Swiss Re

Deciphering Experience Analyses

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Outline

- ***A Caveat***
- A Simplifying Assumption
- An Example
- Some Conclusions

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A Caveat

- Company A's experience is running at 110% of the standard table
- Company B's experience is running at 160% of the standard table

Which company's actuary would you rather be?

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A Caveat

CLAIMS EXPERIENCE

	Actual	Expected	*A to E*
Company A	5 500	5 000	*110%*
Company B	8	5	*160%*

Company A's actual experience is well above the upper limit of the 95% confidence interval (5 500 compared to 5 139)

Company B's actual experience is below the upper limit of the 95% confidence interval (8 compared to 9)

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A Caveat

With experience analyses, volatility can muddy the water.

Ensure your results have sufficient credibility before using them as the basis for management decisions.

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Outline

- A Caveat
- ***A Simplifying Assumption***
- An Example
- Some Conclusions

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A Simplifying Assumption

In the example which follows, we consider a very large company.

The portfolio is of such a size that volatility can be ignored.

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Outline

- A Caveat
- A Simplifying Assumption
- ***An Example (based on real life)***
- Some Conclusions

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An Example

The management of a company is concerned about their underwriting standards.

While their mortality overall is running at 85% of the industry table (used for pricing and statutory valuation), their medically underwritten business is exhibiting consistently worse experience than their non-medical business.

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An Example

BY UNDERWRITING STATUS

	A to E
Medical	*87%*
Non-medical	*84%*
Total	*85%*

Firstly, are the results credible?

Yes, each cell has over 10 000 claims

Let us dig a bit deeper, then, and consider a different view of the experience.

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An Example

THE ISSUE

	A to E
Medical	87%
Non-medical	84%
Total	85%

BY AGE BAND

	A to E
Age 0 to 9	84%
Age 10 to 19	70%
Age 20 to 29	52%
Age 30 to 39	41%
Age 40 to 49	40%
Age 50 to 59	53%
Age 60 to 69	74%
Age 70 to 79	100%
Age 80 to 89	100%
Age 90 to 99	100%
Total	85%

Mortality appears unbelievably favourable between ages 20 and 59

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An Example

THE ISSUE

	A to E
Medical	87%
Non-medical	84%
Total	85%

The favourable mortality at the younger ages led the company to consider the expected rates at these ages.

It became clear that it was the AIDS loading which was causing the unusual trend by age.

This loading in the industry table is intended to allow for FUTURE mortality deterioration due to AIDS. As the company is analysing PAST experience, the company felt it appropriate to remove this loading from their expected basis.

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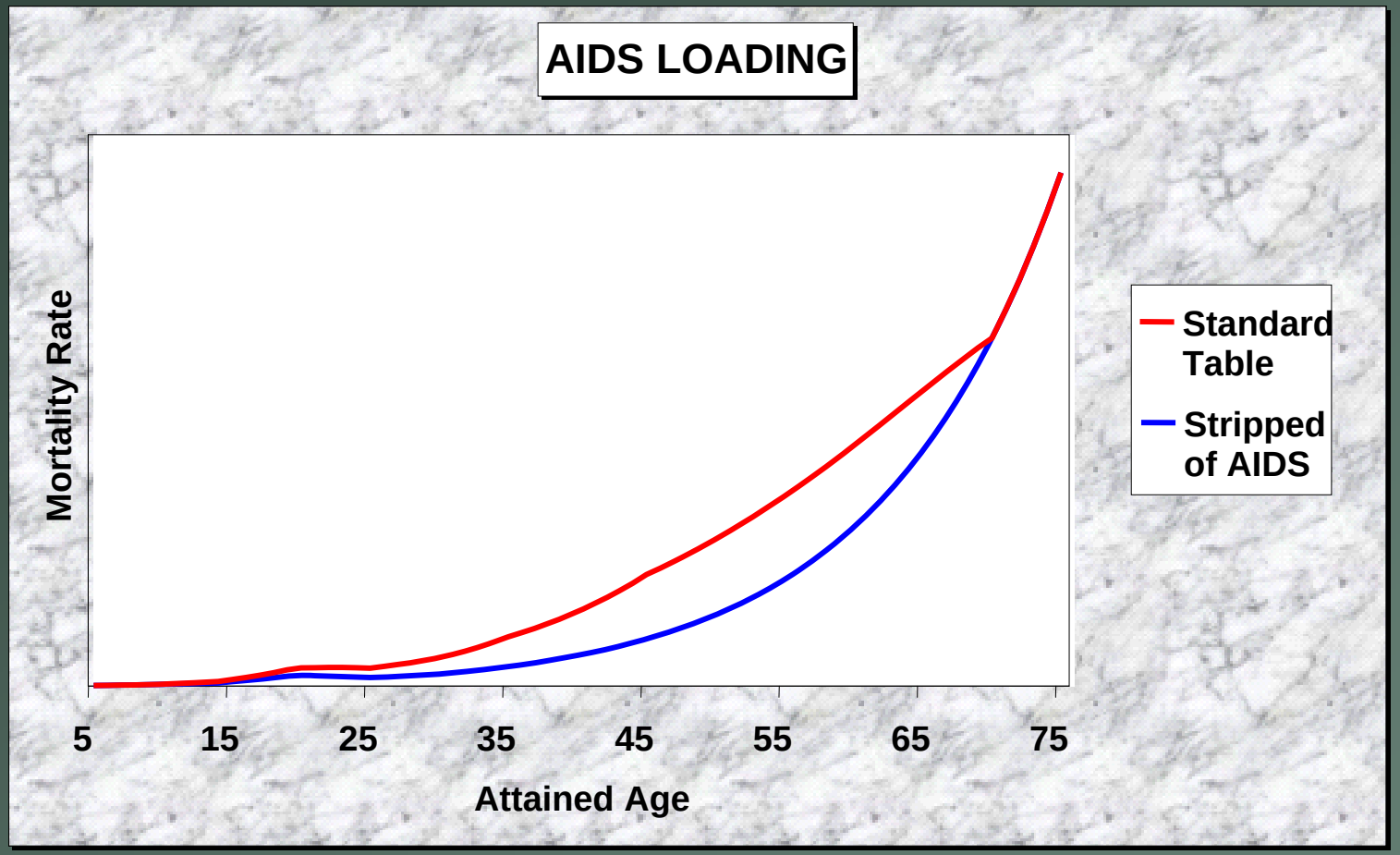
An Example



An Example

THE ISSUE

	A to E
Medical	87%
Non-medical	84%
Total	85%

BY AGE BAND

	A to E (With AIDS Load)	A to E (Without AIDS Load)
Age 0 to 9	84%	84%
Age 10 to 19	70%	87%
Age 20 to 29	52%	90%
Age 30 to 39	41%	91%
Age 40 to 49	40%	91%
Age 50 to 59	53%	92%
Age 60 to 69	74%	93%
Age 70 to 79	100%	100%
Age 80 to 89	100%	100%
Age 90 to 99	100%	100%
Total	85%	98%

Trend remains, but is much improved

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An Example

THE ISSUE

	A to E
Medical	87%
Non-medical	84%
Total	85%

But what has this done for the A to E ratios for Medical and Non-medical business?

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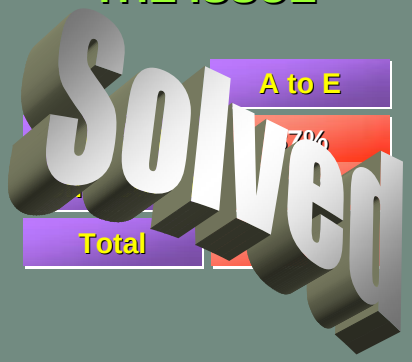
An Example

THE ISSUE



BY UNDERWRITING STATUS

	A to E (With AIDS Load)	A to E (Without AIDS Load)
Medical	87%	93%
Non-medical	84%	102%
Total	85%	98%

Removing the AIDS loading has also helped in ensuring consistency between the medical and non-medical A to E ratios (non-medical business roughly 10% worse than medical).

Since the AIDS loading was distorting the ratios at the younger ages (where most of the non-medical business is written), the A to E ratio for the non-medical business was suppressed.

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An Example

The company still wants to understand why the experience worsens by age

An Example

BY AGE BAND

	A to E (Without AIDS Load)
Age 0 to 9	84%
Age 10 to 19	87%
Age 20 to 29	90%
Age 30 to 39	91%
Age 40 to 49	91%
Age 50 to 59	92%
Age 60 to 69	93%
Age 70 to 79	100%
Age 80 to 89	100%
Age 90 to 99	100%
Total	98%

Why is mortality more favourable below age 70?

Let's consider yet another view of the experience.

An Example

THE ISSUE

	A to E (Without AIDS Load)
Age 0 to 9	84%
Age 10 to 19	87%
Age 20 to 29	90%
Age 30 to 39	91%
Age 40 to 49	91%
Age 50 to 59	92%
Age 60 to 69	93%
Age 70 to 79	100%
Age 80 to 89	100%
Age 90 to 99	100%
Total	98%

BY DURATION

	A to E (Without AIDS Load)
Duration 0	61%
Duration 1	77%
Duration 2	87%
Duration 3	93%
Duration 4	96%
Duration 5+	100%
Total	98%

Mortality experience worsens with duration

After seeing this table, the company remembered that the industry table is an ultimate table, with no allowance for selection.
A selection assumption was therefore factored into their expected basis.

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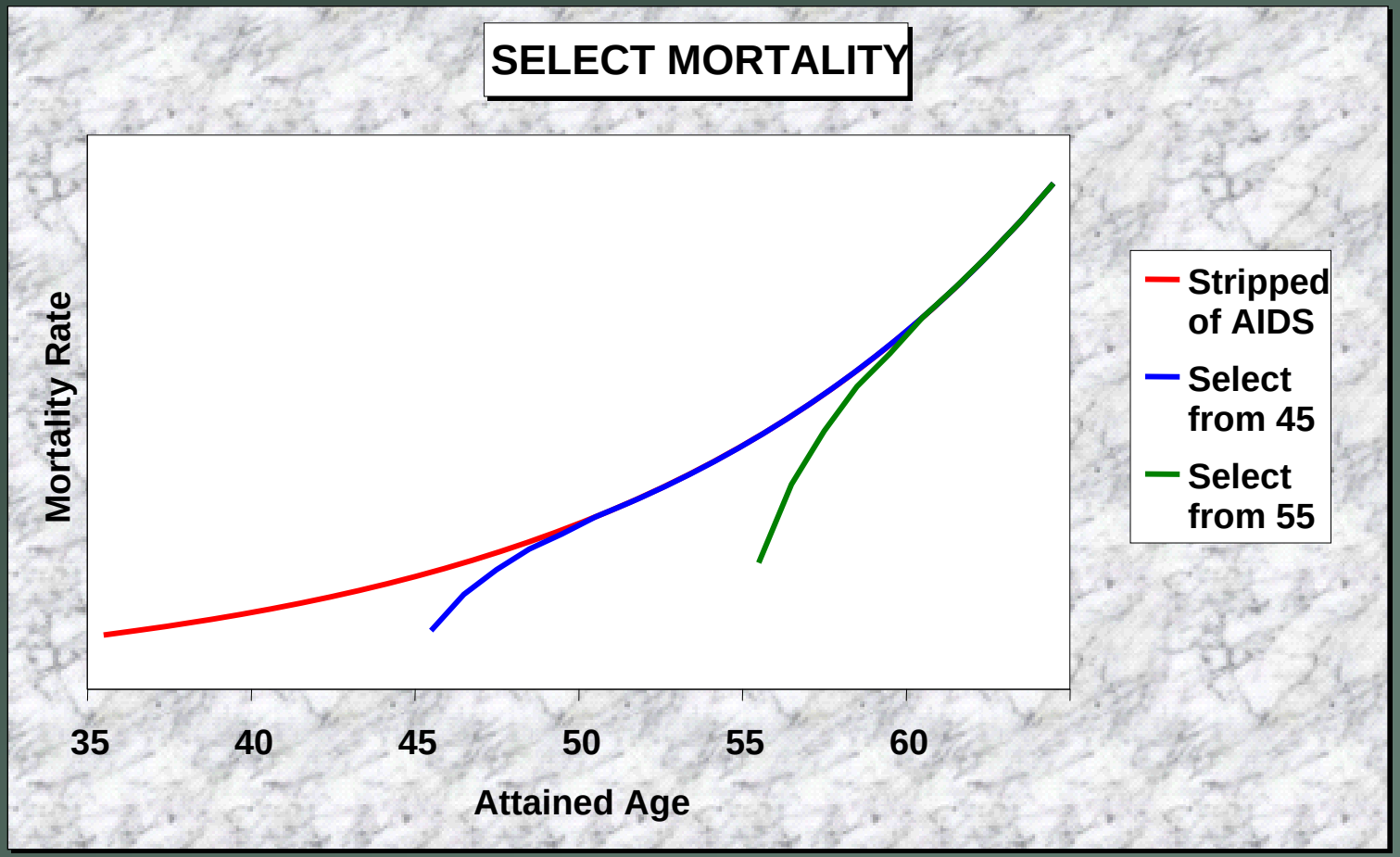
An Example



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An Example

THE ISSUE

	A to E (Without AIDS Load)
Age 0 to 9	84%
Age 10 to 19	87%
Age 20 to 29	90%
Age 30 to 39	91%
Age 40 to 49	91%
Age 50 to 59	92%
Age 60 to 69	93%
Age 70 to 79	100%
Age 80 to 89	100%
Age 90 to 99	100%
Total	98%

BY DURATION

	A to E (Without Selection)	A to E (With Selection)
Duration 0	61%	100%
Duration 1	77%	100%
Duration 2	87%	100%
Duration 3	93%	100%
Duration 4	96%	100%
Duration 5+	100%	100%
Total	98%	100%

Trend is eliminated

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An Example

THE ISSUE

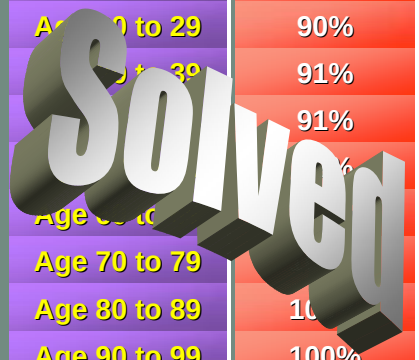
	A to E (Without AIDS Load)
Age 0 to 9	84%
Age 10 to 19	87%
Age 20 to 29	90%
Age 30 to 39	91%
Age 40 to 49	91%
Age 50 to 59	92%
Age 60 to 69	93%
Age 70 to 79	100%
Age 80 to 89	100%
Age 90 to 99	100%
Total	98%

But what has this done for the A to E ratios by age band?

An Example

THE ISSUE

	A to E (Without AIDS Load)
Age 0 to 9	84%
Age 10 to 19	87%
A[illegible] to 29	90%
[illegible] to 39	91%
[illegible]	91%
[illegible]	[illegible]
[illegible]	[illegible]
Age 70 to 79	[illegible]
Age 80 to 89	10[illegible]
Age 90 to 99	100%
Total	98%



BY AGE BAND

	A to E (Without Selection)	A to E (With Selection)
Age 0 to 9	84%	100%
Age 10 to 19	87%	100%
Age 20 to 29	90%	100%
Age 30 to 39	91%	100%
Age 40 to 49	91%	100%
Age 50 to 59	92%	100%
Age 60 to 69	93%	100%
Age 70 to 79	100%	100%
Age 80 to 89	100%	100%
Age 90 to 99	100%	100%
Total	98%	100%

No select business

Since policies are generally sold at the younger ages, ignoring the selection effect results in mortality appearing good at these ages.

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An Example

- From a situation where:
  - The overall A to E value appeared to be 85%
  - The experience of medical business appeared to be worse than that of non-medical business
  - The experience of older lives appeared to be worse (as a percentage of the table) than that of young lives
- Further analysis of the experience and further thought about the expected basis has resulted in:
  - The overall A to E value being adjusted to 100%
  - The experience of medical business being seen to be 110% of the experience of non-medical business
  - The experience of older lives (as a percentage of the table) being seen to be no worse than that of young lives

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Outline

- A Caveat
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- An Example
- ***Some Conclusions***

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Some Conclusions

- Ensure that your expected basis is a true best estimate, stripped of loadings and margins
- Ensure that your expected basis allows for all mortality differentials that you can estimate
  - Differentiate rates by age
  - Differentiate rates by gender
  - Differentiate rates by duration since inception

Some Conclusions

BY AGE BAND

	Expect Selection		Expect No Selection	
	Established	New	Established	New
Age 0 to 9	100%	100%	84%	78%
Age 10 to 19	100%	100%	87%	78%
Age 20 to 29	100%	100%	90%	81%
Age 30 to 39	100%	100%	91%	79%
Age 40 to 49	100%	100%	91%	79%
Age 50 to 59	100%	100%	92%	78%
Age 60 to 69	100%	100%	93%	59%
Age 70 to 99	100%	N/A	100%	N/A
Total	100%	100%	98%	75%

Experience appears very favourable but can be expected to deteriorate

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Some Conclusions

- Ensure that your expected basis is a true best estimate, stripped of loadings and margins
- Ensure that your expected basis allows for all mortality differentials that you can estimate
  - Differentiate rates by age
  - Differentiate rates by gender
  - Differentiate rates by duration since inception
- Where you suspect that the mortality of two blocks of business will differ, but you have no feel for the level of the differential, analyse the blocks separately
  - Medical business vs non-medical business
  - Smokers vs non-smokers
  - Plans with acceleration riders and plans without acceleration riders

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Some Conclusions

Consider “Health States” in the population

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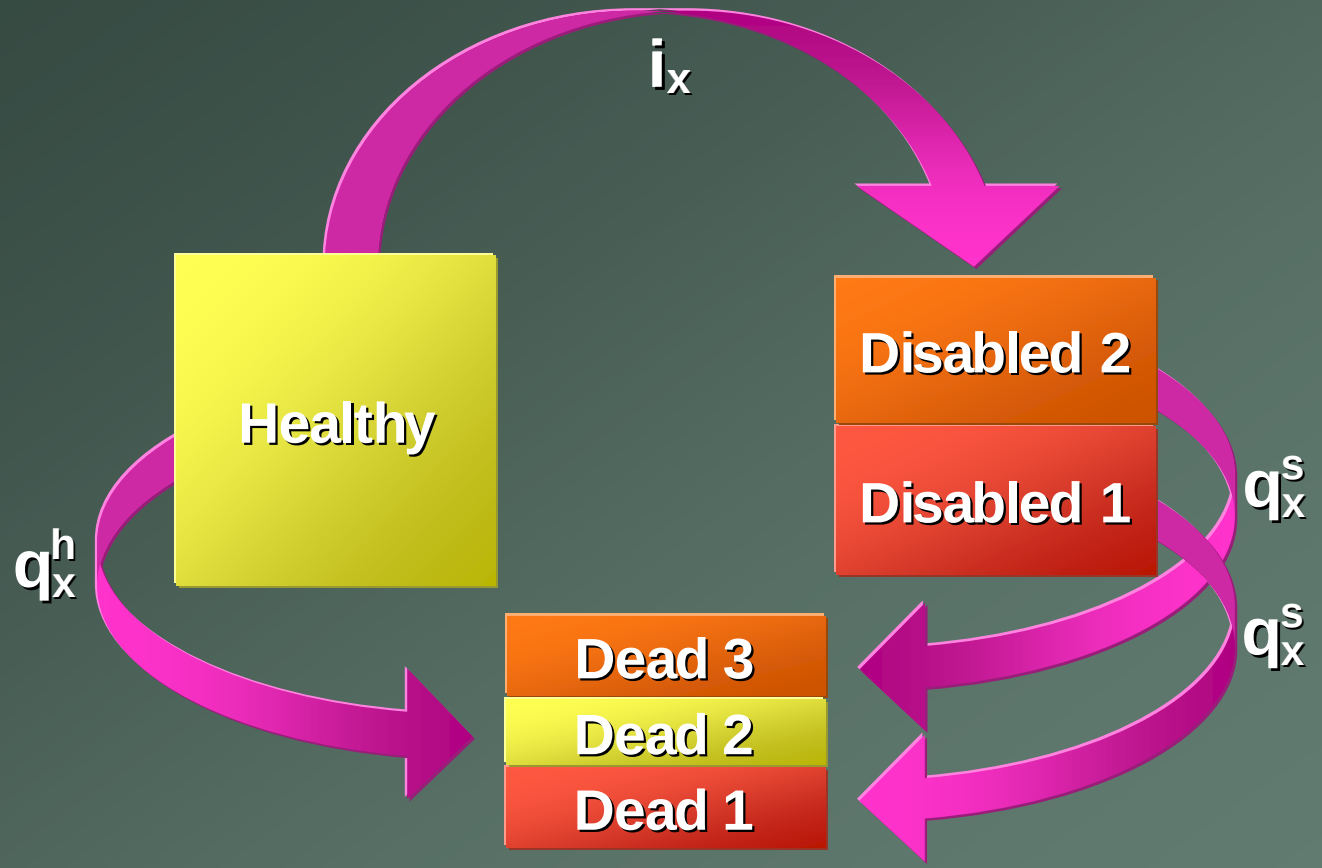
Some Conclusions



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Some Conclusions

Now consider a portfolio of underwritten lives

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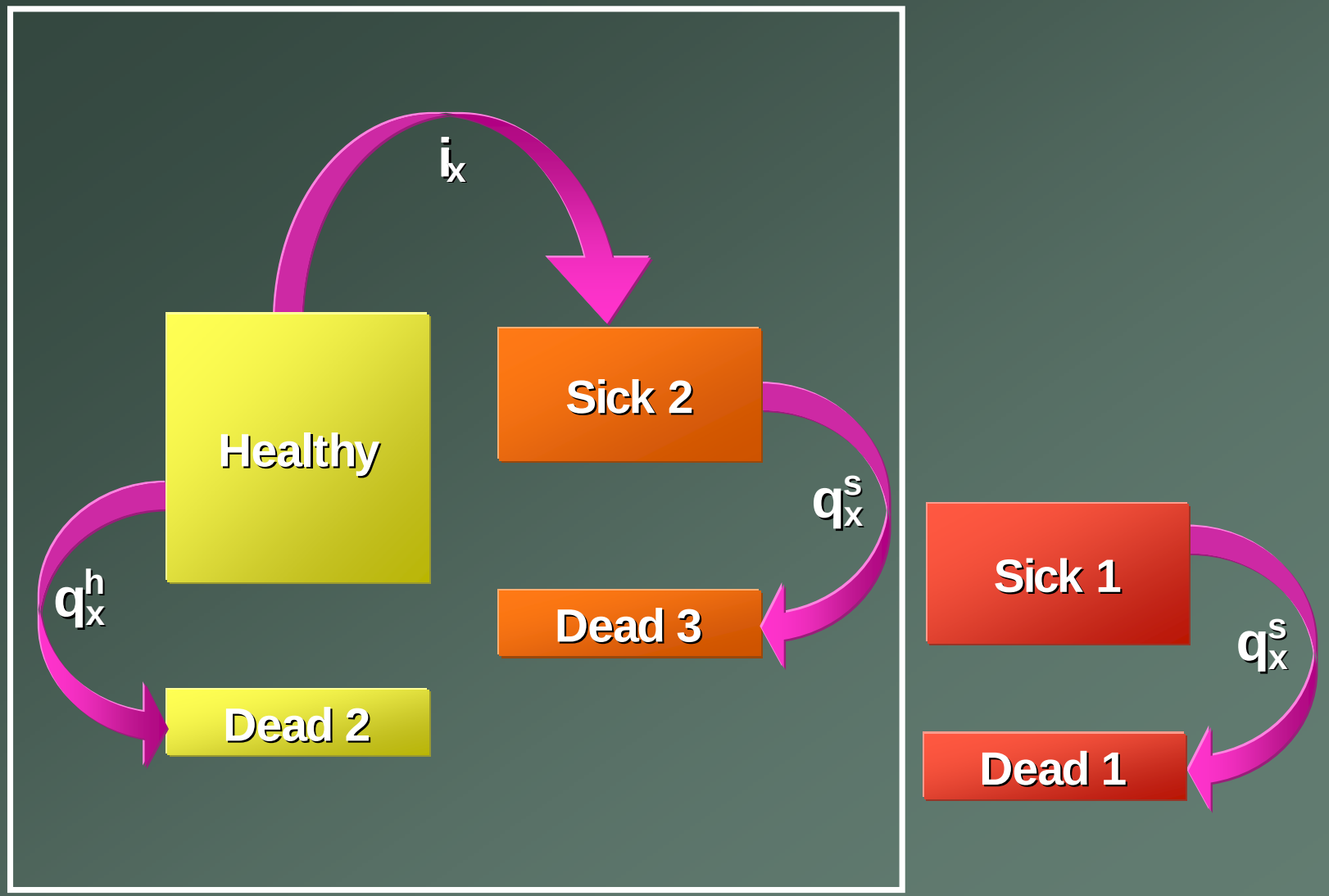
Some Conclusions



Some Conclusions

Now consider a portfolio of underwritten lives with acceleration dread disease riders

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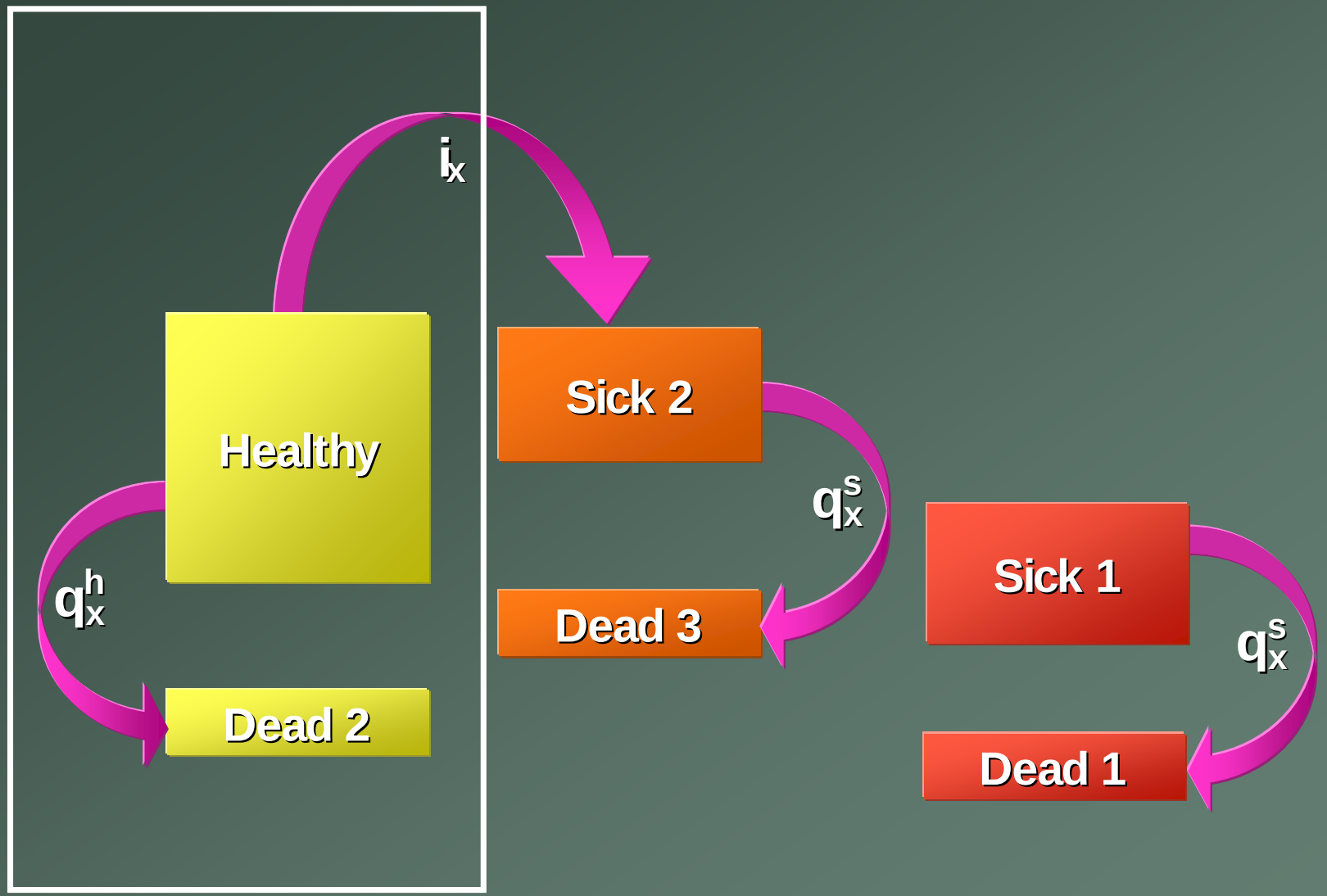
Some Conclusions



Some Conclusions

BY AGE BAND

	No Accel Riders	With Accel Riders
Age 0 to 9	100%	88%
Age 10 to 19	100%	86%
Age 20 to 29	100%	94%
Age 30 to 39	100%	83%
Age 40 to 49	100%	63%
Age 50 to 59	100%	62%
Age 60 to 69	100%	63%
Age 70 to 79	100%	60%
Age 80 to 99	100%	75%
Total	100%	72%

Accident hump

BY DURATION

	No Accel Riders	With Accel Riders
Duration 0	100%	91%
Duration 1	100%	75%
Duration 2	100%	68%
Duration 3	100%	66%
Duration 4	100%	65%
Duration 5+	100%	72%
Total	100%	72%

Underwriting effect

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Some Conclusions

- Ensure that your expected basis is a true best estimate, stripped of loadings and margins
- Ensure that your expected basis allows for all mortality differentials that you can estimate
  - Differentiate rates by age
  - Differentiate rates by gender
  - Differentiate rates by duration since inception
- Where you suspect that the mortality of two blocks of business will differ, but you have no feel for the level of the differential, analyse the blocks separately
  - Medical business vs non-medical business
  - Smokers vs non-smokers
  - Plans with acceleration riders and plans without acceleration riders

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