

# **Medical Savings Accounts in Singapore: How much is Adequate?**

**Ngee-Choon CHIA and Albert TSUI  
National University of Singapore  
Department of Economics**

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## **Overview**

- 1 Why MSAs? Why not?**
- 2 Sources of Health Care Financing in Singapore – the 3 Ms**
- 3 Adequacy of MSAs in Singapore: A simulation analyses**
- 4 Concluding Remarks**

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# Medical Savings Accounts (MSAs)

Goodman and Musgrave (1992)

- an appealing sustainable health care financing scheme

Schieber (1997) and Prescott (1998)

- 'an innovation' in the design of health financing instruments.

Pauly and Goodman (1995)

- alternative incremental reform.
- failure of implementing large-scale health care reform
- MSAs in conjunction with high-deductibles health insurance

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## Appeals of MSAs

- non-distortionary
- holds individuals responsible for health care consumption funded from savings
- Efficient = depart from third party financing
- resolves over-consumption
- efficiency gains from elimination of welfare loss caused by moral hazard.

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## Interest on MSAs

- potential cost containment
- consumers price sensitive and have incentive to choose appropriate and cost-effective care
- However, only a few countries have experimented with MSAs

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## Experience with MSAs

### **Singapore**

- first country to implement a nation-wide compulsory medical savings, known as the Medisave.
- introduced in 1984 and is still functioning.

### **China**

- piloting scheme in cities of Zhenjian and Jiujang
- implement MSAs for the urban formal sector employees nation-wide

### **The United States and South Africa**

- recently experimented with a voluntary small scale MSAs.

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## Evidence on MSAs

### Shortt (2002)

- studied Singapore and China and simulation analysis based on United States Medicare data
- MSAs by itself have not controlled costs and may increase inequalities in the publicly funded systems.

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## Evidence on MSAs

### Hurley (2002) and Forget et al. (2002)

- MSAs unlikely to advance key Canadian health policy goals with respect to cost control.

### Hanvoravongchai (2002)

- available evidence on the impact of MSAs on health systems is inconclusive
- MSAs are neither a panacea nor a catastrophe for health care systems
- must be evaluated in the context of the entire financing scheme.

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# Research Focus

Most studies focus on:

- efficiency issues of MSAs in terms of cost containment and reducing the welfare costs generated by moral hazard.
- e.g. Barr 2001, Pauly 2001

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# Research focus of this paper

- concentrates on the very intent of creating the savings account
- key objective of Medisave is to mobilize resources for sustainable health care spending over the long term
- examine how much savings should be accumulated in the MSA so that it could adequately finance medical expenses of the elderly.

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# Health Indicators, 2002

- Life expectancy: 78.49
- IMR per 1000 live-births: 2.2
- Admission rate per 1000 population: 85
- Average length of stay in acute hospitals : 5.1 days
- Doctor to population ratio: 1:670
- Hospital beds to population ratio: 1:355
  
- WHO 2000 overall health attainment:  
Singapore ranked 6, Japan 10, Australia 32,  
United States 37

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## Background: Health sector in Singapore

- Dual healthcare delivery system
  
- Public sector
  - caters to lower income groups who cannot afford private sector charges
  - sets benchmark for the private sector on professional standards and charges

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## ***a. Primary healthcare***

- Public sector provides 20% of the primary health care
  - Services subsidized at about 50% of cost
- Private sector provides remaining 80%
  - fee-for-service basis
  - medical charges are not regulated though there are guidelines.

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## ***b. Secondary and tertiary healthcare***

- delivered mainly through the public sector
- 80% of the beds are in the 8 public hospitals ( 4/5 are in subsidized wards)
- remaining 20 % of the beds are in the 12 private hospitals (25-500 beds)

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## ***b. Secondary and tertiary healthcare***

Dominant role of the public sector allows the government to:

- control the supply of hospital beds,
- control the introduction of high-tech/high-cost medicine
- set the benchmark in terms of medical service and product pricing in the private sector

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## **3. Healthcare Financing**

- individual responsibility
- consciously design policies away from third party payments and towards cost sharing
- philosophy of co-payment is built into the various health-financing schemes

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## ***The 3 Ms***

- Health care financing delivered through an integrated state-managed system –
  - [1] **M**edisave
  - [2] **M**edishield
  - [3] **M**edifund

Also,

privately operated **M**anaged Healthcare system (MHS) and private health insurance

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## **[1] Medical savings account**

- the first country to implement a medical savings account on a nation wide basis.
- fully funded system
- Medisave operates like a pre-funded system to finance health expenditure from illnesses
- shifts health cost from public to private sector
- “forced” precautionary savings = compulsory self insurance scheme

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# Medical savings account

Contributions shared between employer and employee.

- Integrated with the fully funded compulsory social security system
- Managed by the Central Provident Funds Board
- Rates increases according to age, with specified maximum contribution per month

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## Contributions to the Central Provident Funds, Jan 2004

Employee Age	Contribution by		Total Contribution	Credited to		
	Employer	Employee		Ordinary	Special	Medisave
35 & below	13	20	33	22	5	6 (\$330)
Above 35- 44	13	20	33	20	6	7 (\$385)
Above 45 -54	13	20	33	18	7	8 (\$440)
Above 55 – 59	6	12.5	18.5	10.5	0	8 (\$480)
Above 60 -65	3.5	7.5	11	2.5	0	8.5 (\$480)

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## Medical savings account

- used primarily for:
  - hospitalization
  - certain outpatient treatments like chemotherapy and radiotherapy treatments
  - step-down care eg: community hospitals, hospices
  - premiums of Medishield, and other approved schemes e.g. Eldershield, private medical insurance

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## Medical savings account

- Currently, accumulation **ceiling** limited to \$30,000
- to prevent excessive build-up of Medisave balance which could result in unnecessary use of medical services.
- The amount in excess is automatically transferred to the Central Provident Fund (CPF) Ordinary Account

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## **Medical savings account**

- Savings earn interest & are fully tax exempted
- Currently, interest rate is based on 80% of the 12-monthly fixed deposit (FD) and 20% of savings deposit (SD) of the four local banks, subject to a floor of 2.5%
- Interest rate is pegged at 1.5% above the ordinary account interest rate. Currently at 4%

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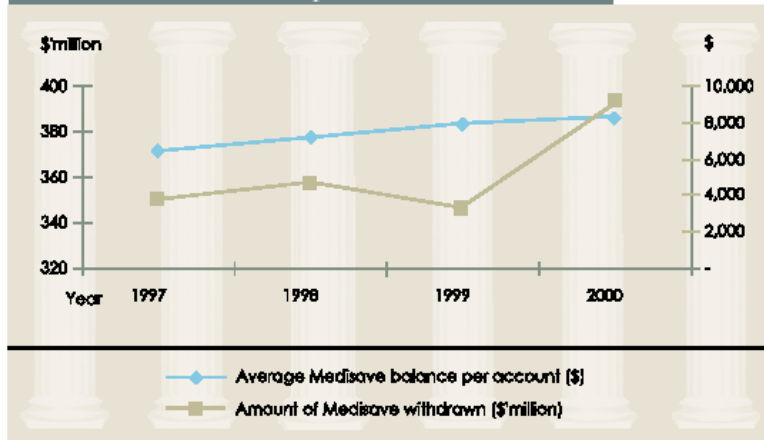
## **Medical savings account**

- The ratio of withdrawal to contribution remained fairly steady at 15 to 100.
- The average Medisave balance per account is about \$8,300 (1S\$ approx US\$1.7)
- In 1999, about 87% of all hospital inpatients make use of Medisave to pay their hospital bills.

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Source: MOH website at <http://www.moh.gov.sg>

Figure 4.5: Amount of Medisave Withdrawn and Average Medisave Balance per Account



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## Medical savings account

- emphasis on family support
- although Medisave does not provide for risk pooling across individuals, it provides for risk pooling within the family
- children's Medisave is a major source of healthcare financing for the elderly.

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## Provision of Health Care Financing for the Aged by Gender

Type of Provision	Total	Male	Female
<b>Children's Medisave</b>	<b>55.0</b>	<b>43.8</b>	<b>65.0</b>
Spouse's Medisave	2.0	0.6	3.2
Own Medisave	17.9	30.1	6.9
<b>Own Savings</b>	<b>12.0</b>	<b>13.1</b>	<b>11.1</b>
Other Provisions	5.2	5.1	5.3
No Provision	7.9	7.3	8.5

Source: The National Senior Citizens Survey 1995

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## Pitfall of Medisave – excessive use

Asset wealth effects increase demand

- shift demand from government hospitals to restructured and private hospitals.
- increase in demand for upgraded hospital services in terms of better wards.

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# Govt's partnership: setting institutional guidelines

- **To minimize moral hazard (over-consumption and over-production)**

[1] Medisave can only be used to **finance hospitalization and surgical procedure** (inelastic demand).

- Can be utilised only if the patient stays in the hospital for at least 8 hours (unless the patient is admitted for day surgery).

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## Regulations on withdrawal limits and private hospital charges

[2] MOH set limits on the amount of savings the patients may draw.

Medisave withdrawal is at a fixed limit - depending on the complexity of the operation - according to the table of surgical operation. (i.e. according to DRG)

[3] MOH set limits on what service providers can charge for each medical condition whenever Medisave is used.

- Only those hospitals and specialists that accept the set limits will be accredited to treat patients wishing to use Medisave to pay part of their bills.

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## Examples of withdrawal limit

- **Chemotherapy on cancer**
  - includes analgesic medication and suppressive treatments such as neuroendocrine and nuclear medicine treatments)
  - \$300 for 7-day treatment cycle
  - \$1200 for 21/28-day treatment cycle

Source:

<http://www.moh.gov.sg/corp/financing/medisave/summary.do>

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## Withdrawal limits for inpatient treatments

- **Medical and surgical inpatient cases**
  - \$300 per day + Surgical limits according to the Table of Operations
- **Approved day surgeries**
  - \$150 per day + Surgical limits according to the Table of Operations
- **Psychiatric Treatment**
  - \$150 per day up to \$3,500 a year

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## Medical Minimum Sum Scheme

- a minimum sum or the actual Medisave balance has to be retained in the account, whichever is lower upon age 55.
- Enable account holder to meet the hospitalization expenses during retirement
- Remaining balance will be paid in cash to the account holder's nominees upon his death. Such paid out is exempt from the estate duty.

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## Pitfall of Medisave – Adequacy of savings

- minimum sum of \$25,000
  - Singaporeans who reached age 55
    - 56% of these have savings that were at least the Medisave Minimum Sum.
    - Average balance of \$16,000
- ➔ compulsory savings **sacrifices on risk pooling**

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## [2] Medical insurance

- To avoid the pitfalls of Medisave and to complement Medisave, Medishield was introduced in July 1990 as a basic, low-cost catastrophic medical insurance scheme.

Note:

The Government provides two different forms of insurance.

1. implicit form: in terms of government subsidies to hospital
2. explicit form: national catastrophic illness insurance scheme under Medishield

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## Medishield

- Varying premiums for different age groups to minimise cross-subsidy.
- The annual premiums range from S\$12 for those below 30 years old to S\$390 for those between the age of 79 and 80 years old.
- The maximum entry age is at 75 years old and the maximum coverage age is 80 years old.
- Covers most hospital expenses including intensive care, surgical operations and implants.
- Also covers outpatient kidney dialysis, outpatient chemotherapy and radiotherapy for cancer treatment, and certain drugs for transplant patients, pre-dialysis and dialysis patients.

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# Main features of Medishield

- **To deal with moral hazard**
  - Depart from the open-ended, unrestricted medical insurance
  - Mainly for catastrophic life-threatening illnesses
- **To curb excessive demand**
  - Claim limits, co-payments and high deductibles
  - Determined by the maximum limits for per day of hospitalization, surgical procedures, surgical implants and approved specific treatments and outpatient treatments.
- **To curb supplier-induced demand**
  - A system of negotiated fee schedule to restrict what providers may charge the insurers per individual and type of illnesses.
- **To avoid adverse selection**
  - An opt-out system.

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# Enhancements to Medishield

## Eldershield

- long-term care
- lifetime coverage
- cash payout - \$300 per month, up to maximum of 60 months
- Opt-out at age 40
- Maximum entry age at 70
- Prefunded premiums, i.e. pay more while younger to cover the higher risk during older years.

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# Pitfalls of Medishield

- Opt out rate  
Report of the Cost Review Committee 1996, highest opt-out rate among those between 61 to 70 = 1 out of 4  
Reason: Medisave balances for the elderly are insufficient to pay for premiums
- Medishield scheme for elderly aged 61-69, 2 years of basic MediShield premium rebate if sign up before 31 Dec 2000

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## [3] Medifund

- State-funded safety net
- Government gave an initial \$200m grant to endowment fund and \$100m yearly when there is a budget balance
- Law passed in April 1993
- Based on equity consideration, not efficiency
- Interest income from fund to pay part or all bills or used as loans

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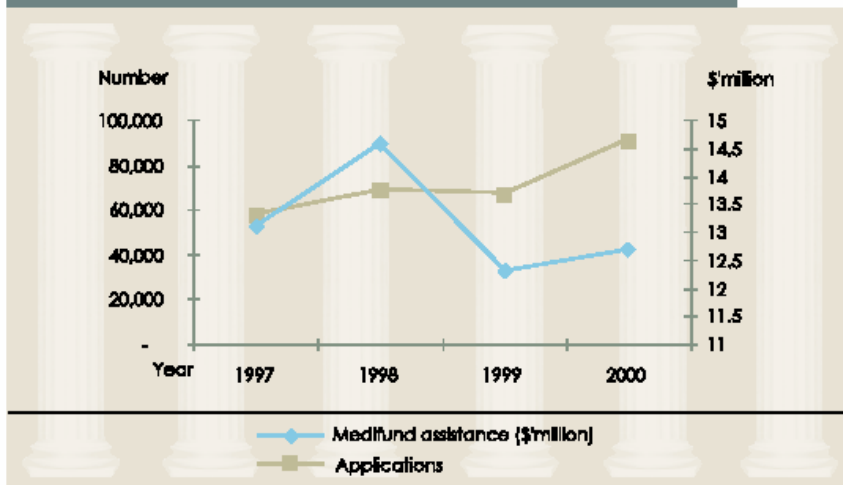
# Medifund

- **Means-testing**
  - **Eligibility**
    - The poor
    - Younger Singaporeans with not enough Medisave
    - Older Singaporean (born before 1940) - Medisave was introduced too late for them to build up sufficient saving
    - Those who have run out of their quota
- 2001: capital sum = \$900 million

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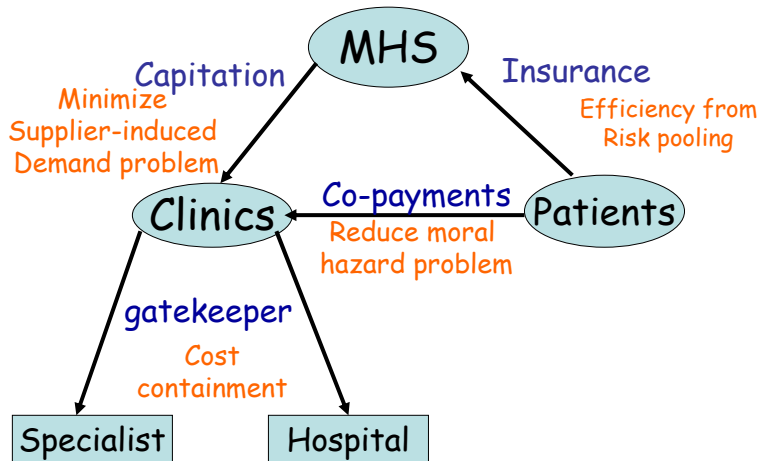
Source: MOH website at <http://www.moh.gov.sg>

Figure 4.8: Number of Medifund Applications and Amount of Assistance Given



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# Managed Healthcare system



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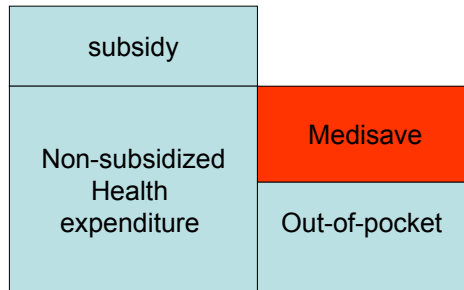
## Summary: Health Care Financing

- Patients in public sector restructured hospitals enjoy government subsidy according to the class of ward they choose

Class of ward	Govt subsidy (%)
A	0
B1	20
B2+	50
B2	65
C	80

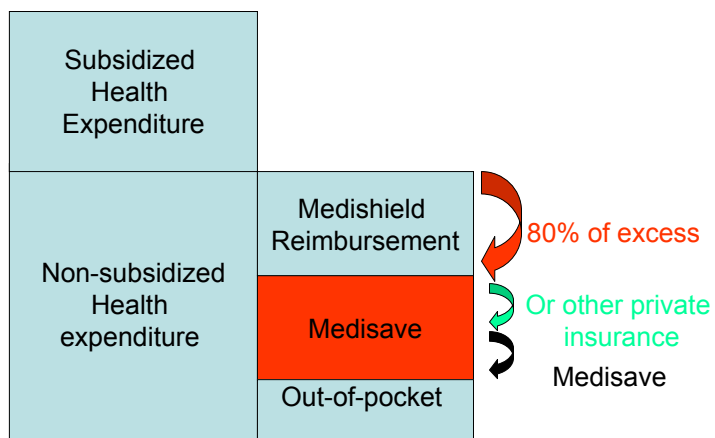
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## *Non-catastrophic illnesses*



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## *Catastrophic illnesses*



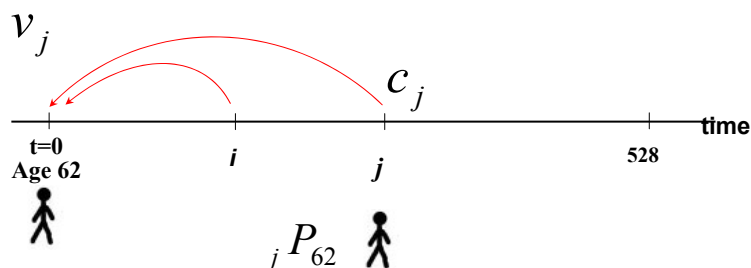
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## MSA: How much is adequate?

- How much Medisave to adequately finance healthcare?
- Decreed minimum sum set at \$25,000 in July 2003
- We do not take this government-decreed minimum sum as given
- We estimate the minimum sum that will support the stream of future health expenditure, using the concept of the present value of healthcare expenditure.

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Present value of healthcare expense  $PVHE = \sum_{j=1}^{528} c_j v_{j,j} P_{62}$



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## [1] Calibration of healthcare expenditure $c_j$

- No published disaggregated data of medical expenditure by age and by sex.
- Use unpublished longitudinal study by Chan (2001) on elderly Singaporean
  - Phase 1: 1995, 4750 elderly
  - Phase 2: 1999, follow up of phase 1 with about 42% of the original sample
  - See Tables 4 and 5

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## [2] Discount rates modeling: Cox, Ingersoll and Ross (1985) model

$$r_{t+1} = r_t + \underbrace{\theta (r_a - r_t)}_{\text{Deterministic}} + \underbrace{\beta r_t^{1/2} \varepsilon_{t+1}}_{\text{Stochastic}}$$

short rate  
at time  $t$

**Deterministic**

**Stochastic**

Speed of mean reversion

Volatility parameter

Long term average rate

standard normal  
random variables

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## Deterministic interest rate models

### [1] Constant yield curve (CYC)

- flat rate for all durations
- 2%, 3%, 4%

### [2] Fixed yield curve (FYC)

- based on the historical rates for government bonds since 1988
- use 15-year bond rate at 3.9% to proxy spot rates with longer durations.
- interpolation used to obtain spot rates for durations less than 15 years.

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## [3] Calibration of survival probabilities

**Step 1:** Predict mortality using the Lee Carter model

- based on the abridged life tables for male and female elderly

$$\ln m_{xt} = a_x + b_x k_t + \varepsilon_{xt} \quad (15)$$

$$k_t = \mu + \phi k_{t-1} + \eta_t \quad (16)$$

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### [3] Calibration of survival probabilities

- Estimated values of  $k_t$ 
  - re-estimated either by matching the fitted total deaths with the actual deaths in year  $t$  or by matching the fitted life expectancy at birth with the actual life expectancy at birth in year  $t$ .
- Estimates of  $\mu$  and  $\phi$ 
  - used to forecast  $k_t$  beyond the current calendar year.
- Estimates of  $a_x$  and  $b_x$  + forecasted values of  $k_t$ 
  - generate mortality rates beyond the sample calendar year according to equations (15) and (16)

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### [3] Calibration of survival probabilities

#### Step 2:

Calibrate the abridged **cohort** life tables based on the predicted mortality rates obtained from Step 1

**Life table:** snap shot of the age-specific death rates in a particular period

**Cohort life table:** provides the actual mortality experience within a cohort of individuals from the birth of the first to the death of the last cohort member.

Using Bourbeau and Legare approach

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### [3] Calibration of survival probabilities for joint life from age 62 to 105

#### Step 3:

Convert calibrated **abridged** cohort mortality rates into **yearly** rates

Using Pollard method to smooth mortality rates in 5-year basis to 1-year basis .

- accounts for different mortality experiences at different age groups.

#### Step 4:

- transform mortality rates at monthly intervals
- assume uniform distribution

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Table 6: Values of parameters for different scenarios

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#### Healthcare expenses

Growth rate of medical expenditure = 3 % per annum.

Other values are 4% and 5%.

#### Cox-Ingersoll-Ross model of stochastic interest rates:

Initial interest rate = 2%, 3%, and 4%

Average interest rate ( $ra$ ) = 2%, 3% and 4%

Values of mean reversion ( $\theta$ ) = 0.2, 0.3 and 0.4

Value of the interest rate volatility parameter ( $\beta$ ) = 0.01, 0.02 and 0.03

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# Simulation Results

## [a] 3% medical growth rate

	Model	Female	Male
ra = 2%	CIR	\$30,407 (-21%)	\$26,481 (-5%)
	CYC	\$30,520	\$28,192
	FYC	\$21,988	\$21,425
ra = 3%	CIR	\$25,564	\$22,735
	CYC	\$25,635	\$24,412
	FYC	\$21,988	\$21,425
ra = 4%	CIR	\$21,697	\$19,681
	CYC	\$21,766	\$21,289
	FYC	\$21,988	\$21,425

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## [b] 4% medical growth rate

		Female	Male
ra = 2%	CIR	\$36,653 (-46%)	\$31,752 (-27%)
	CYC	\$37,214	\$33,065
	FYC	\$26,303	\$24,834
ra = 3%	CIR	\$30,433	\$27,166
	CYC	\$30,945	\$28,458
	FYC	\$26,303	\$24,834
ra = 4%	CIR	\$25,520	\$23,417
	CYC	\$26,017	\$24,672
	FYC	\$26,303	\$24,834

## [c] 5% medical growth rate

ra = 2%	CIR	\$46,651 (-86%)	\$38,586 (-54%)
	CYC	\$45,804	\$38,982
	FYC	\$31,761	\$28,931
ra = 3%	CIR	\$38,610	\$33,005
	CYC	\$37,707	\$33,343
	FYC	\$31,761	\$28,931
ra = 4%	CIR	\$32,218	\$28,425
	CYC	\$31,389	\$28,734
	FYC	\$31,761	\$28,931

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## Summary of Simulation Results

- *PVHE* for female elderly under the stochastic interest rate model is greater than that of the male elderly
- Eg: under benchmark scenario, the estimated *PVHE* for the female elderly in 3-room is \$30,433, and \$27,166 for the male elderly.
- Similar pattern is observed for those more well-to-do elderly staying in the 5-room housing.

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## Summary of Simulation Results

- *PVHE* is sensitive to medical expenditure growth rates and the long-term interest rates
- *PVHE* is more elastic to healthcare inflation and is less sensitive to long-term interest rates.

### **1% increase in medical inflation**

- 1.2% increase in *PVHE* for the female elderly
- 0.86% increase for the male elderly

### **1% increase in the long-term interest rate**

- 0.48% decrease in *PVHE* for the female elderly
- 0.42% decrease for the male elderly

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## Summary of Simulation Results

### Adequacy of the decreed minimum sum

- Male elderly: adequate at 3% medical cost growth and at higher discount rates of 3% and 4%
- Female elderly: adequate only if a higher discount rate of 4% is used. It is barely adequate at 3% discount rate.

### At higher medical cost inflation

- At 5%, the decreed sum would be inadequate for both males and females.
- For every 1% increase in medical costs, the inadequacy for the female elderly increases by 15%.

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## Concluding Remarks

- Our simulation results indicate that under certain parameterisation, the decreed minimum sum would be reasonably adequate.
- However, the reality may be less rosy.  
MOH: In 2000, only 56% of Singaporeans at age 55 have the decreed minimum sum (set at \$19,000 then).
- Average balances = \$13,769 (in 2000).

Age	% Shortage of decreed amount
60 to 64	32%
65 to 69	53%
age 70+	77%.

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## Concluding Remarks

- Hence the impact of using MSA as a health care financing scheme must be evaluated within the entire health care financing framework.
- A three-legged stool for health care financing
  - [1] A compulsory individual medical savings account
  - [2] A high-deductible medical insurance for catastrophic illnesses and private health insurance
  - [3] Government insurance and assistance.

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## Concluding Remarks

- Other alternatives:
  1. Strengthens the MSA by topping up accounts and increasing interest rates on MSAs.
  2. Tax incentives to encourage more private partnership in terms of family support.

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