Health transition before and after 1995 health reform in Taiwan

Chi-Tsun Chiu, University of Texas at Austin
Meng-Fan Li, Shih Chien University
Yasuhiko Saito, Nihon University

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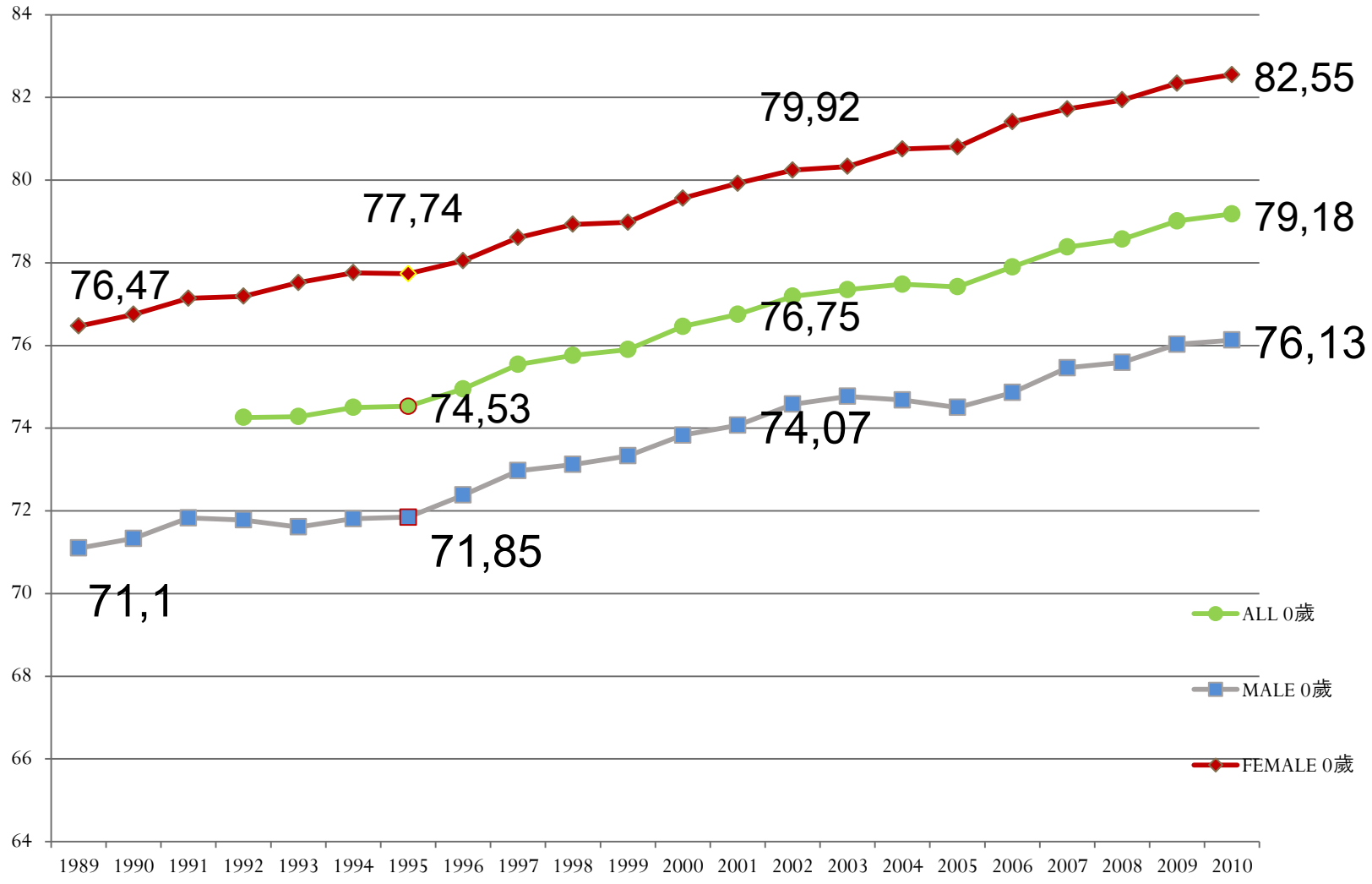
National Health Insurance in Taiwan

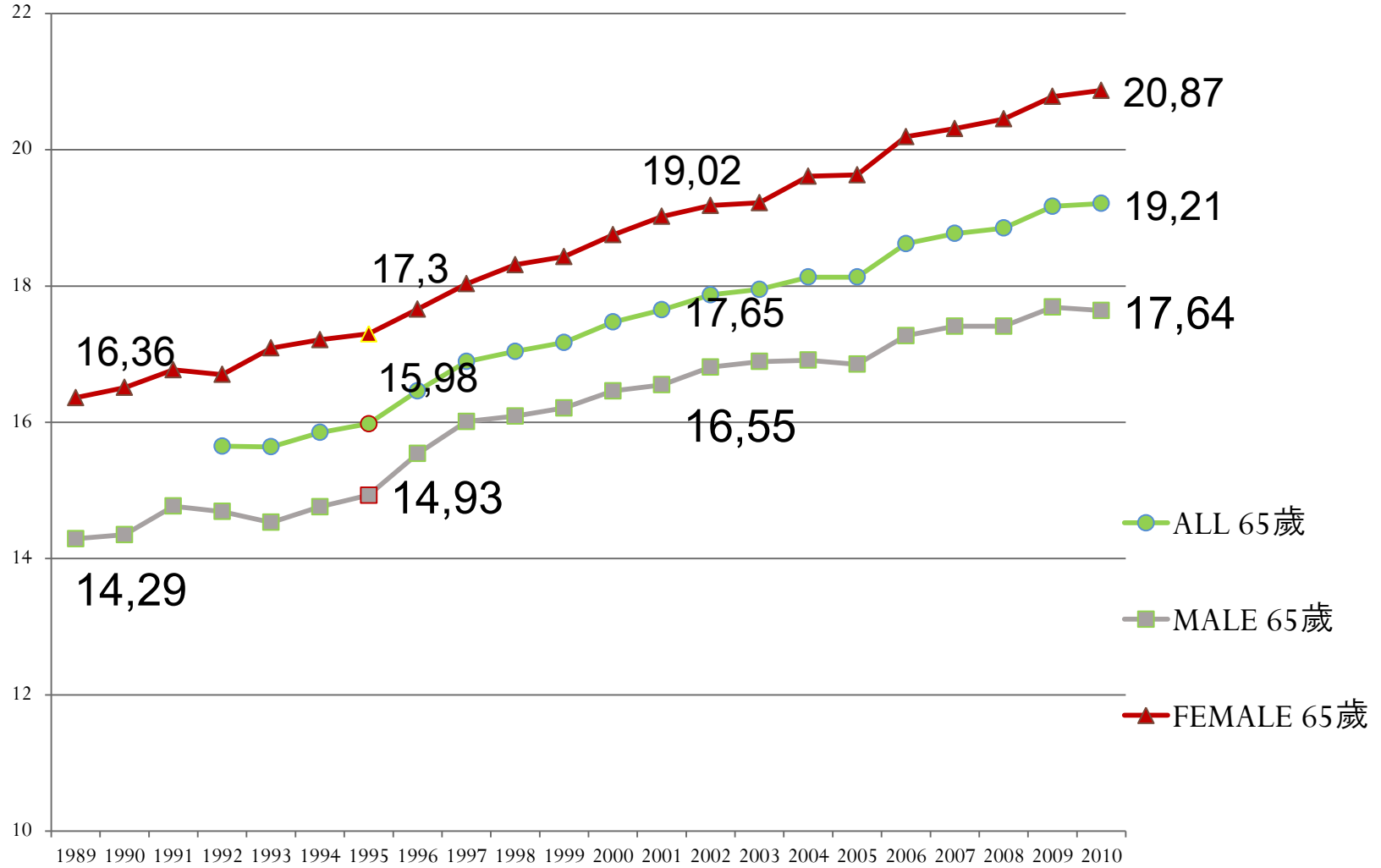
- **1995/03 to start the universal program, -NHI**
  - 10 health insurance programs were place in one - NHI
  - before NHI coverage rate 59%, 41% (the uninsured) are children, the elderly, the unemployed
  - After NHI, coverage rate 92%

- **2008 coverage rate 99.48%**

The trends of LE at birth (1989~2010)



The trends of LE at age 65 (1989~2010)



Life Expectancy for selected countries (2009)

	Average Life Expectancy(2009)	
	F	M
Japan	86.4	79.6
Switzerland	84.6	79.9
Italy (2008)	84.5	79.1
Australia	83.9	79.3
Spain	84.9	78.6
Sweden	83.4	79.4
France	84.4	77.7
Canada (2007)	83.0	78.3
Norway	83.2	78.7
Austria	83.2	77.6
New Zealand	82.7	78.8
Netherlands	82.7	78.5
Germany	82.8	77.8
Belgium	82.8	77.3
UK	82.5	78.3
Finland	83.5	76.6
South Korea	83.8	76.8
Taiwan	82.3	76.0
USA	80.6	75.7
Czechoslovakia	80.5	74.2
Mexico	77.6	72.9

Source: OECD health data 2011, Health Statistics

Changes in mortality

Health Status Indicators	10 years prior to NHI 1985~1994	10 years after NHI 1995~2004
mortality rate	Decrease by 12%	Decrease by 18%
LE at birth(Male/Female)	Increase 1.0/1.9	Increase 1.9/2.1

Source NHI(2011)Health for All. Retrieved from http://www.nhi.gov.tw/Resource/webdata/21422_1_ImprovedHealthStatus-01.jpg

Purpose of this paper

- **To investigate possible effect of health reform in 1995 in Taiwan on health transition among the elderly Taiwanese.**
- **Health status defined by**
  - Death
  - Disability
  - Physical functioning

Data

- **The Surveys of Health and Living Status of the Middle Aged and Elderly in Taiwan (SHILSE)**
- 6 waves of data in 1989, 1993, 1996, 1999, 2003, and 2007
- Nationally-representative of Taiwanese aged 60+ at baseline (N=4049)

Measures

- **Disability was measured by difficulty in performing at least one of 6 basic and instrumental activities of daily living.**
  - 1 ADL: bathing
  - 5 IADLs: shopping, managing money, making phone calls, doing heavy housework, using transportation

Measures

- **functional limitation (FL) was measured by difficulty in performing at least one of 6 NAGI items.**
  - (1) Stoop/Squat
  - (2) Raise both hands over your head
  - (3) Use fingers to grasp or turn objects
  - (4) Lift or carry something weighing 11-12kg
  - (5) Walk for 200 to 300 meters
  - (6) Walk up two or three flights of stairs

Research questions

- Does any different pattern of age-specific transition rates exist before and after health reform?
- If any effect is observed, to what extent does NHI reduce health inequality resulting from different SES?
- Can we test the difference of health transitions before and after health reform?

Method

- **Apply discrete time hazard model to estimate transition rates**
- **SAS: PROC LIFEREG**
- **Apply weights for each wave**

Health Transitions

- **Mortality**
  - Total
  - Non-disabled at baseline
  - Disabled at baseline
  - No FL at baseline
  - FL at baseline
- **Disability onset**
- **Recovery from disability**
- **FL onset**
- **Recovery from FL**

Model and variables

- **Models:**
- **1. log(μ)=β0+β1*age, by sex and time interval**
- **2. log(μ)=β0+β1*age+β2*sex+β3*Edu+β4*Inc, by time interval**
- **3. log(μ)=β0+β1*age+β2*sex+β3*Edu+β4*Inc+β5*time interval**
- **Education:**
  - No Formal Education (reference)
  - 1-6 years
  - 7+ years
- **Income:**
  - [0,25%] (reference)
  - (25%, 75%]
  - (75%, 100%]

Model and variables

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- **3. log(μ)=β0+β1*age+β2*sex+β3*Edu+β4*Inc+β5*time interval**
- **Time intervals:**
  - (1) 1989-1993
  - (2) 1993-1996 ← health reform in March 1995
  - (3) 1996-1999
  - (4) 1999-2003
  - (5) 2003-2007

Model and variables

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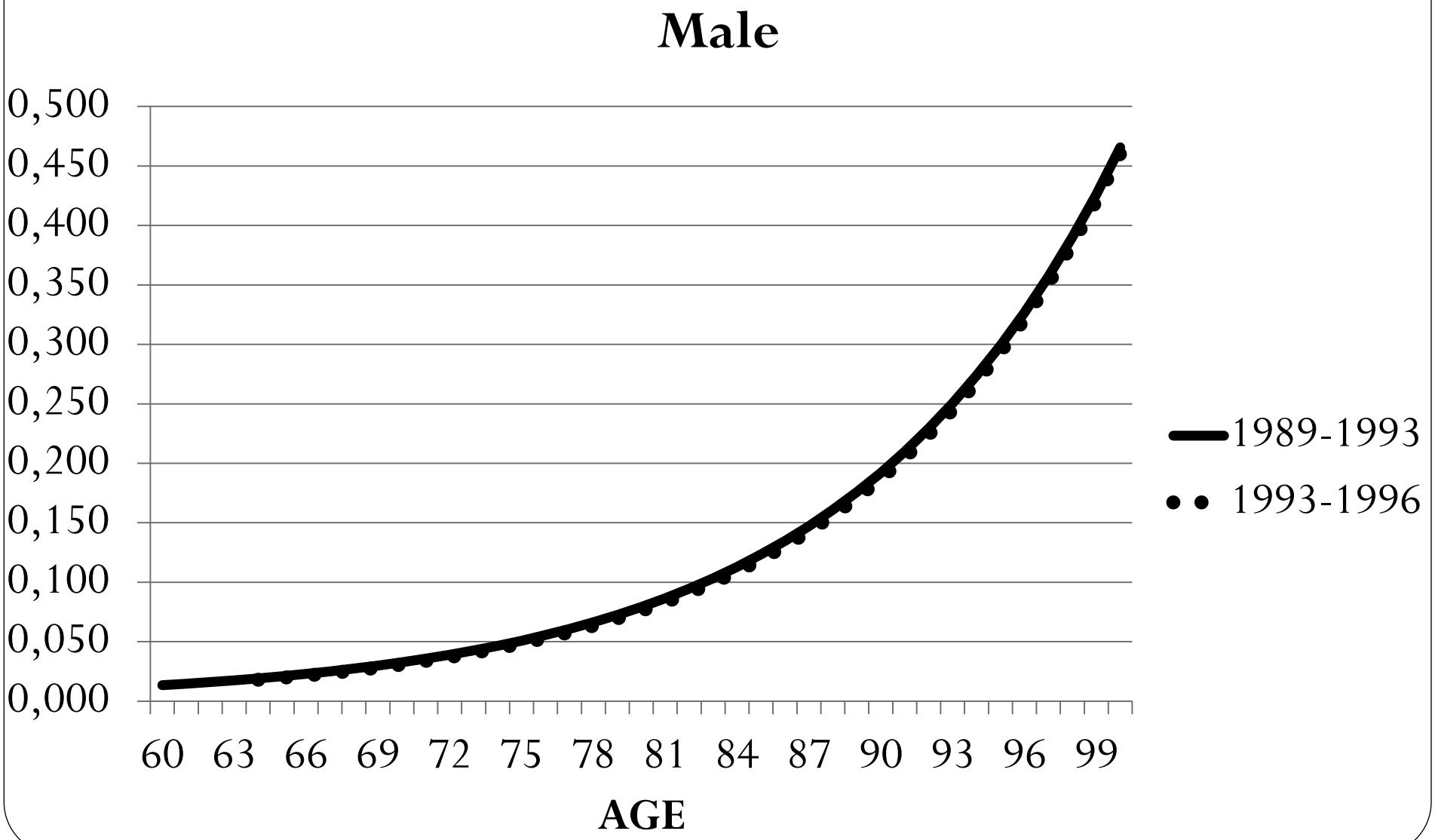
- **3. log(μ)=β0+β1*age+β2*sex+β3*Edu+β4*Inc+β5*time interval**
- **Time intervals:**
  - (1) 1989-1993
  - (2) 1993-1996 "before"
  - (3) 1996-1999
  - (4) 1999-2003 "after"
  - (5) 2003-2007

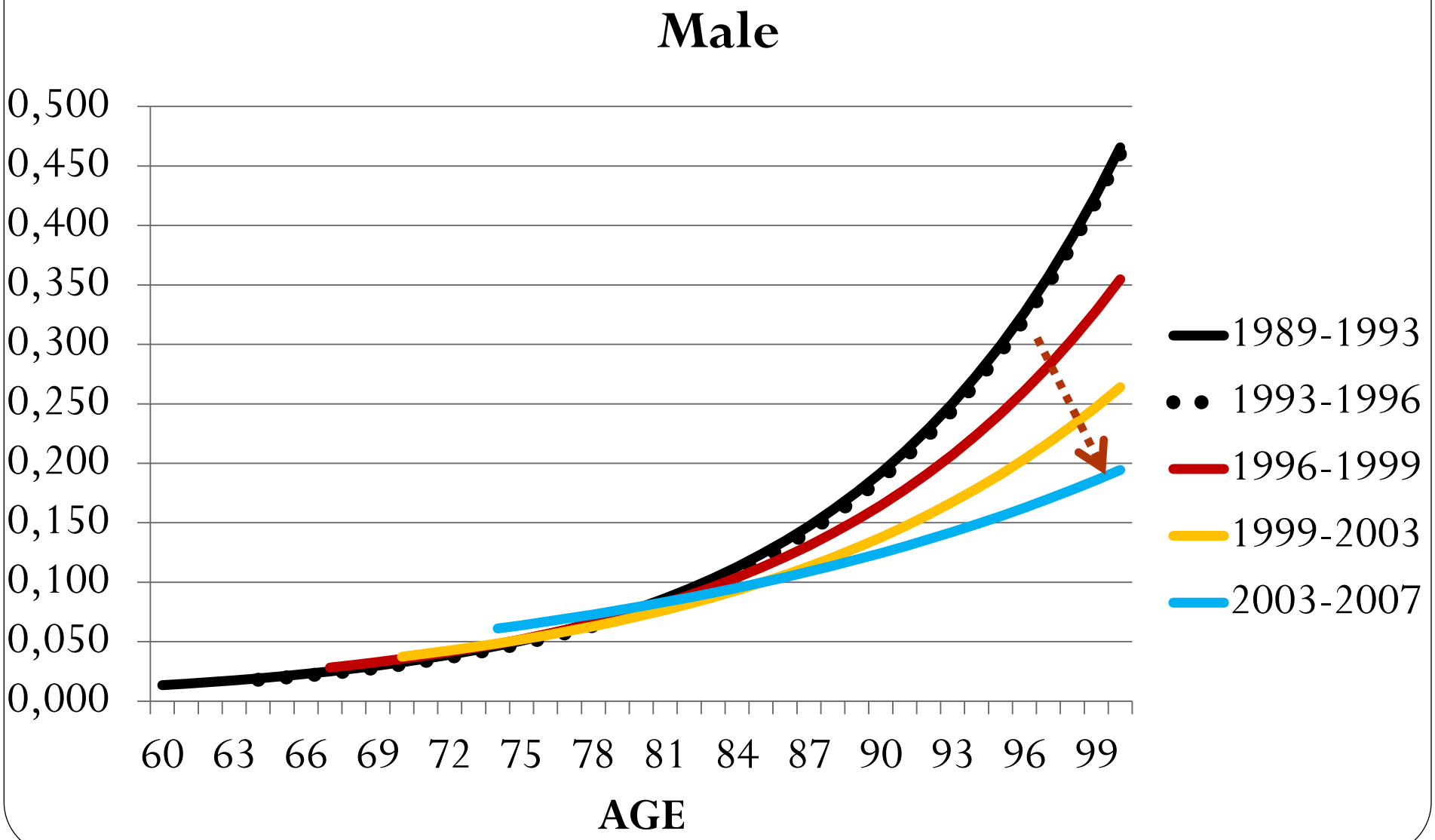
- **Does any different pattern of age-specific transition rates exist before and after health reform?**

- **Model 1.**
- **$\log(\mu)=\beta 0+\beta 1*age$, by sex and time interval**

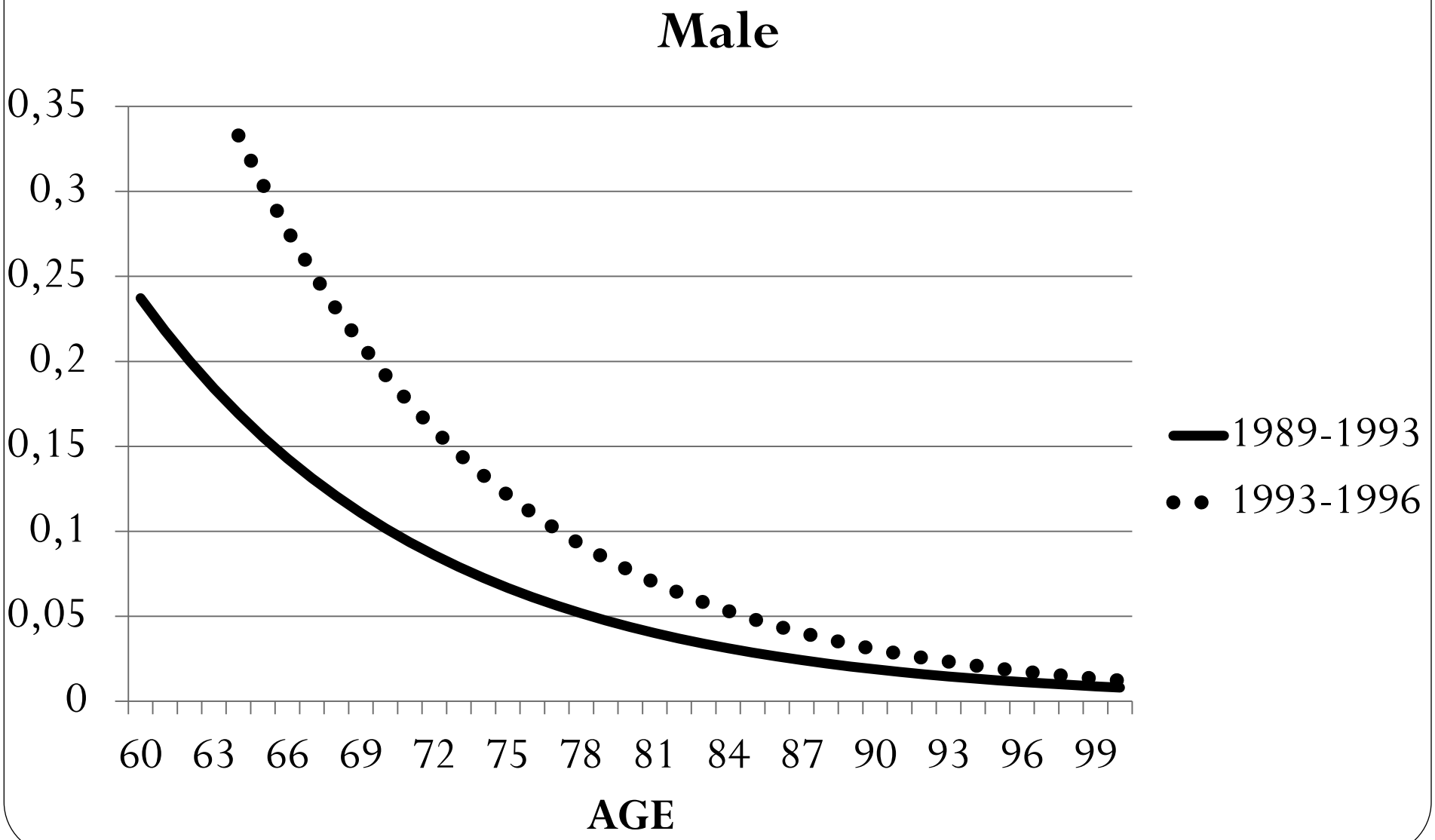
Ex 1. Mortality – before



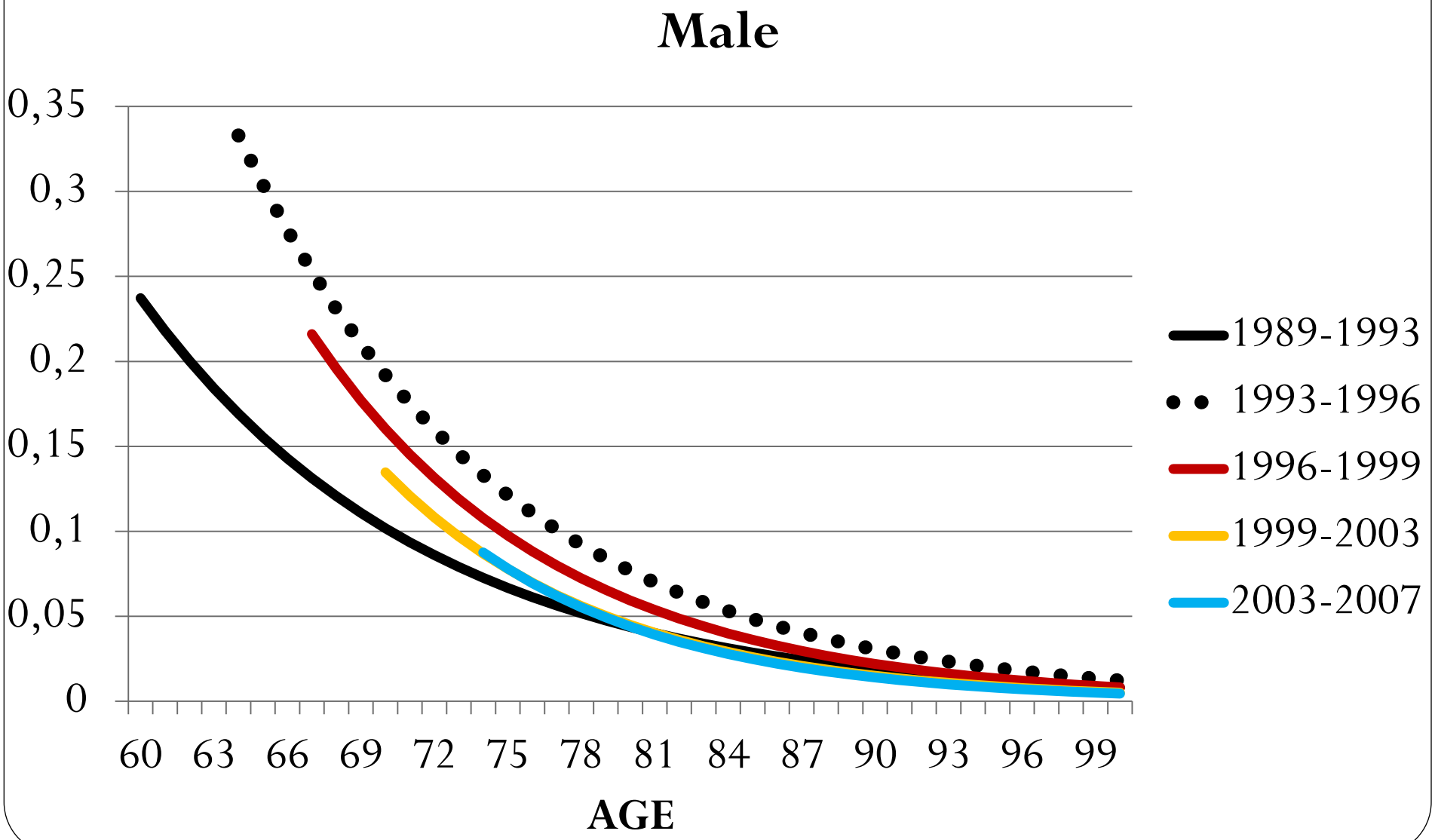
Ex 1. Mortality – before and after



Ex 2. Recovery from disability – before



Ex 2. Recovery from disability – before and after



- **Do we see different patterns between “before” and “after”?**

- **Do we see different patterns between "before" and "after"?**

- **YES**

- **Do we see different patterns between "before" and "after"?**
- **YES**
- **So, why different patterns exist?**

Possible factor?

- Before health reform,
- who are the uninsured?

Possible factor?

- **Before health reform,**
- **the uninsured are**
  - children
  - the elderly
  - the unemployed

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- **Before health reform,**
- **the uninsured are**
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  - the elderly
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- **➔No/lower Income**

- **If the uninsured have the access to health care, we can expect they will have improved health outcome.**

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- **Hypothesis:**
- **NHI can help to reduce SES gap on health.**

- **Another possible factor?**

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- **Education!!**

- **To what extent does NHI reduce health inequality resulting from different education and income?**

- **Model 2.**
- **$\log(\mu)=\beta 0+\beta 1*age+\beta 2*sex+\beta 3*Edu+\beta 4*Inc$, by time interval**

Results

Health Transitions	Education before	Education after
Mortality:		
Total		V
non-disabled at baseline		V
disabled at baseline		
No FL at baseline		V
FL at baseline		

Note: red means p<0.05

Results

Health Transitions	Income before	Income after
Mortality:		
Total	V	V
non-disabled at baseline	V	
disabled at baseline		V
No FL at baseline	V	
FL at baseline		

Note: red means p<0.05

Results

Health Transitions	Income before	Income after
Mortality:		
Total	V	V
non-disabled at baseline	V	
disabled at baseline		V
No FL at baseline	V	
FL at baseline		

Note: red means p<0.05

Results

Health Transitions	Education before	Education after	
Disability onset	V		
Recovery from disability			
FL onset	V		
Recovery from FL	V	V	

Note: red means p<0.05

Results

Health Transitions	Income before	Income after
Disability onset	V	
Recovery from disability	V	
FL onset		
Recovery from FL	V	

Note: red means p<0.05

Results

Health Transitions	Education		Income	
	before	after	before	after
Mortality:				
Total		V	V	V
non-disabled at baseline		V	V	
disabled at baseline				V
No FL at baseline		V	V	
FL at baseline				
Disability onset	V		V	
Recovery from disability			V	
FL onset	V			
Recovery from FL	V	V	V	

Note: red means p<0.05

Results

Health Transitions	Education		Income	
	before	after	before	after
Mortality:				
Total		V	V	V
non-disabled at baseline		V	V	
disabled at baseline				V
No FL at baseline		V	V	
FL at baseline				
Disability onset	V		V	
Recovery from disability			V	
FL onset	V			
Recovery from FL	V	V	V	

Note: red means p<0.05

- **Can we test the difference of effect of time on health transitions before and after health reform?**

- **Model 3.**
- **$\log(\mu)=\beta 0+\beta 1*age+\beta 2*sex+\beta 3*Edu+\beta 4*Inc+\beta 5*$time interval**
- **where 1993-1996 is the reference**

Results

Health Transitions	1989-1993	(ref) 1993-1996	1996-1999	1999-2003	2003-2007
Mortality:					
Total					
non-disabled at baseline	better				worse
disabled at baseline					
No FL at baseline	better		worse	worse	worse
FL at baseline					
Disability onset					
Recovery from disability	worse			worse	worse
FL onset	better		worse		
Recovery from FL	worse		worse	worse	worse

Note: red means p<0.05

Results

Health Transitions	1989-1993	(ref) 1993-1996	1996-1999	1999-2003	2003-2007
Mortality:					
Total					
non-disabled at baseline	better				worse
disabled at baseline					
No FL at baseline	better		worse	worse	worse
FL at baseline					
Disability onset					
Recovery from disability	worse			worse	worse
FL onset	better		worse		
Recovery from FL	worse		worse	worse	worse

Note: red means p<0.05

Summary

- **Mortality:**
  - Education matters (especially highest education group) after health reform but income becomes less important after health reform.

Summary

- **Disability and Functional Limitation:**
  - For disability and FL, after health reform, the importance of education and income drops.

Thank You!

- **Acknowledgement:**
- **Survey was conducted by the Bureau of Health Promotion, Department of Health, Executive Yuan.**

- **Contact information:**
- **Chi-Tsun Chiu**
- **ctchiu@utexas.edu**
- **Meng-Fan Li**
- **mandyli@mail.usc.edu.tw**
- **Yasuhiko Saito**
- **saito.yasuhiko@nihon-u.ac.jp**

Number of deaths

Interval	1989-1993	1993-1996	1996-1999	1999-2003	2003-2007
N	3948	3347	2913	2446	1884
death	601	434	467	562	536