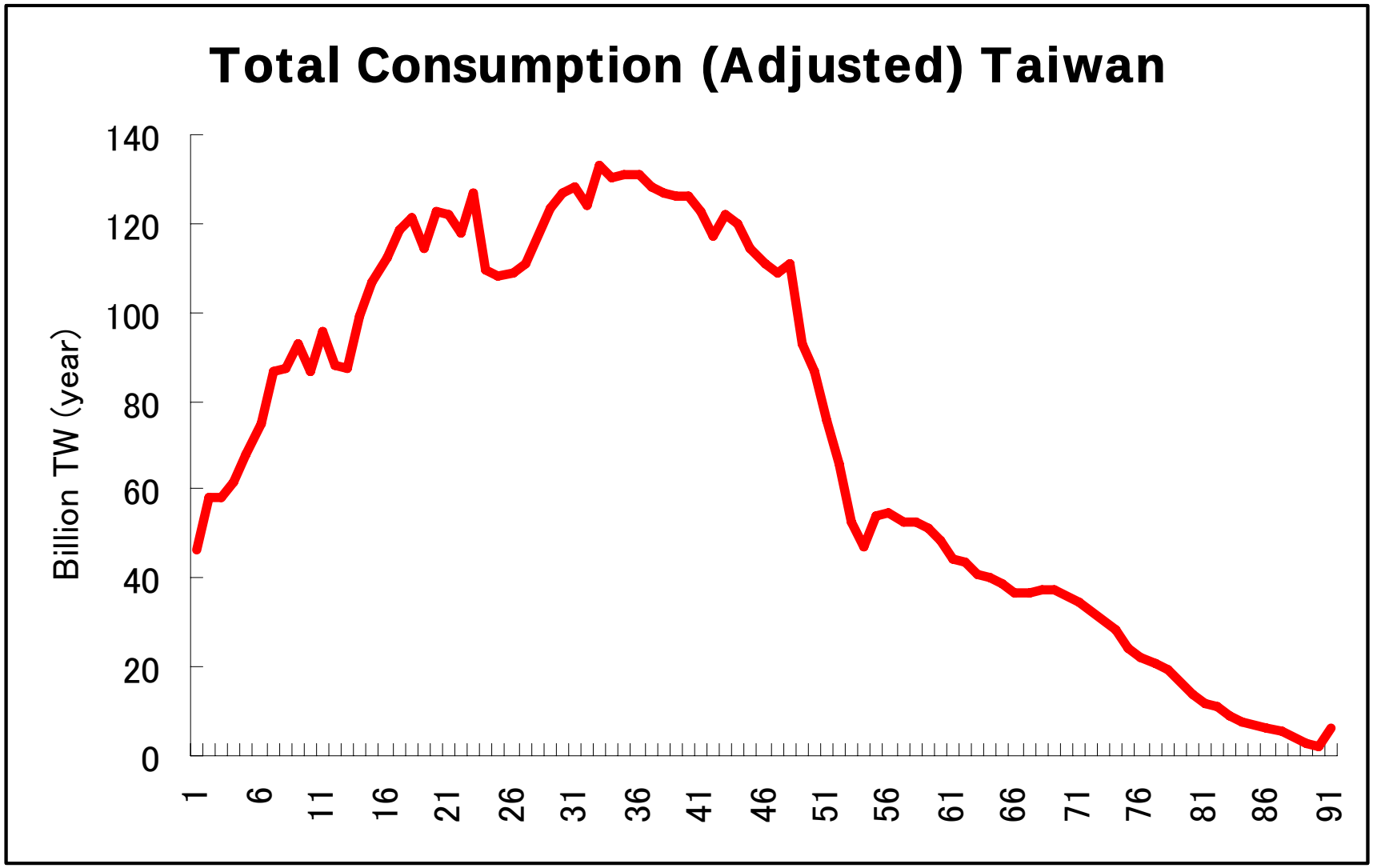
2. Multiply by the Population

$$C_f = \beta \widehat{C}_f N_f$$

$$\beta = C_{NIPA}^{private} \Big/ \sum_f \widehat{C}_f^{private} N_f$$

Adjust to NIPA total


Total Consumption (Adjusted) Indonesia 1996
Billion Rupiah (Year)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1
6
11
16
21
26
31
36
41
46
51
56
61
66
71
76
81
86
91


Total Consumption (Adjusted) Taiwan
Billion TW (year)
140
120
100
80
60
40
20
0
1
6
11
16
21
26
31
36
41
46
51
56
61
66
71
76
81
86
91