



SOCIETY OF ACTUARIES

**Longevity Risk: Recent Developments and
Actuarial Implications**

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**The Chinese University of Hong Kong
(A SOA Center of Actuarial Excellence)**

**The Significance of Actuarial Evidence and
Mortality Statistics in Personal Injury Litigations**

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- *Restitutio in integrum*.
- Lord Blackburn: “Where any injury is to be compensated by damages, in settling the sum of money to be given ... you should as nearly as possible get at that sum of money which will put the person who has been injured ... in the same position as he would have been in if he had not sustained the wrong.” (*Livingstone v Rawyards* (1880) HL)

- Lady Hale: “The only principle of law is that the claimant should receive full compensation for the loss which he has suffered as a result of the defendant’s tort, not a penny more but not a penny less.” (*Simon v Helmot* [2012] PC)

- In 1971 Lord Pearson said in *Taylor v O'Connor*.
- “I do not think that actuarial tables or actuarial evidence should be used as the primary basis of assessment. There are too many variables, and there are too many conjectural decisions to be made before selecting the tables to be used. There would be a false appearance of accuracy and precision in a sphere where conjectural estimates have to play a large part. The experience of practitioners and judges in applying the normal method is the best primary basis for making assessments.”

- “intuitive” selection of multiplier
- Judges used their “experience” and “wisdom”
- Betrayed a woeful ignorance of the breath of factors that actuaries, statisticians and economists took into account when compiling the Life Tables and Actuarial Tables.
- 28 years later: ***Wells v Wells*** [1999] HL

***Wells v Wells* [1999] 1 AC 345**

- Lord Lloyd: “I do not suggest that the judge should be a slave to the [Ogden Tables]. There may well be special factors in particular cases. But the tables should now be regarded as the starting point, rather than a check. A judge should be slow to depart from the relevant actuarial multiplier on impressionistic grounds, by reference to ‘a spread of multipliers in comparable cases’ especially when the multipliers were fixed before actuarial tables were widely used.”

- Ogden Tables:
- First published by the UK Government Actuary in 1981 based on the work done by a committee chaired by Sir Michael Ogden QC
- Used extensively by both Judges and practitioners in England and Wales in order to determine the correct multiplier
- The UK Ogden Tables are now in their seventh edition, published in October 2011. The figures in those tables are based on the official 2008-based projected mortality rates published by the UK Government Actuary's Department.

- Compensation principle paramount.
- Common law guideline:
average rate of real return on ILGS over past 3 yrs net of tax (with assumption of 3% future inflation).

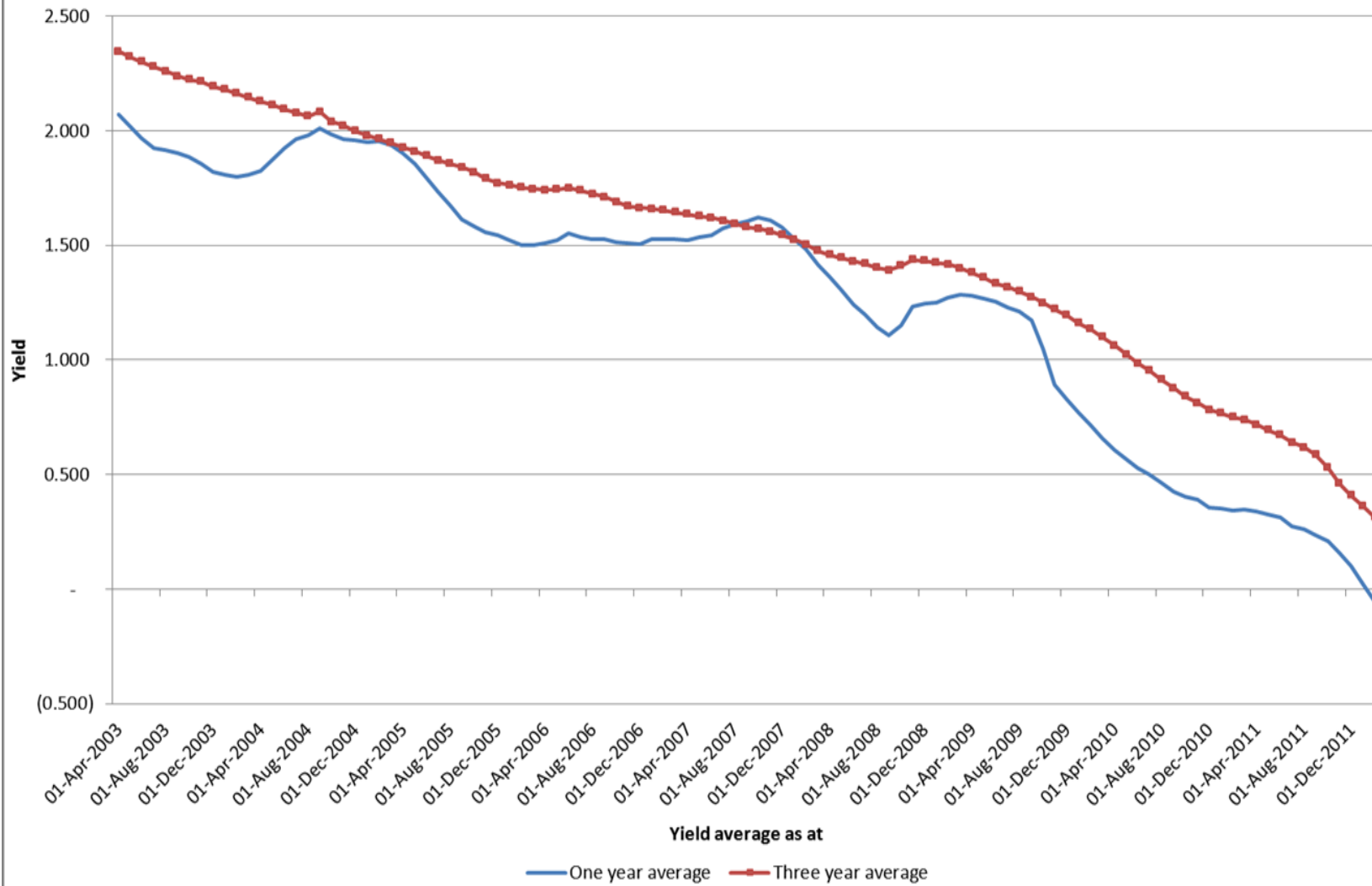
- ILGS = Index-linked Government Securities
- Both capital and income are protected against inflation
→ Underwritten by the UK Government.
- Discount rate was set by the HL at 3%. However, for the past 15 years, ILGS yields have been sliding down significantly. The rate recently dipped below the 0% mark.

What is recent position (2012) on ILGS yields?

	3 year	1 year	Month
All			
31 January	0.363	0.180	-0.487
29 February	0.315	-0.055	-0.450
31 March	0.274	-0.126	-0.473
Over 5 yrs			
31 January	0.540	0.193	-0.326
29 February	0.499	0.125	-0.233
31 March	0.464	0.059	-0.231

Source: www.ft.com (Financial Times)

Average yields for all index linked bonds: 30 April 2003 to 29 February 2012



***Simon v Helmot* [2012] UKPC 5**



- An appeal from CA of Guernsey (Channel Islands)
- A British Crown Dependency
- Similar to Hong Kong and Singapore, Guernsey's legal system is largely based on the English common law system.

Privy Council affirmed Guernsey CA decision:

- (Agreed) gross real yield of 1.25%
- Reduce for tax to 1% in Guernsey (a bit more in UK) +
Reduce for 0.5% higher inflation in Guernsey
- Result: **rate of return 0.5%** for Guernsey
- Evidence established 2% extra inflation: **rate of return
for earnings-related heads of claim = 0.5% - 2%
= -1.5%**

- Hong Kong and Singapore?
- Both jurisdictions are still adopting the old discount rate of 4-5% (!!)
- HK: *Chan Pui Ki* (1996) HKCA
- Singapore: *Lai Wee Lian v Singapore Bus Service* (1978) PC
- Lord Fraser (PC) said in *Lai Wee Lian*:
“The calculations are not correctly described as ‘actuarial’; they involve no element of judgment,

actuarial or other, except the arbitrary choice of 5 per cent as the assume rate of interest.”

- Can the Hong Kong and Singapore Courts ignore the compensation principle laid down in *Wells v Wells* (HL) as developed by *Simon v Helmot* (PC)?
- Lord Hope: “The English common law has persuasive force in Guernsey in areas not governed by Guernsey statutes or Guernsey customary law

... This is not to say that the solutions that have adopted in English law will be applied in Guernsey without an inquiry as to whether the underlying conditions in the respective jurisdictions are truly comparable. There is no reason why a discount rate calculated in accordance with English common law principles should not be adjusted in order to take account of differences between the two jurisdictions
...”
...

HONG KONG

- HK actuarial tables (with explanatory notes and analysis) constructed by an inter-disciplinary research team:
- Felix W.H. Chan (Law)
- Wai-sum Chan (Statistics and Actuarial Maths)
- Johnny S.H. Li (Econometrics and Quantitative Finance)
- Research Assistants funded by the HK Research Grant Council (General Research Funds).

Primary Data:

- *Hong Kong Life Tables 2006-2041*, Demographic Statistics Section, Census and Statistics Department, Hong Kong SAR Government.
- *The Hong Kong Population Projections 2012-2041*, Demographic Statistics Section, Census and Statistics, Hong Kong SAR Government.

Similar to the seventh edition of the UK Ogden Tables, the three sets of actuarial tables in the present edition include:

- (1) Multipliers for pecuniary loss for life;
- (2) Multipliers for loss of earnings to pension age; and
- (3) Multipliers for loss of pension commencing from the retirement age.

- Each set of tables is comprised of different tables of multipliers, computed under different combinations of factors such as gender (male and female) and retirement age (50 to 75). The range of discount rates is from -2% to +5%.
- Published by Sweet and Maxwell Asia, Hong Kong as “Personal Injury Tables Hong Kong 2013”. (3rd edition)
- Available in bookstores since Dec 2012.



Table number	Multipliers	Formula
1, 2	Multipliers for pecuniary loss for life	\bar{a}_x
3, 4	Multipliers for loss of earnings to pension age 50	$\bar{a}_{x:\overline{50-x} }$
5, 6	Multipliers for loss of earnings to pension age 55	$\bar{a}_{x:\overline{55-x} }$
7, 8	Multipliers for loss of earnings to pension age 60	$\bar{a}_{x:\overline{60-x} }$
9, 10	Multipliers for loss of earnings to pension age 65	$\bar{a}_{x:\overline{65-x} }$
11, 12	Multipliers for loss of earnings to pension age 70	$\bar{a}_{x:\overline{70-x} }$
13, 14	Multipliers for loss of earnings to pension age 75	$\bar{a}_{x:\overline{75-x} }$
15, 16	Multipliers for loss of pension commencing age 50	$(50-x) \bar{a}_x$
17, 18	Multipliers for loss of pension commencing age 55	$(55-x) \bar{a}_x$
19, 20	Multipliers for loss of pension commencing age 60	$(60-x) \bar{a}_x$
21, 22	Multipliers for loss of pension commencing age 65	$(65-x) \bar{a}_x$
23, 24	Multipliers for loss of pension commencing age 70	$(70-x) \bar{a}_x$
25, 26	Multipliers for loss of pension commencing age 75	$(75-x) \bar{a}_x$
27	Discounting factors for term certain	v^n
28	Multipliers for pecuniary loss for term certain	$\bar{a}_{\overline{n} }$

Yuen Hiu Tung (A Minor) v Hospital Authority [2012]

Justice Bharwaney:

“I agree that the ***Chan Tables*** should be accepted as the starting point in Hong Kong, just as the Ogden tables are accepted as the starting point in the UK. In future, there should be less need to refer to previous case law of multiplier precedents, particularly if those cases were decided without reference to actuarial tables by way of a cross-check.”





Neutrality of the Chan Tables.

e.g. Table 8:

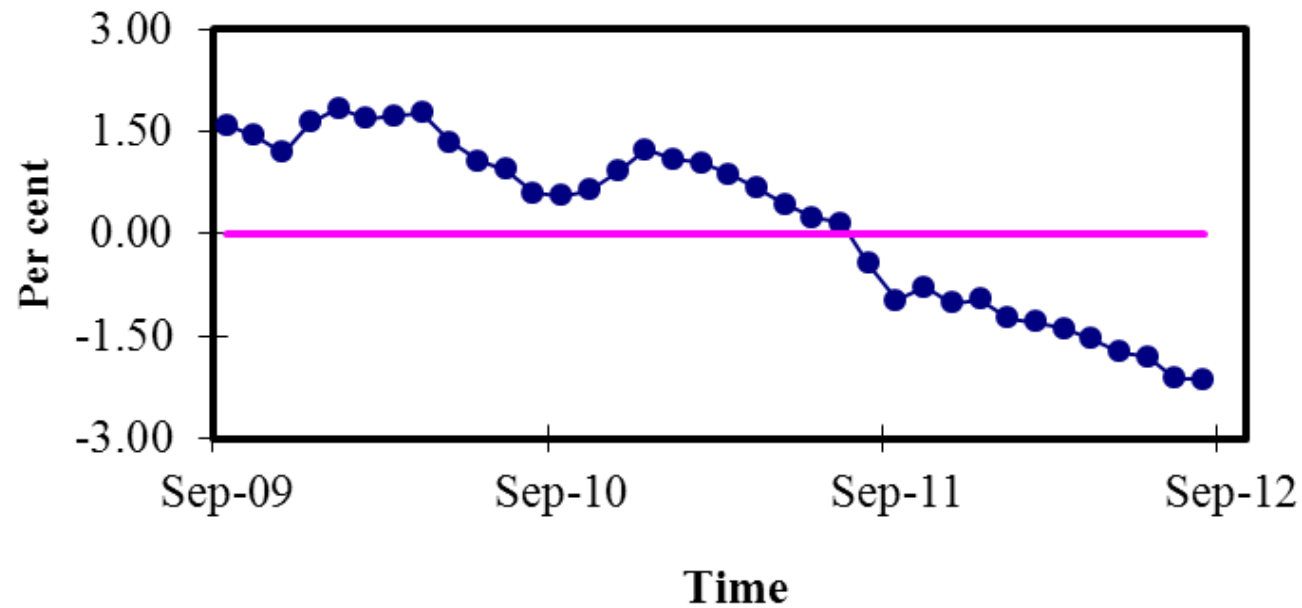
Multipliers for Loss of Earnings to Pension
Age 60 (Females)
Age: 16

-2.0%	70.37
-1.5%	62.05
-1.0%	54.96
-0.5%	48.92
0.0%	43.74
0.5%	39.28
1.0%	35.44
1.5%	32.12
2.0%	29.23
2.5%	26.72
3.0%	24.52
3.5%	22.58
4.0%	20.88
4.5%	19.38
5.0%	18.04

If the multiplicand is \$144,000
(\$12,000 x 12 months)

Discount Rate	Multiplier	Quantum
0%	43.74	HK\$ 6,298,560
2.5%	26.72	HK\$ 3,847,680
5%	18.04	HK\$ 2,597,760

Estimated real rates of return on risk-free securities in HK (HK Exchange Bills and Notes)



- Which rate should be adopted in HK?
- A special hearing in HK (part of *Yuen Hiu Tung* proceedings) in Jan 2013.
- Leave granted to engage London QCs:
 - Victims: James Dingemans QC
 - Hospital: James Badenoch QC

Judgment delivered on 7 February 2013 by
Justice Bharwaney

Discount Rates

< 5 years	<10 years	>10 years
-0.5%	1%	2.5%

Investment Portfolios

	<5 years	<10 yrs	>10 yrs
12-month time deposits	20%	15%	10%
EFNs	80%		
EFNs and BBB+(or better) bonds		85%	
BBB+(or better) bonds			70%
Equities (high quality blue-chips)	NO	NO	20%



Monetary Authority
of Singapore

DEPARTMENT OF
STATISTICS
SINGAPORE



- Past nominal yields on 10-year SGS
→ Monetary Authority of Singapore
(<http://www.sgs.gov.sg>)
- Population data and inflation rates (e.g. increase in CPI) → Dept of Statistics Singapore (<http://www.singstat.gov.sg>)

Estimated real rates of return on risk-free securities in Singapore (SGS):

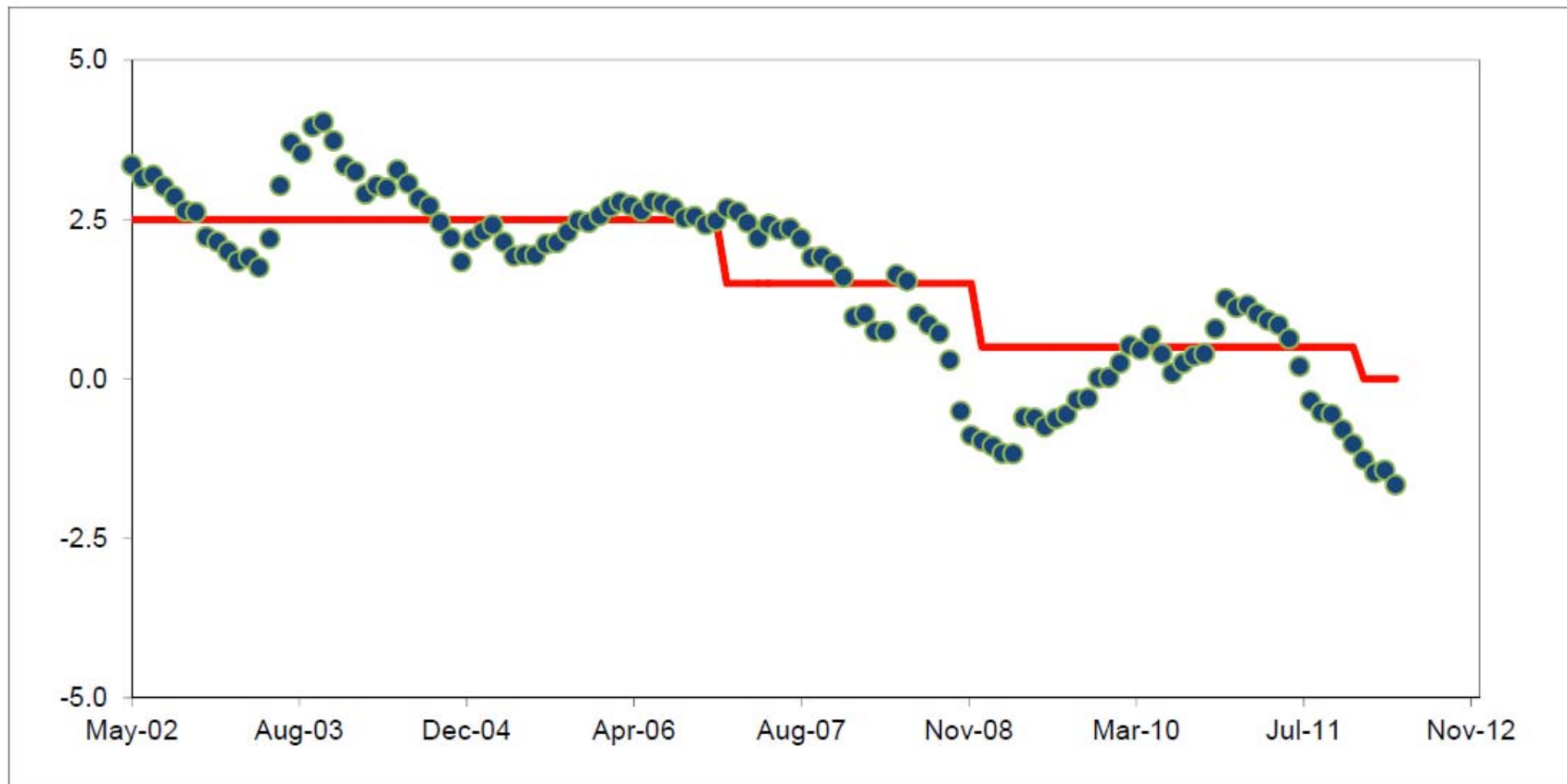


Illustration: *Lee Wei Kong v Ng Siok Tong*
[2012] SGCA 4

- 22 years old at the time of the hearing
- Loss of future income from 22 to 60.

\$32,400 (multiplicand) x 20 (multiplier)
= SG\$648,000

Singapore version of Chan Tables

[Please do not quote without citing the source.]

Table 7:

Multipliers for Loss of Earnings to Pension

Age 60 (Males)

Age: 22

0.0%	37.59
0.5%	34.26
1.0%	31.32
1.5%	28.74
2.0%	26.46
2.5%	24.43
3.0%	22.63
3.5%	21.03
4.0%	19.60
4.5%	18.31

Discount Rate	Multiplier	Quantum
2.5%	24.43	SG\$ 791,532
4%	20	SG\$ 648,000

Under-compensation: SG\$ 143,532

General principles of English common law
as developed by the Privy Council in 2012

VS

Population statistics + economic data in
Hong Kong / Singapore

- Distinctly inter-disciplinary
- Law, Statistics, Actuarial Mathematics, Economics and Quantitative Finance.

- Lord Brown (*Simon v Helmot* [2012] PC):

“Only if we were unwise enough to introduce into Guernsey compensation law a new principle to the effect that economic theory is just too imprecise a tool by which to seek to gauge likely future trends (and were therefore to bar, or simply ignore, evidence substantially based upon it) could the [Defendant’s] approach in this case properly be upheld.”

- Only if HK / SG courts were similarly lacking in wisdom would our current systems remain unchanged.
- Arguably the current systems in HK and SG are manifestly unjust and arcane.
- HK → imminent change in line with the English common law using the Chan Tables and selecting the proper discount rate (*Yuen Hiu Tung*)
- SG → Not much was done to address Lord Fraser's valid criticism (in *Lai Wee Lian*) since 1978 → systematic under-compensation not tackled.

Thank you!

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