# The Impact of Longevity Environment for Risk and Insurance

報告人： 東吳大學商用數學系 楊曉文

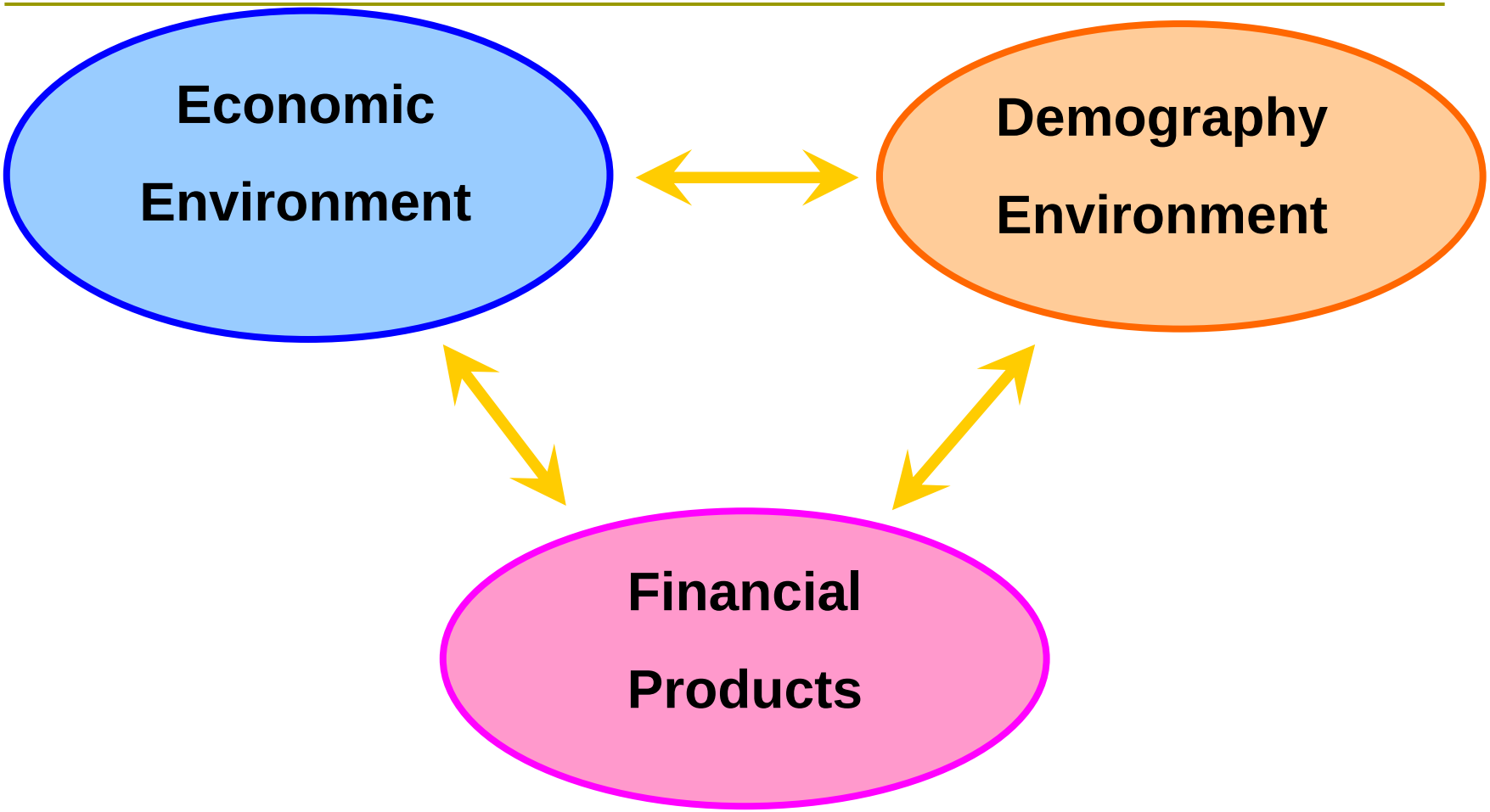
工作小組: 政大風管系鄭雅丰及許鳴遠

日期：2005年3月18日

# Agenda

- Introduction
- The longevity environment for risk and insurance
  - Risks related to longevity v.s. Their impacts v.s. Implication
- Individual
- Insurer
- Government

# Introduction



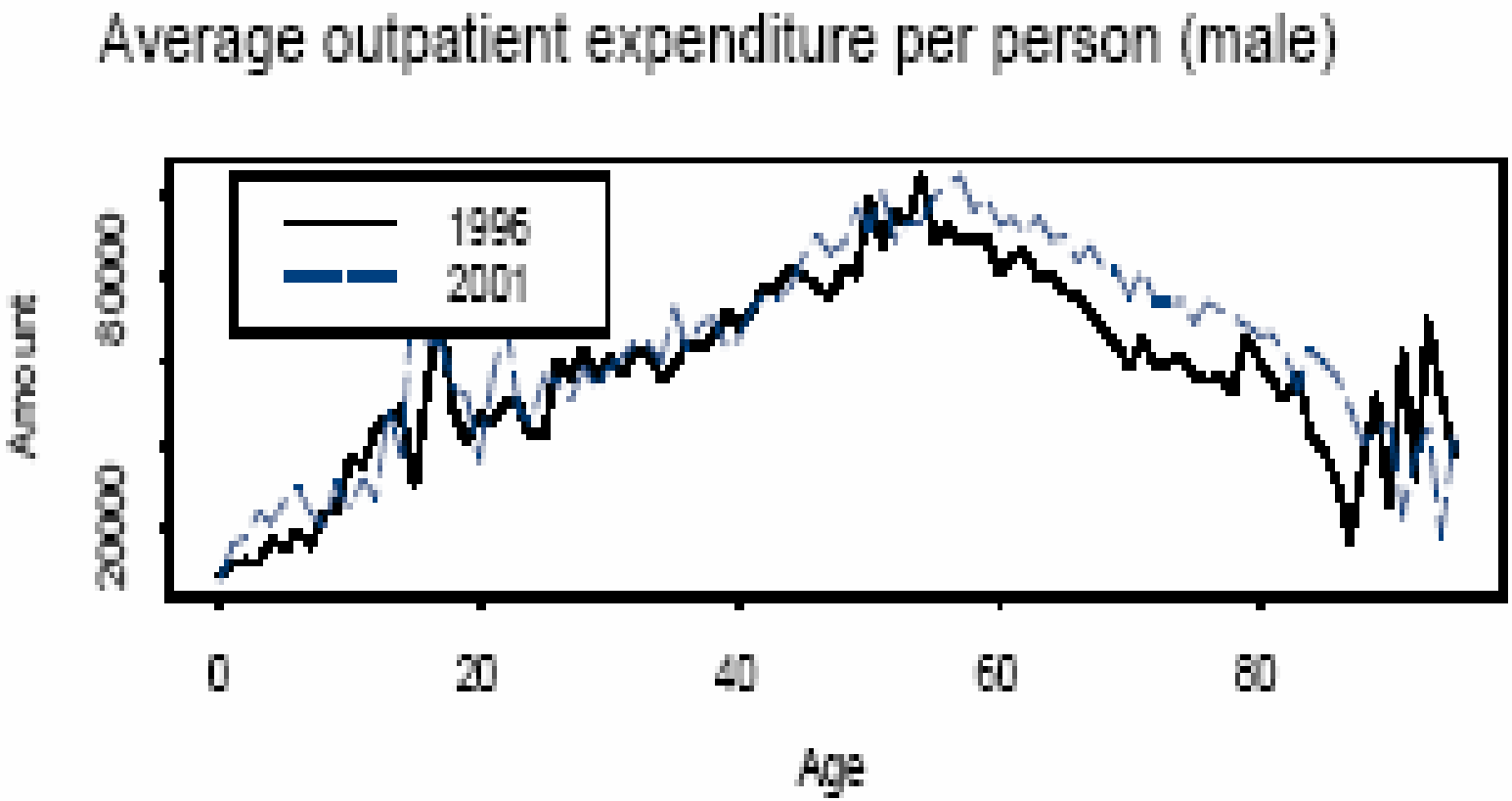
# Risks related to longevity and Their impacts on Individual

How do these increase in longevity affect the demand for various kinds of financial services?

# Risks Related to Longevity for Individuals

- Uncertainty
  - Insufficient pensions and personal savings
  - Chronic illness
- The change of family structure makes the impacts of longevity more serious.

# Medical Expense



# Long Term Care

- Use of LTC is increases with age.
  - 65歲以上為9.12%；0-64歲為0.57%；
  - 輕微失能比例在0-64歲為45.2%，
    但在65歲以上為38.0%

# Family structure –The Impact of Increased Life Expectancy on U.S. Family Structure, 1900-2000

| | | 1900 | 1940 | 1960 | 2000 |
|---|---|---|---|---|---|
| 個人和生存之祖父母 | 20歲，祖父母雙亡 | 30% | 18% | 8% | 3% |
| | 30歲，至少有一個存活 | 21 | 33 | 51 | 76 |
| 個人和生存之父母 | 50歲，至少有一個存活 | 39 | 52 | 67 | 80 |
| | 50歲，都存活 | 4 | 8 | 14 | 27 |
| | 60歲，至少一個存活 | 7 | 13 | 24 | 44 |

Source: Adapted from Uhlenberg(1996)

# Family structure –每戶人數

| End of Year (Month) | Volnme of Household (Persons/ Household) |
|---|---|
| 八　十年**1991** | **3.94** |
| 八十五年**1996** | **3.57** |
| 九十年 **2001** | **3.29** |
| 九十四年**2005** | **3.16** |

資料來源：本部戶政司。

Source : Dept. of Household Registration Affairs, MOI.

# Implications for Individuals

- Demand for
  - Pensions
  - Health Insurance
    - Critical Illness
    - Medical expense
    - Long-term Care
- Advervse Selection

# Risks related to longevity and Their impacts on the insurer

How do these increases in longevity affect the supply for various kinds of insurance products?

# Risks

- Pricing Risk
  - Annuity Provider
  - Health Insurance Provider

- Liabilities increase

  →Solvency

# Pricing Risk-an example of single premium deferred life annuity

| 年金表打折比例 | 100% | 95% | 90% | 85% | 80% | 75% | 70% |
|---|---|---|---|---|---|---|---|
| 領取金額6000 | 15 | 16 | 17 | 18 | 19 | 21 | 22 |
| 領取金額10000 | 26 | 27 | 29 | 30 | 32 | 34 | 37 |
| 領取金額15000 | 39 | 41 | 43 | 46 | 49 | 52 | 55 |
| 領取金額20000 | 51 | 54 | 58 | 61 | 65 | 69 | 73 |

# Problems with Liabilities Increase

- Significant capital requirements apply to longevity risk
- The duration of liabilities can be longer
- Availability of reinsurance or other hedge for longevity exposure is limited

# Liabilities Increase (Con't)

- Longevity risk is very huge in UK

- Estimated Size of Longevity Risk
  - Life Insurance Company: £100M
  - Pension Fund: £ 700M
  - Government: £ Trillion

# Solvency Caused by Longevity Risk

- UK, Guaranteed Annuity Options
  - Interest Rate Risk
  - Mortality Improvement Risk
- Equitable Life:

| | 125 | 115 | 111 | 105 | 95 | 85 |
|---|---|---|---|---|---|---|
| a(55) | 9.35% | 7.79% | 7.17% | 6.23% | 4.66% | 3.07% |
| PA90M | 9.41% | 7.87% | **7.26%** | 6.33% | 4.79% | 3.22% |
| PMA80-C2010 | 10.72% | 9.20% | 8.60% | 7.68% | 6.15% | 4.60% |
| PMA92-C2020 | 11.90% | 10.41% | 9.81% | 8.92% | 7.42% | 5.89% |

Table 3.9: Interest Rate Implied by Different Guaranteed Annuity Rates Based on Different Mortality Tables; With 5-year Guaranteed Period; Annual Payment in Advance.

# Suggestions by UK experience

- Reserving for longevity risk
  - Suggestion Approach: Stochastic

- Development of Stochastic Mortality Models

# Risks related to longevity and Their impacts on Government

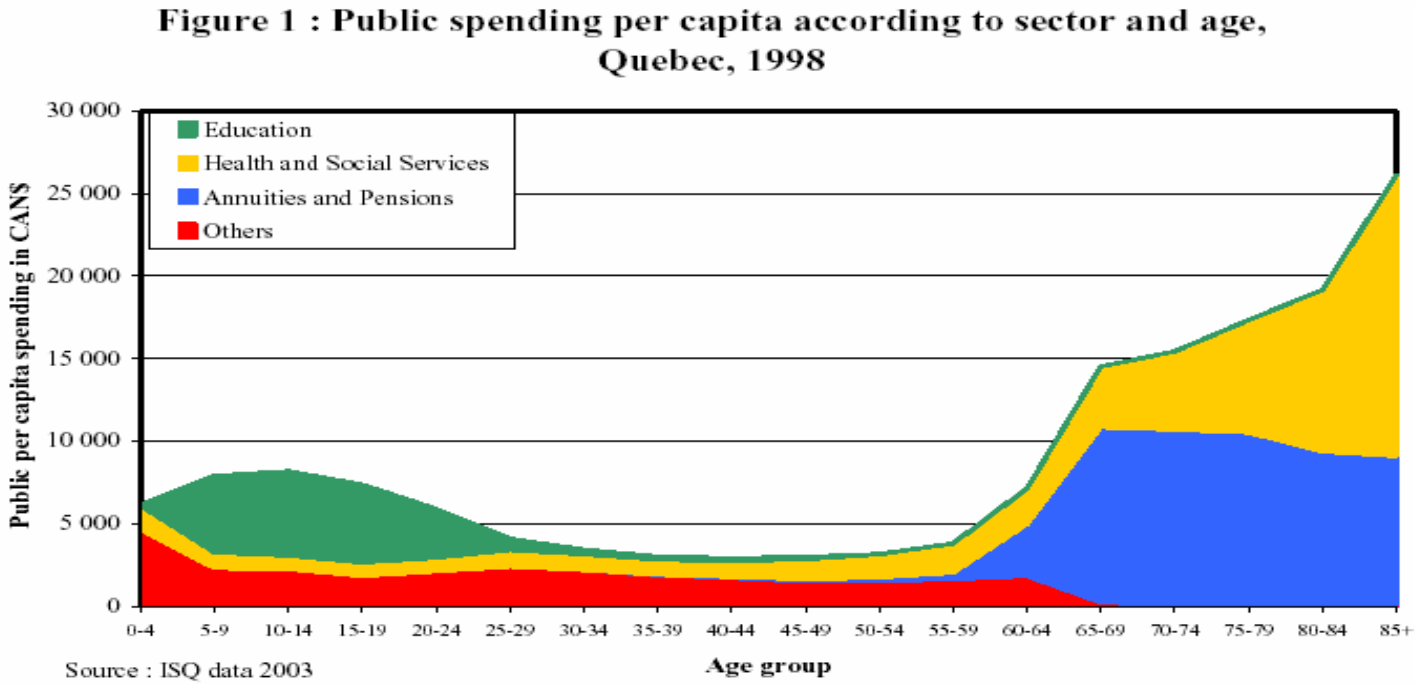
How do these increases in longevity affect the social security for the public and the supervision for financial services?

# Risks

- Financial Burdens on Social Security Increase
  - Health costs increase
  - Pensions
- Note the change of demography structure
  - 扶老比之上升與扶幼比之下降
  - 政府稅收減少的同時,支出不斷增加.
- Solvency

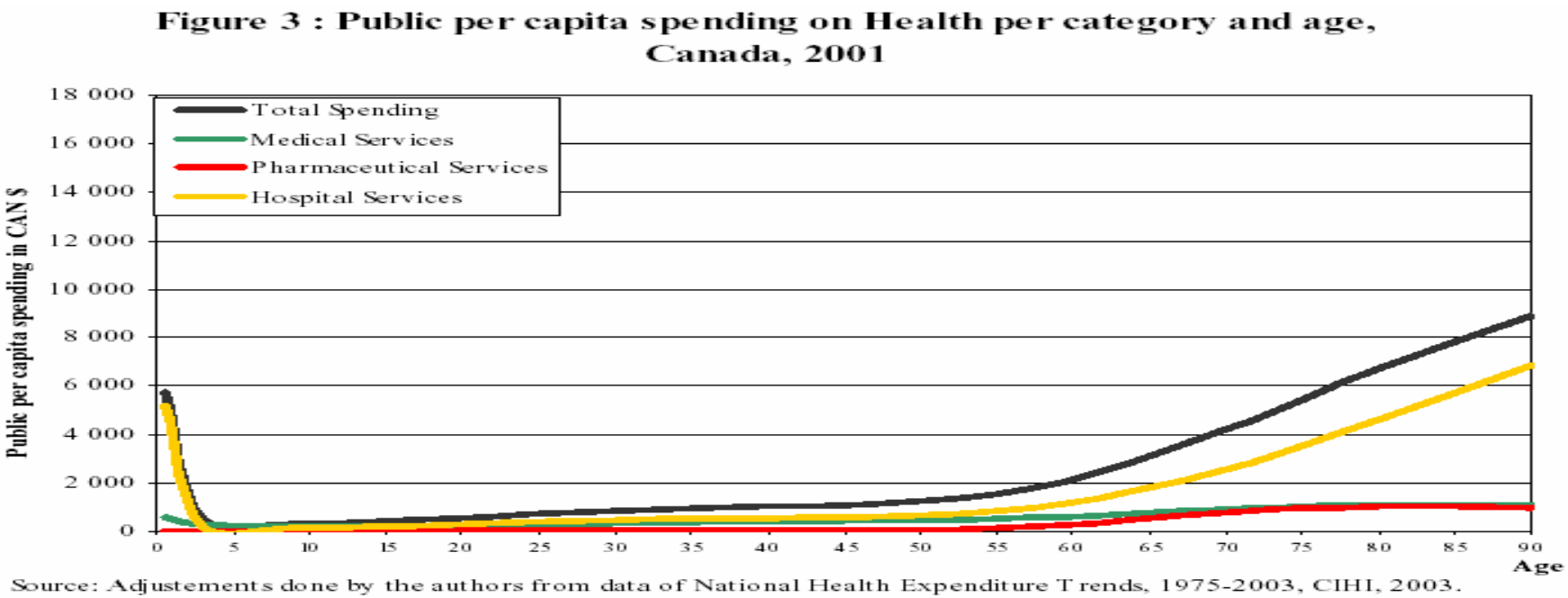
# Canadian Experience

# 社會安全福利成本的增加




- 綠色表示教育支出
- 黃色代表醫療與社會救助
- 藍色代表年金支出
- 紅色代表其他支出

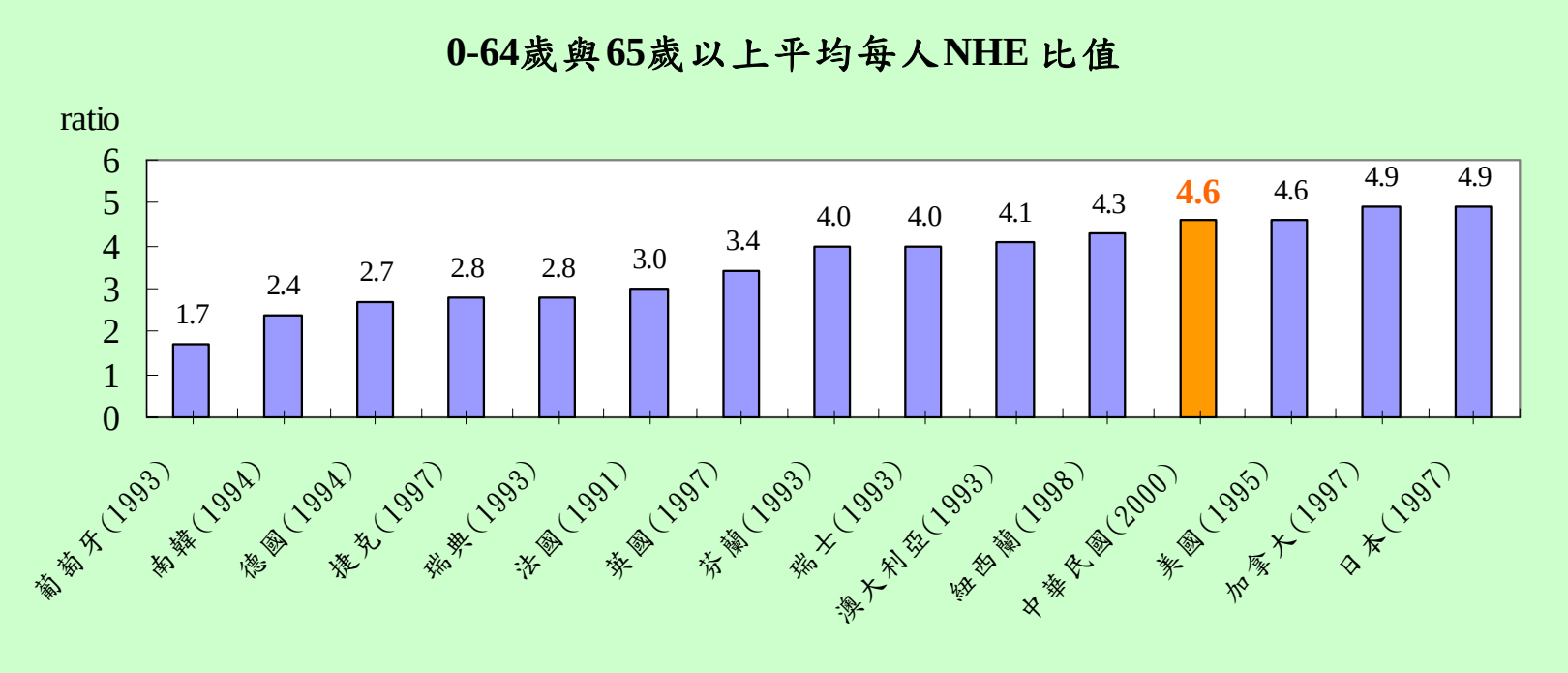
# Canadian Experience
# 醫療成本之增加



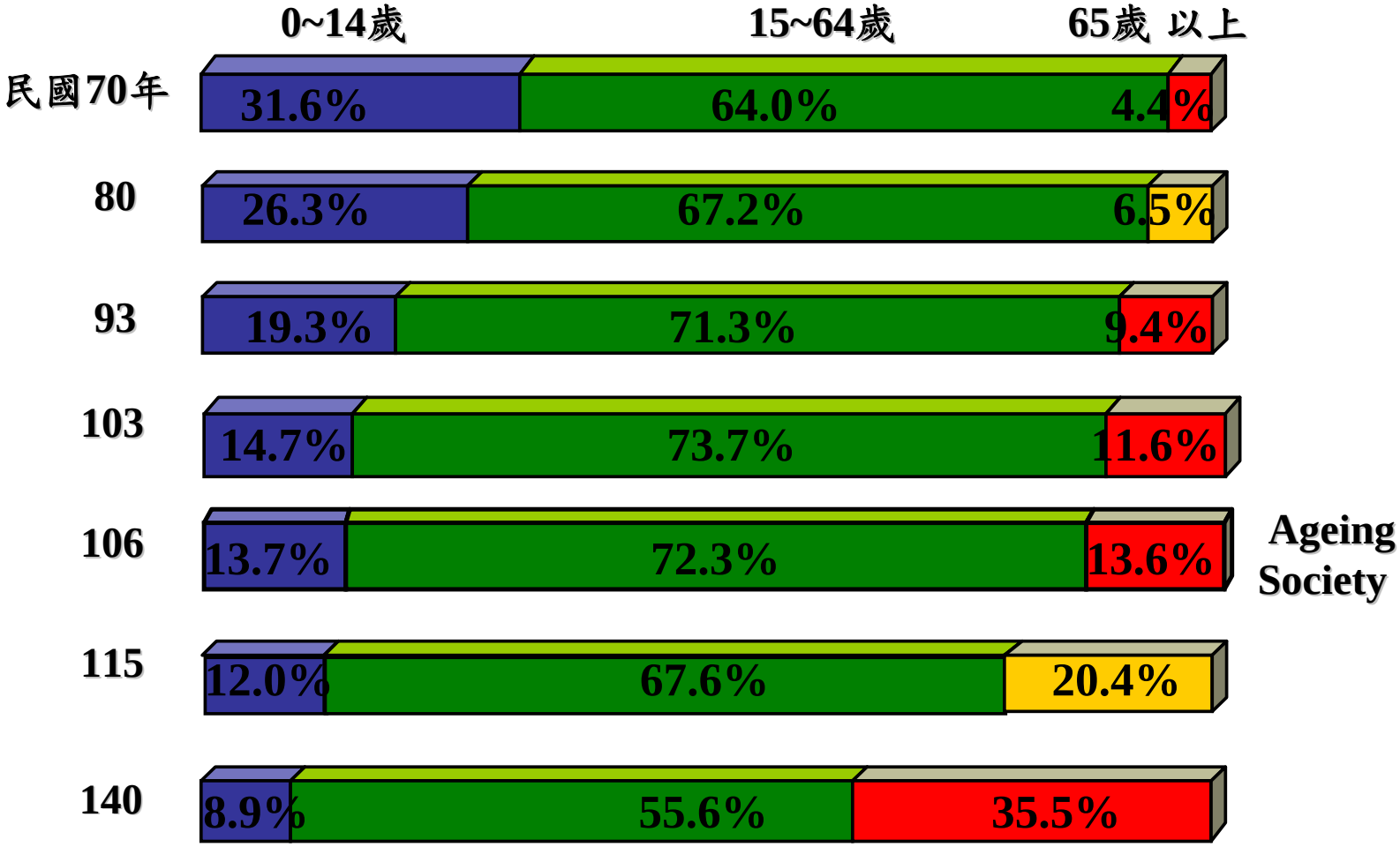

- 黑色代表健康醫療總支出
- 綠色代表醫療支出
- 紅色代表藥品支出
- 住院成本支出

# 老年醫療費用比

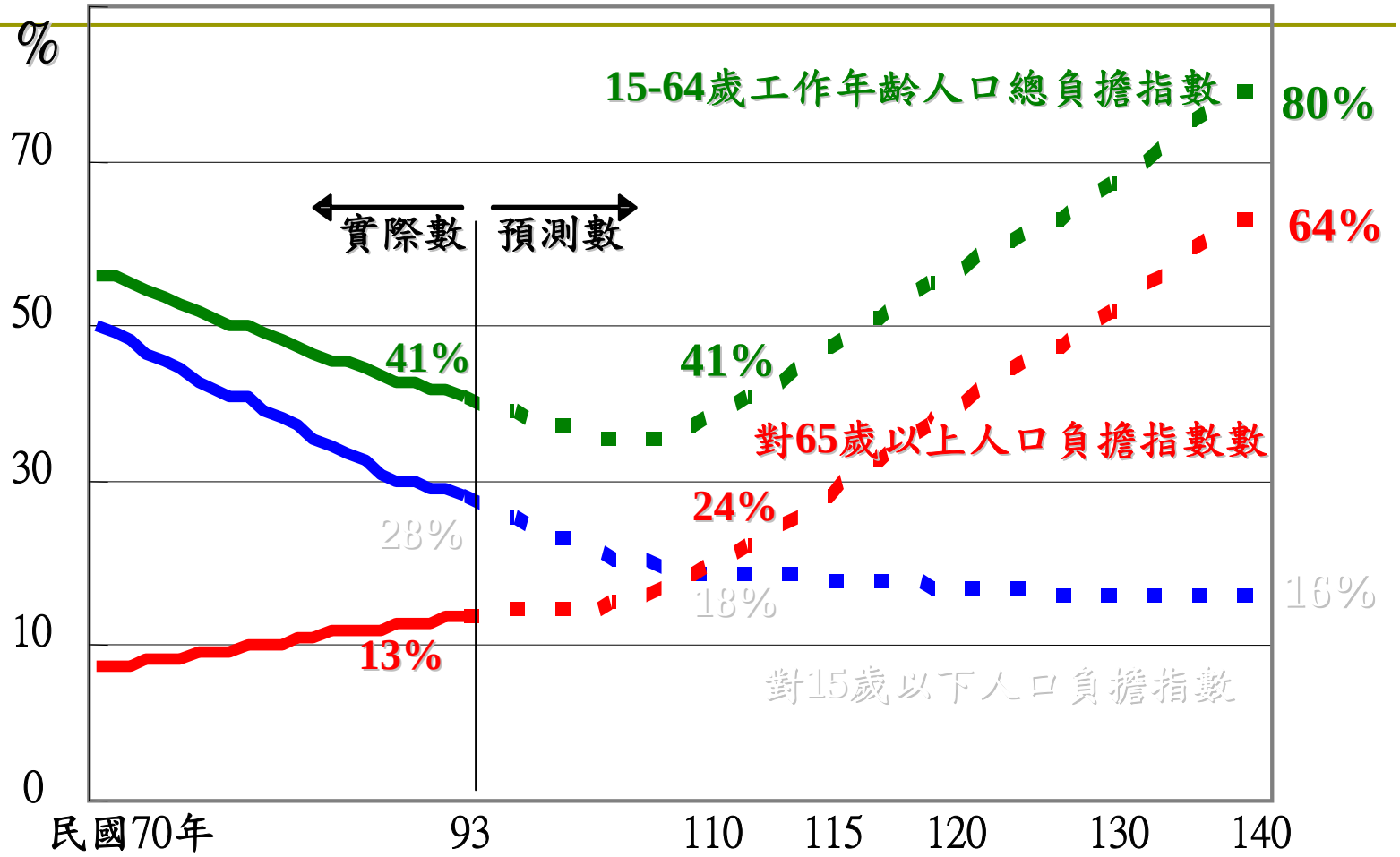
- 下圖為世界主要工業國家其平均65歲以上之老人的醫療支出和65歲以下之支出的比例
- 台灣平均65歲以上之老人用掉之醫療支出為65歲以下之年輕人之4.6倍,其僅次於日本,加拿大與美國.



# 臺灣未來三階段人口年齡結構圖



# 臺灣未來負擔指數增加趨勢圖




生產者:退休者 7.6:1 3.3:1 1.6:1