2014 EAAC TAIPEI TAIWAN

18TH EAST ASIAN ACTUARIAL CONFERENCE

12-15 October 2014

Taipei International Convention Center, Taipei Taiwan

Comparisons of Industry Experience Studies in the United States and Taiwan

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Society of Actuaries Experience Studies

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EAAC

Society of Actuaries Overview

- 24,000 worldwide members
- Based in Schaumburg, IL
- Focus on Education and Research

Overview

- History prior to 1949
- Entering the Modern Era
- 21st Century Studies
- Future Considerations

The Early Days

- SOA was formed from American Institute of Actuaries and American Society of Actuaries through merger in 1949
- From the start of these preceeding organizations, experience studies were a main driver of focus of the membership
- 1889: Reason for Being Statement
- 1920's: Build and Blood Pressure studies
  - First establishment of body mass indexes as a mortality indicator
- 1941 VBT & CSO by AIA/ASA
  - Emergence of industry wide process to better establish life insurance liability reserves

The Early Days

- SOA formed in 1949
- Record of the SOA begins to have an annual experience study focus, mainly on Individual ("Ordinary") Life Insurance
- Focus on broad industry tables for reference and for regulation
  - 1958 Valuation Basic Table & Commissioners' Standard Ordinary Table: SOA Committee Driven

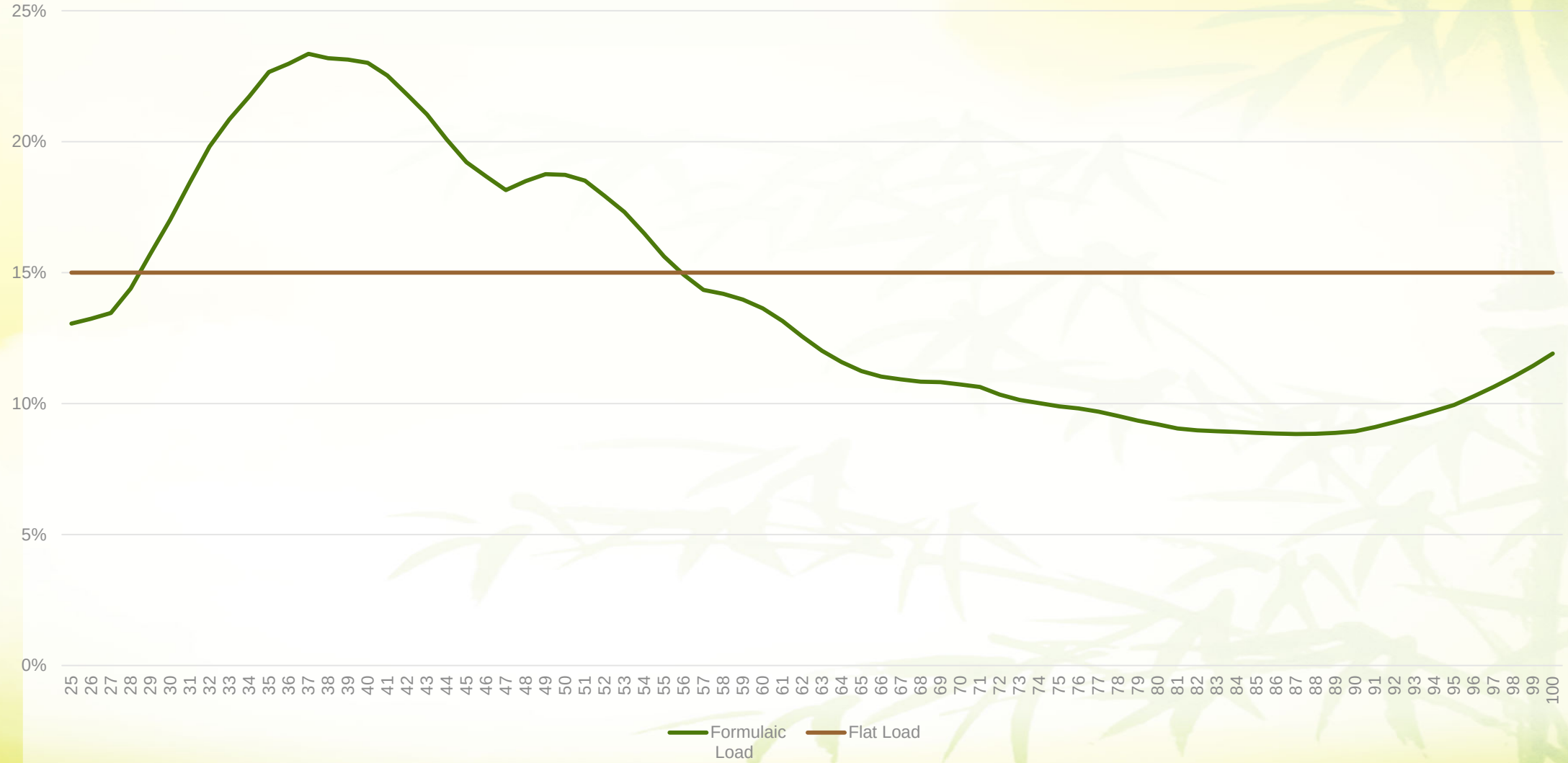
Late 20th Century

- Experience Basic Tables every 5 years
- Strict experience calculations; No smoothing
- 1980 CSO developed
- 1990 – 1995 Experience Basic Tables smoothed to create 2001 VBT
- Partnership with AAA to create margins and create 2001 CSO

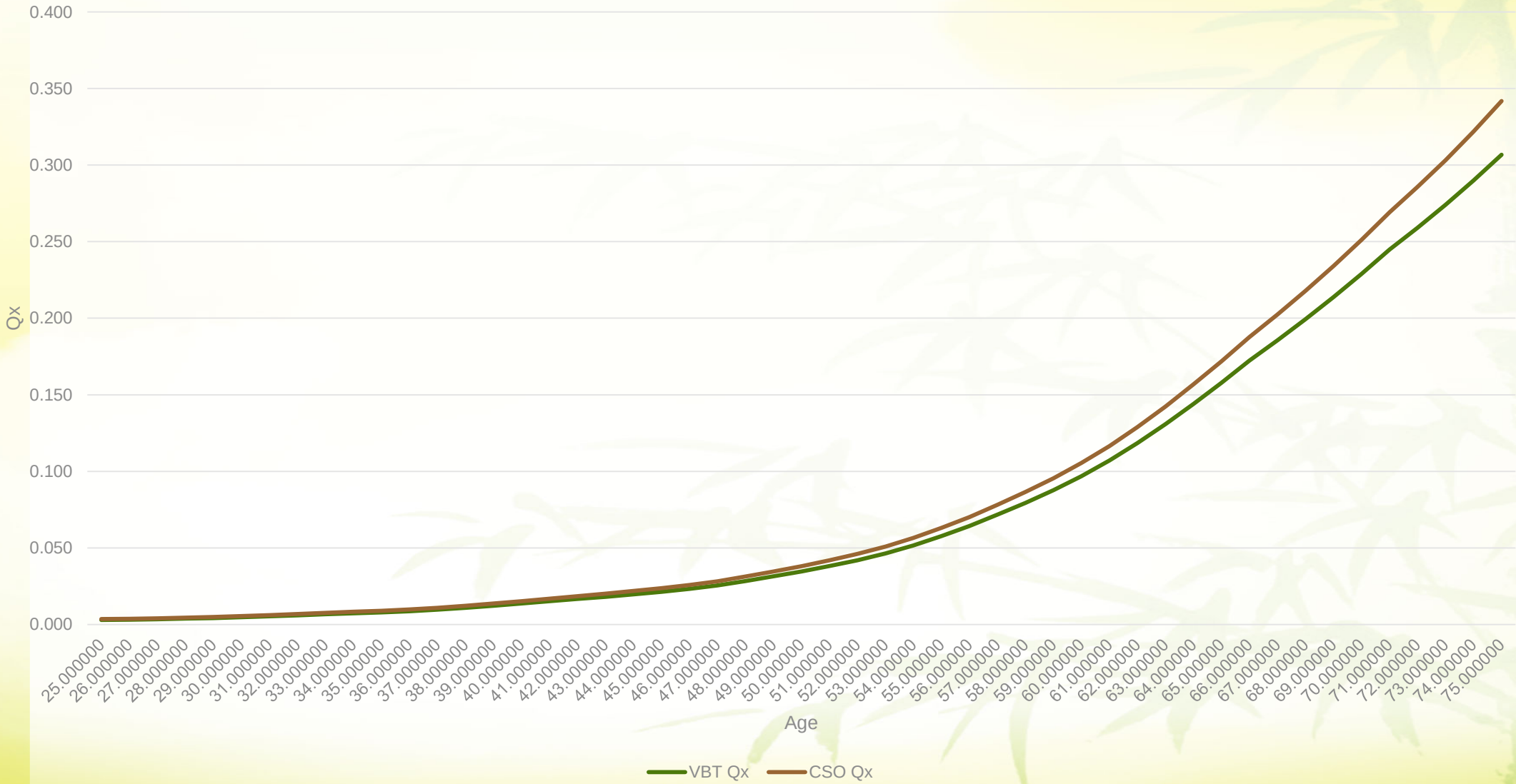
Entering the Modern Data Era

- Ultimate Table Margin Calculations
  - 2001 CSO formula: Margin = $(0.0056 - 0.00016x + 0.000008x^2)/ex$
  - Inverse of the expectation of life provides an absolute load that is monotonically increasing with age and a percentage load that generally decreases with age
- Regulatory Goal
  - Valuation mortality that covers mortality results of roughly 75-85% of industry companies

2001 CSO Male Aggregate Table
CSO Margin as a % of VBT Rate



Comparison of 2001 CSO Male Aggregate VBT and CSO qx



Entering the Modern Data Era

- Data participation concerns
  - Sharing the coordination responsibility from study to study
  - Capitalism
  - Data Privacy
  - Aggregated Results vs. Seriatim Data

Recent evolution

- 2008 VBT created with intentions of supporting move to Principles Based Reserves for individual life products
- 2002 – 2009 data collected
- 52 companies
- 2014 VBT

2014 VBT / CSO

- Presented and exposed by Life Actuarial Task Force of NAIC August 2014
- Relative Risk Tables; Underwriting Selection Process in United States
- Underwriting Criteria Scoring Tool
- CSO Margins: Formula vs Credibility Approach
- Impact Study
- Likely adoption August 2015
- Potentially effective 1/1/2017

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Experience Studies in Taiwan

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Oct. 13, 2014

EAAC

Life Table

- A life table is also known as a mortality table or actuarial table, and it shows

→ The survival probability and remaining life expectancy at different ages.

→Population Table vs. Experience Table

- In Taiwan, the population tables are constructed by government officials and the experience tales are constructed by various life insurance associations.

Population Life Table

- A population life table is for the whole population in Taiwan.

→Aggregate data (mid-year population)

→Abridged and complete life tables are constructed every year and every 10 years.

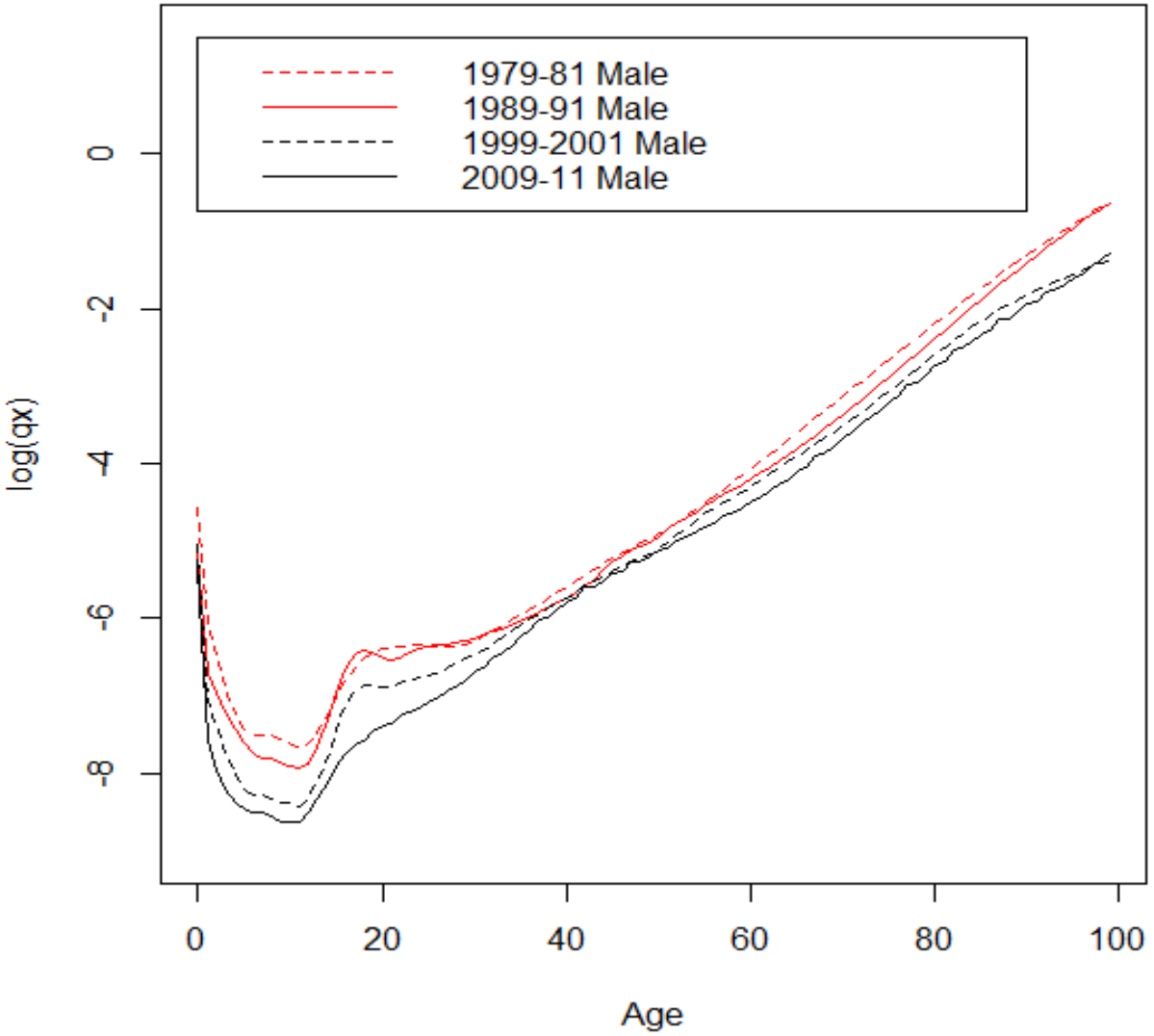
- The focus of study for constructing population tables is on the methodology.

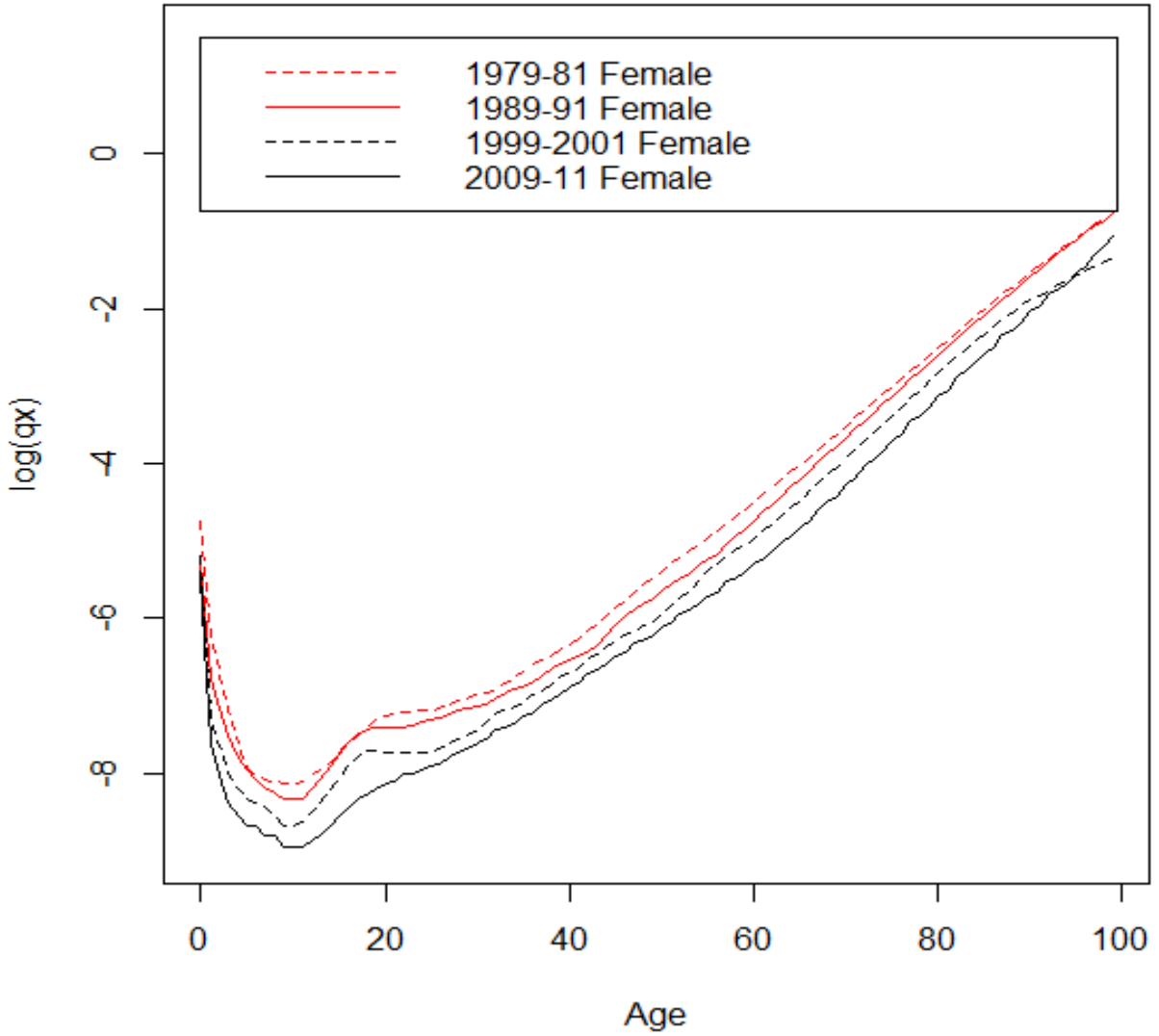
→Recent reports: Elderly mortality models (Gompertz law), Small area life tables.

表 1　國民生命表編算方法修正前後差異比較表

項目	修正前	修正後
死亡機率之推算	1. 60 歲以前 採 Greville 三次九項公式補整 2. 60 歲以後 採高馬氏公式 $\mu_x = \alpha + \beta e^{\alpha x}$ $q_x = 1 - \exp(-A - B * e^{\alpha x})$	1. 60 歲以前 採 Whittaker 修勻法補整 2. 60 歲以後 （1）60 至 86 歲採 Whittaker 修勻法與高馬氏加權迴歸（WLS）之線性組合 $q_{59+i} = (1 - (\frac{i-1}{26}))q_{59+i}^{(Whittaker)} + (\frac{i-1}{26})q_{59+i}^{(WLS)}$ $i = 1,2,\cdots,27$ （2）86 歲以後採 WLS 為補整後之死亡機率
死因除外之死亡假設	定死力假設： 假設各年齡間之死亡分布為指數分配， $f_T(t) = \mu e^{-\mu t}$，　$t \in (0,1)$； 則 $q_x^{'(-i)} = 1 - p_x^{\frac{D_x - D_x^{(i)}}{D_x}}$	均勻死亡假設： 假設各年齡間之死亡分布為均勻分配， $f_T(t) = q_x$，$t \in (0,1)$； 則 $q_x^{'(-i)} = q_x(\frac{D_x - D_x^{(i)}}{D_x})$

New Methods for Constructing Population Life Tables





7th to 10th Taiwan Population Life Tables

Experience Life Table

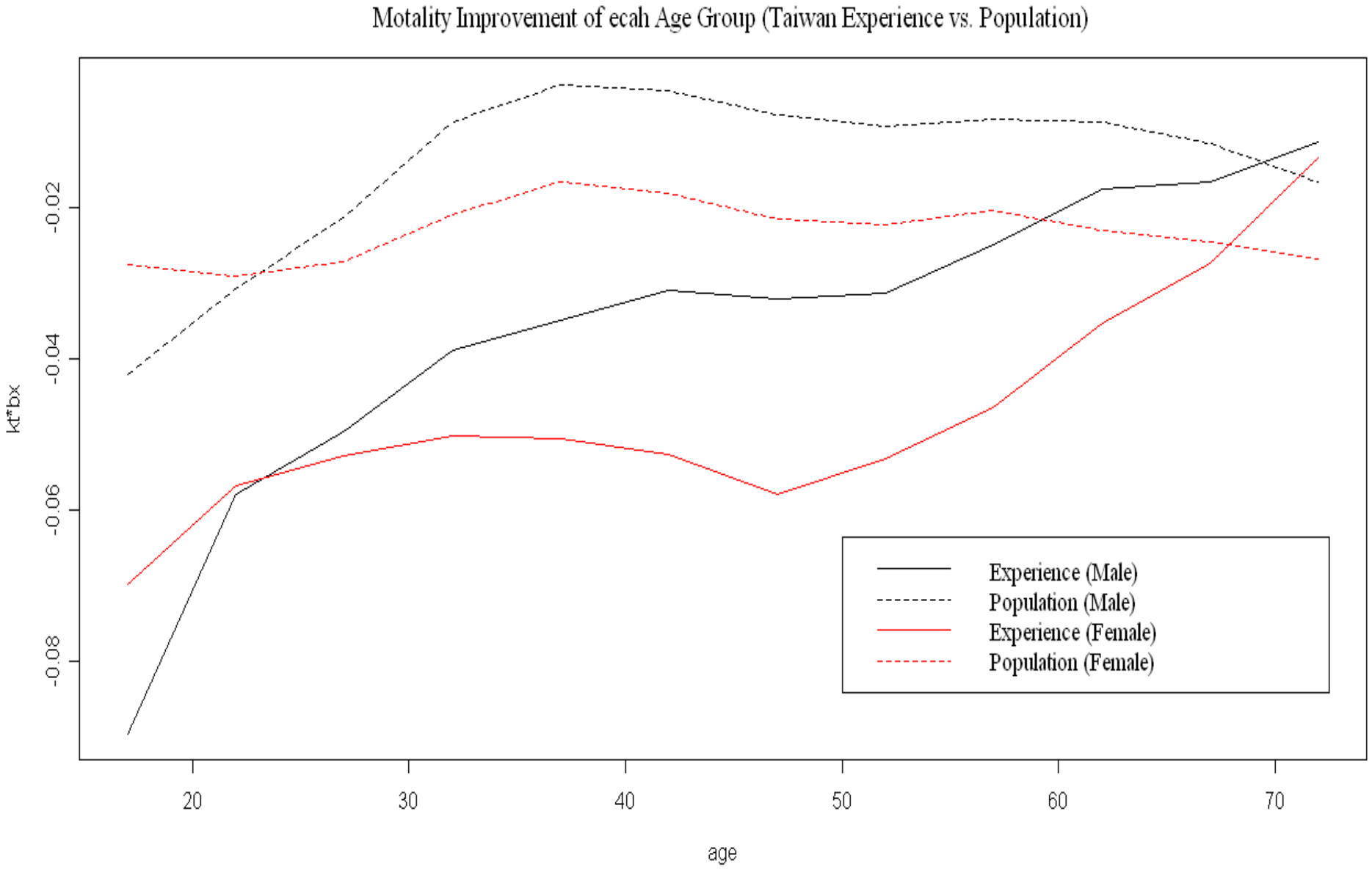
- An experience life table is for certain populations of interest.

→e.g., Ordinary life & pension life tables.

→Unlike population tables, experience tables are not constructed regularly.

- The focus of study for constructing experience tables is on the mortality trend.

→ Need to check if the policy premiums are appropriate.



Experience Data have Larger Mortality Improvement

Lee-Carter Mortality Model

- The Lee-Carter Model (Lee and Carter, 1992), the central mortality rate should be consistent with the following equation

→

$$\ln\left(m_{x,t}\right) = \alpha_x + \beta_x \kappa_t + \varepsilon_{x,t}$$

α_x describes the average age-specific mortality,

β_x represents the general mortality level, and the decline in mortality at age x is captured by κ_t .

Taiwan Standard Ordinary Life Tables

TSO	Data	Time	Responsible	Regulation
1st TSO (1975)	1969 ~1972	1973 ~1974	TLIA	民國64年2月5日 台財錢字第11200號
2nd TSO (1984)	1977 ~1981	1981 ~1983	TLIA	民國73年12月28日 台財融字第24549號
3rd TSO (1989)	1982 ~1986	1988 ~1989	TLIA	民國78年6月19日 台財融字第780163364號
4th TSO (2002)	1995 ~1999	2002	LIAROC	民國91年12月27日 台財保字第0910074199號
5th TSO (2011)	2004 ~2008	2010 ~2011	TII	民國101年1月10日 金管保財字第10102500605號

TLIA: Taipei Life Insurance Association, LIAROC: Life Insurance Association of the Republic of China, TII: Taiwan Institute of Insurance

Taiwan's Life Insurance Associations

- Private insurance companies are allowed starting 1962.

→ Taipei Life Insurance Association (TLIA) was the first LIA in Taiwan (1964), and then followed by the national LIA in 1998 (LIAROC; LIA of the Republic of China).

- TLIA/LIAROC was in charge of collecting data from all insurance companies and constructing experience tables.

About TII

- TII (Taiwan Institute of Insurance) was founded in 1985, to assist the regulators to study and formulate regulatory policies to develop a healthy operating environment.
- TII is in charge of collecting life insurance data (including claims) from all Taiwan's life insurance companies.

→ TII's recent studies: 5th Taiwan TSO, 2nd Taiwan Pension Life Table, Long-term care experience study.

Suggestions for the Experience Tables

- Need to organize a regular-base research committee for experience tables.

→e.g., elderly mortality models, stochastic (or cohort) mortality models

- The mortality rates are changing rapidly and, similar to constructing population tables, the experience tables need to be evaluated regularly (such as every 5 year).
- Data formats need to be unified.

Thank you!!