

Durational Effects in a Health Insurance Portfolio

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New Zealand Society of Actuaries
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I DIDN'T HAVE ANY ACCURATE NUMBERS SO I JUST MADE UP THIS ONE.



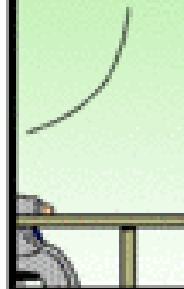
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STUDIES HAVE SHOWN THAT ACCURATE NUMBERS AREN'T ANY MORE USEFUL THAN THE ONES YOU MAKE UP.



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HOW MANY STUDIES SHOWED THAT?



EIGHTY-SEVEN.

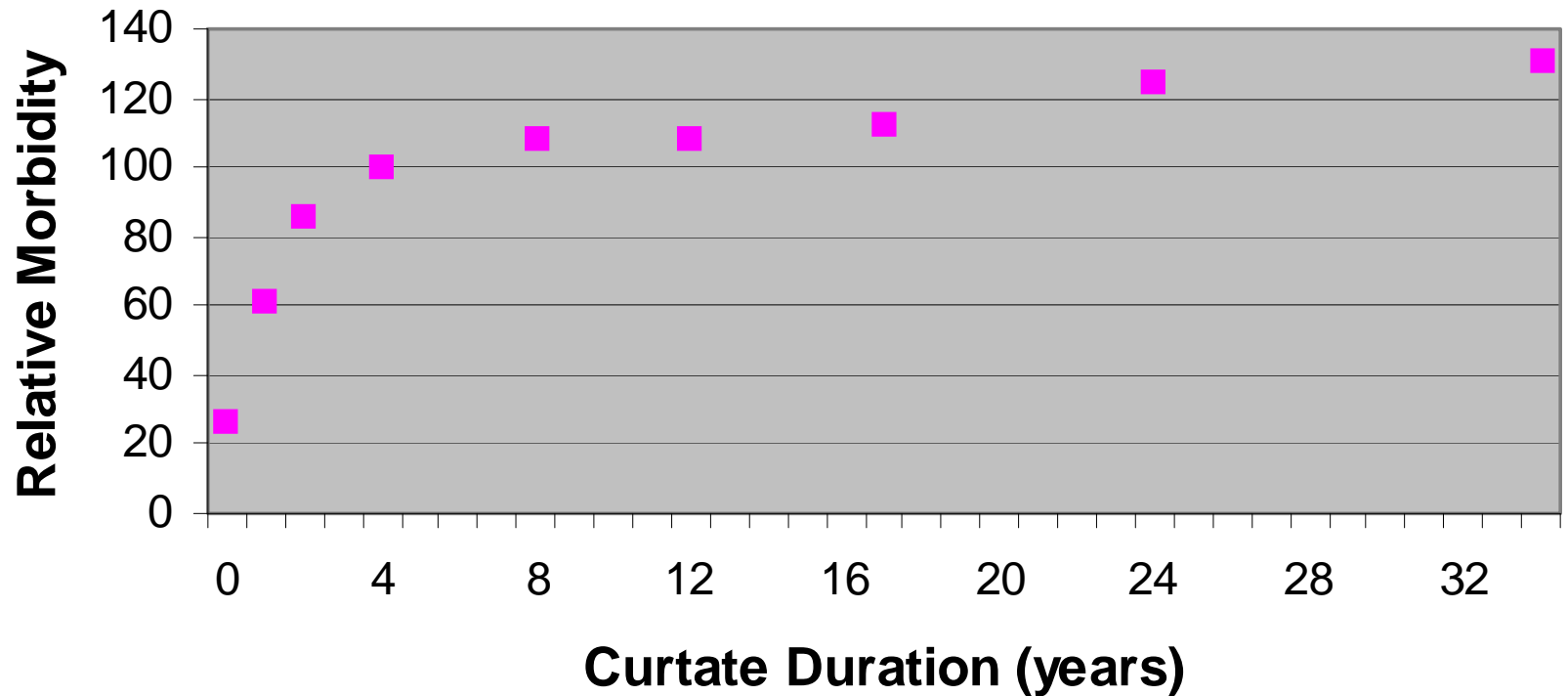


Main Topics

1. The Duration Curve and the modeling performed.
2. Pricing and Portfolio Implications.
3. Health Insurance as a funder of healthcare expenditure.

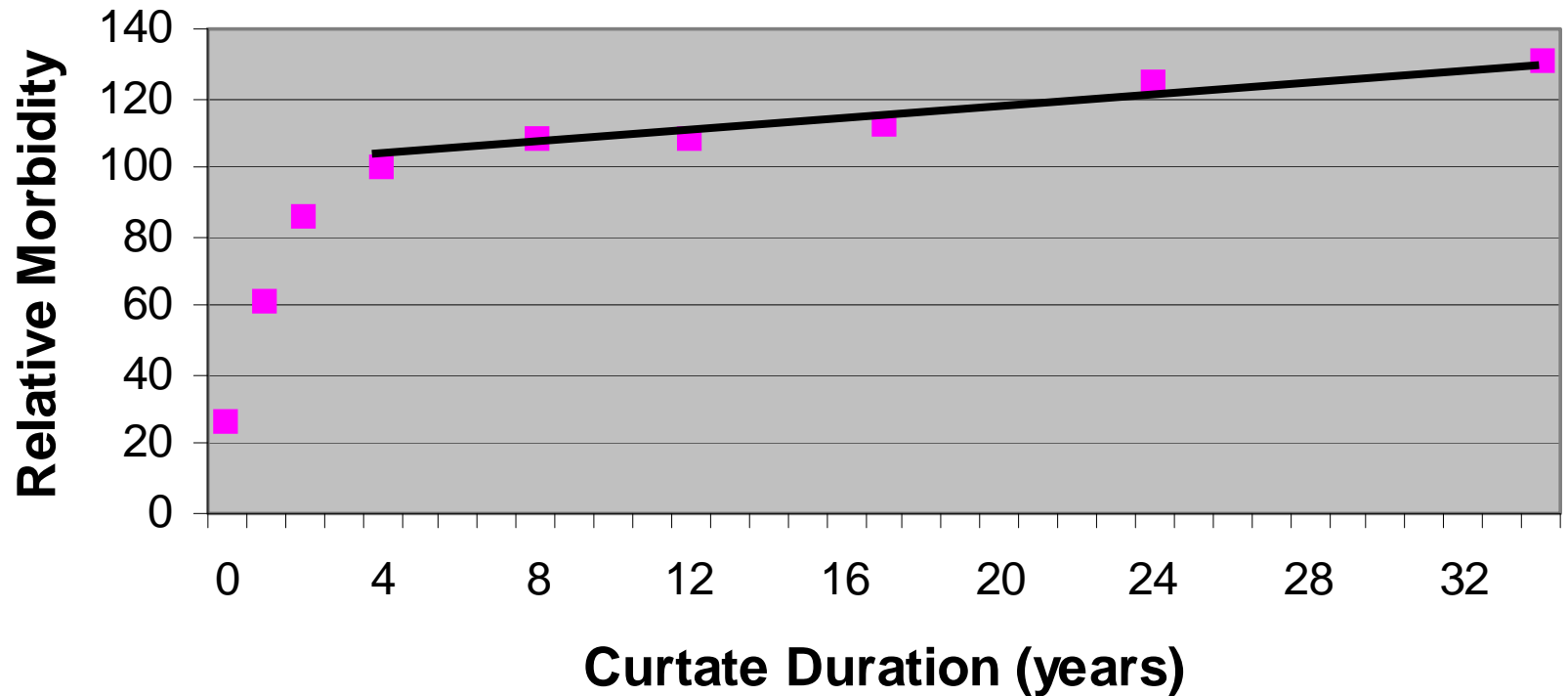
The Duration Curve

Relative Claims per Member by Duration In-force

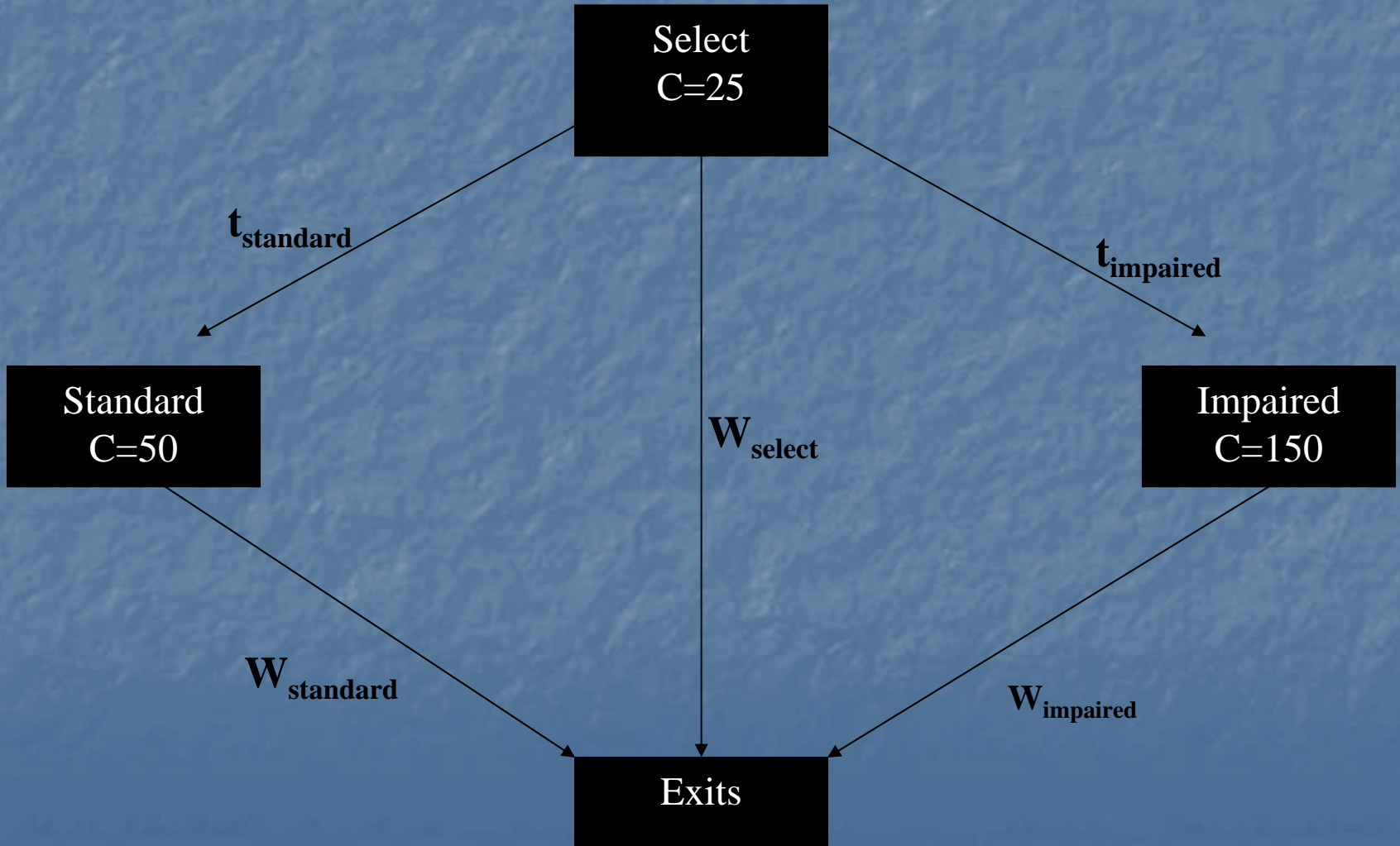


The Duration Curve

**Relative Claims per Member
by Duration In-force**



A Simple Model



Withdrawal Rate Formula

Basic Form

$$W = k1 - k2 * (C/P)$$

But adjusted to

$$W = k1' + k2 * (\text{max} - C/P)$$

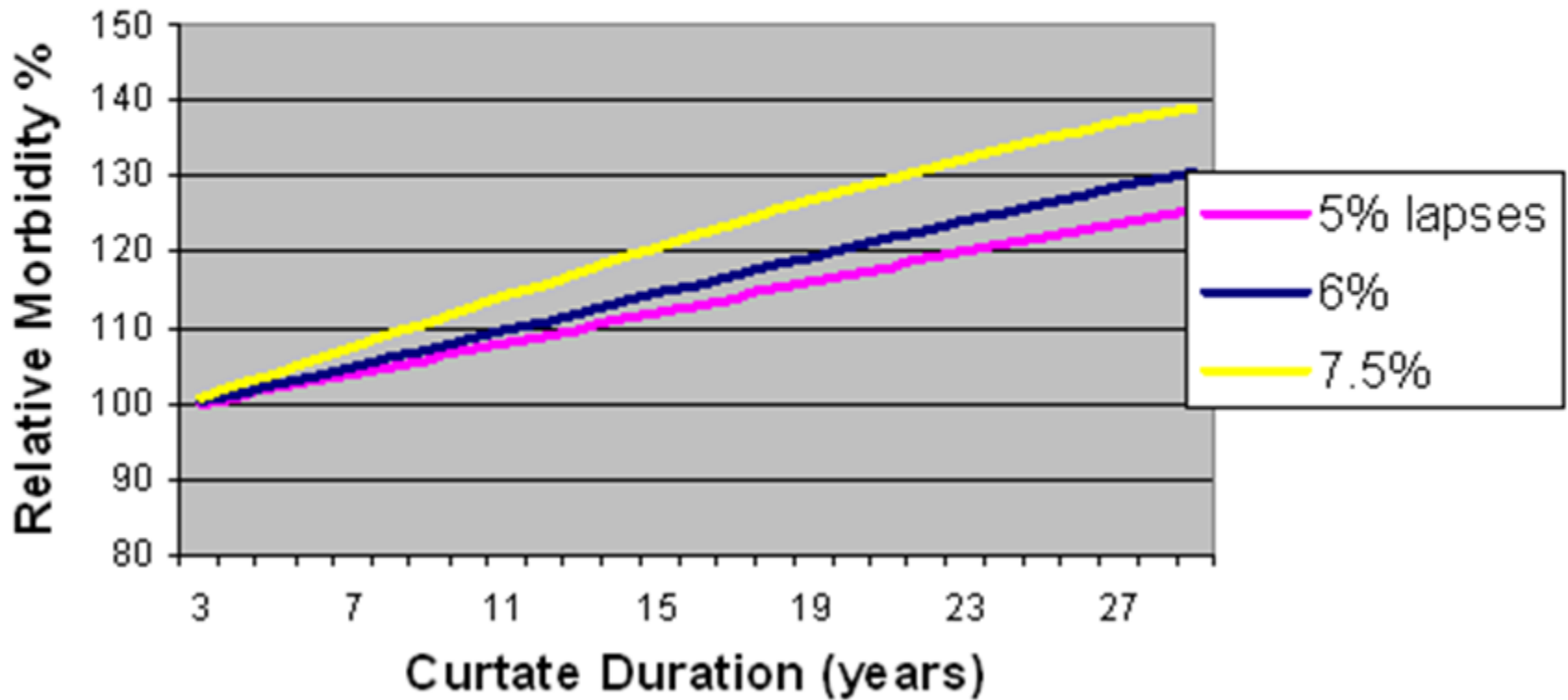
← minimum = 0

Fitted result

$$W = 2.8\% + 4.6\% * (150\% - C/P)$$

Withdrawal Rate Sensitivity

Relative Claims per Member by Duration In-force



Pricing and Portfolio Implications

Projected "Adjusted" Risk Premium

Year	Open Portfolio – Constant New Business
1	100
2	100
3	100
5	100
10	102
15	105
20	107
30	110

Alternative New Business Pattern

Year	New Business Volume	Increasing New Business, Plateau, then reduced level
1	1	100
2	1.2	100
3	1.4	100
5	2	100
10	2	102
15	0.5	106
20	0.5	110
30	0.5	115

Risk Premiums under three scenarios

Year	Open Portfolio – Constant New Business	Increasing New Business, Plateau, then reduced level	Portfolio closed after 5 years
1	100	100	100
5	100	100	100
10	102	102	106
15	105	106	112
20	107	110	119
30	110	115	131

US Example

State of Minnesota – Employee Enrolments					
Plan Option	1995	1996	1997	1998	1999
State Health Plan (POS)	22,969	16,232	10,643	5,029	3,726
State Health Plan Select	-	6,838	14,074	24,983	28,870

State of Minnesota – Monthly Out-Of-Pocket Premiums, Family Coverage					
Plan Option	1995	1996	1997	1998	1999
State Health Plan (POS)	76.14	62.64	155.88	213.72	239.36
State Health Plan Select	-	20.54	21.77	24.33	27.24

"Adjusted" Risk Premiums

Year	Open Portfolio – Constant New Business	Increasing New Business, Plateau, then reduced level	Portfolio closed after 5 years
1	100	100	100
5	100	100	100
10	102	102	106
15	105	106	112
20	107	110	119
30	110	115	131

Issues associated with Closed Book Pricing

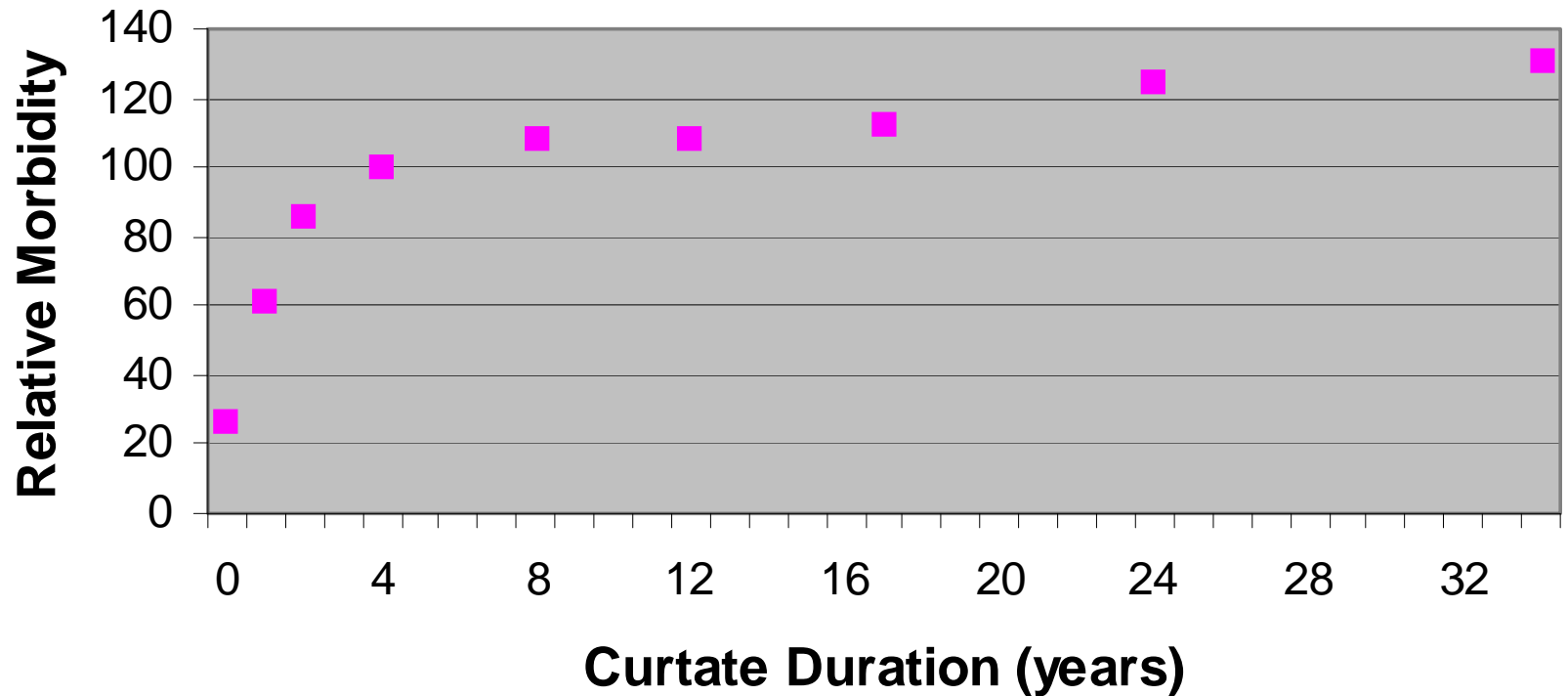
1. The value of the renewal option is reduced.
2. Policyholder Reasonable Expectations?
3. Equity between groups of policyholders.

Possible solutions

- Prefunding
- Pooling

The Duration Curve

Relative Claims per Member by Duration In-force

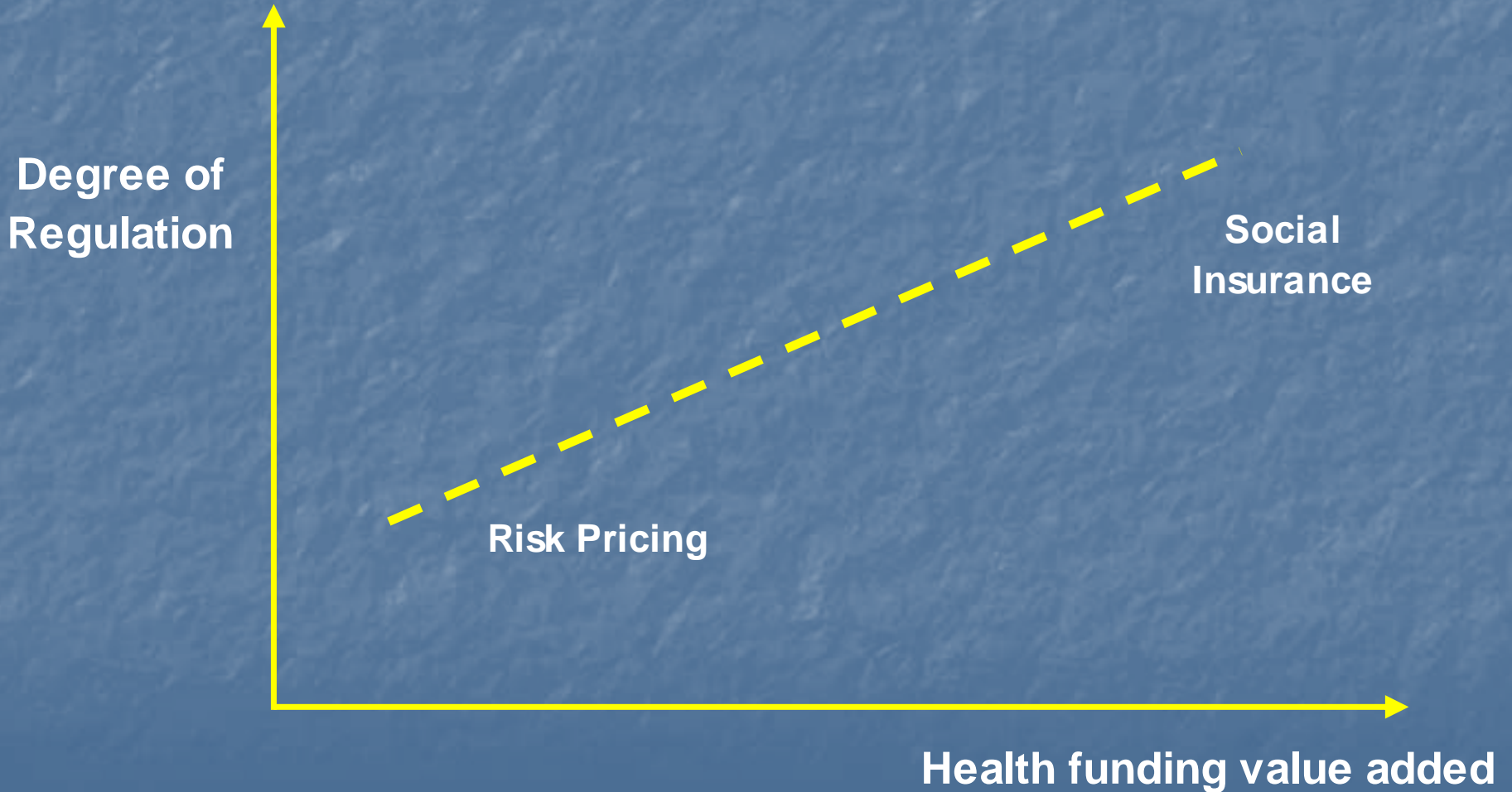


Possible solutions

- Prefunding
- Pooling

Health Insurance as a Funder of Healthcare Expenditure

Risk Pricing vs. Social Insurance



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