



Deciphering Experience Analyses



Outline

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



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?



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)



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.**



Outline

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



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.**



Outline

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



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.



An Example

BY UNDERWRITING STATUS

	<i>A to E</i>
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.



An Example

BY AGE BAND

THE ISSUE

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

	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



An Example

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

THE ISSUE

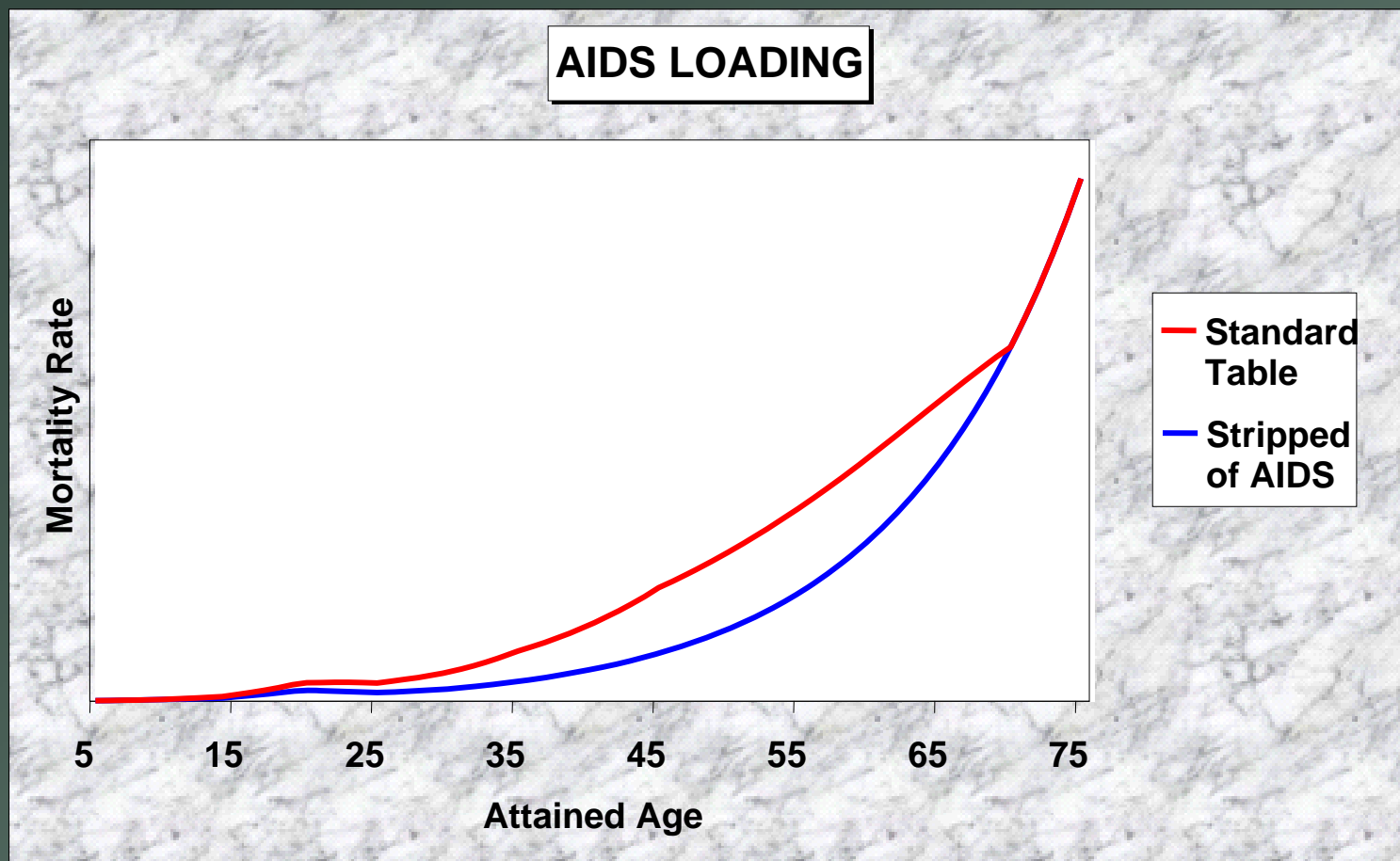
	A to E
Medical	87%
Non-medical	84%
Total	85%

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.



An Example





An Example

BY AGE BAND

THE ISSUE

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

	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



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?**

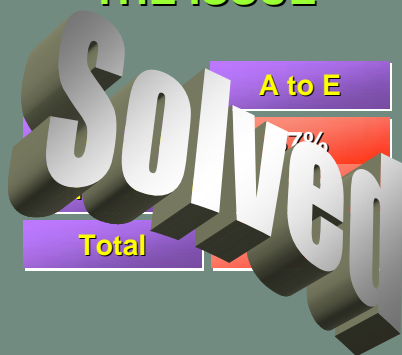


An Example

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%

THE ISSUE



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.



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

BY DURATION

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%

	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%

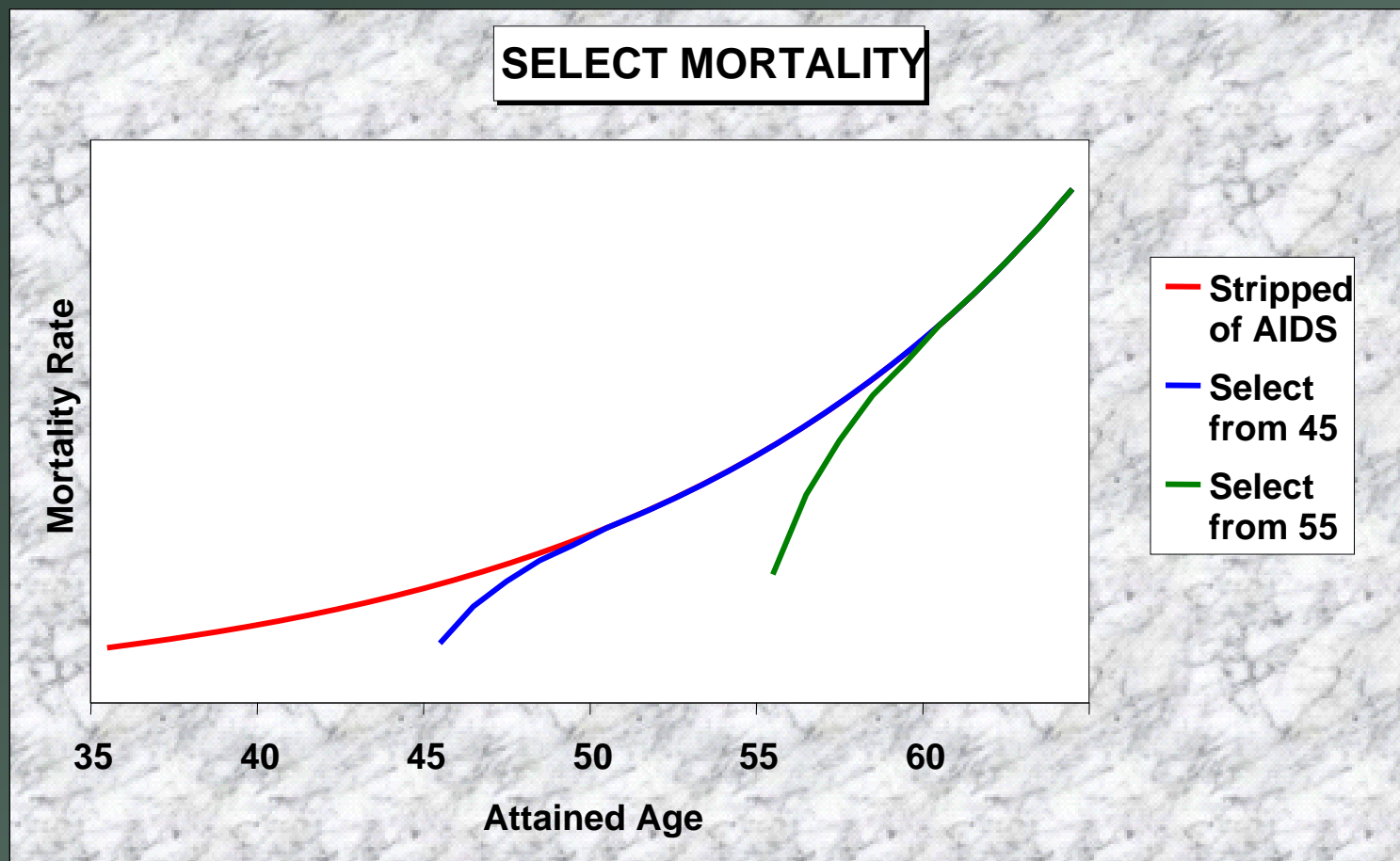
Mortality experience
worsens with duration

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.



An Example





An Example

BY DURATION

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%

	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



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

BY AGE BAND

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%



	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.



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



Outline

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- ***Some Conclusions***



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



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

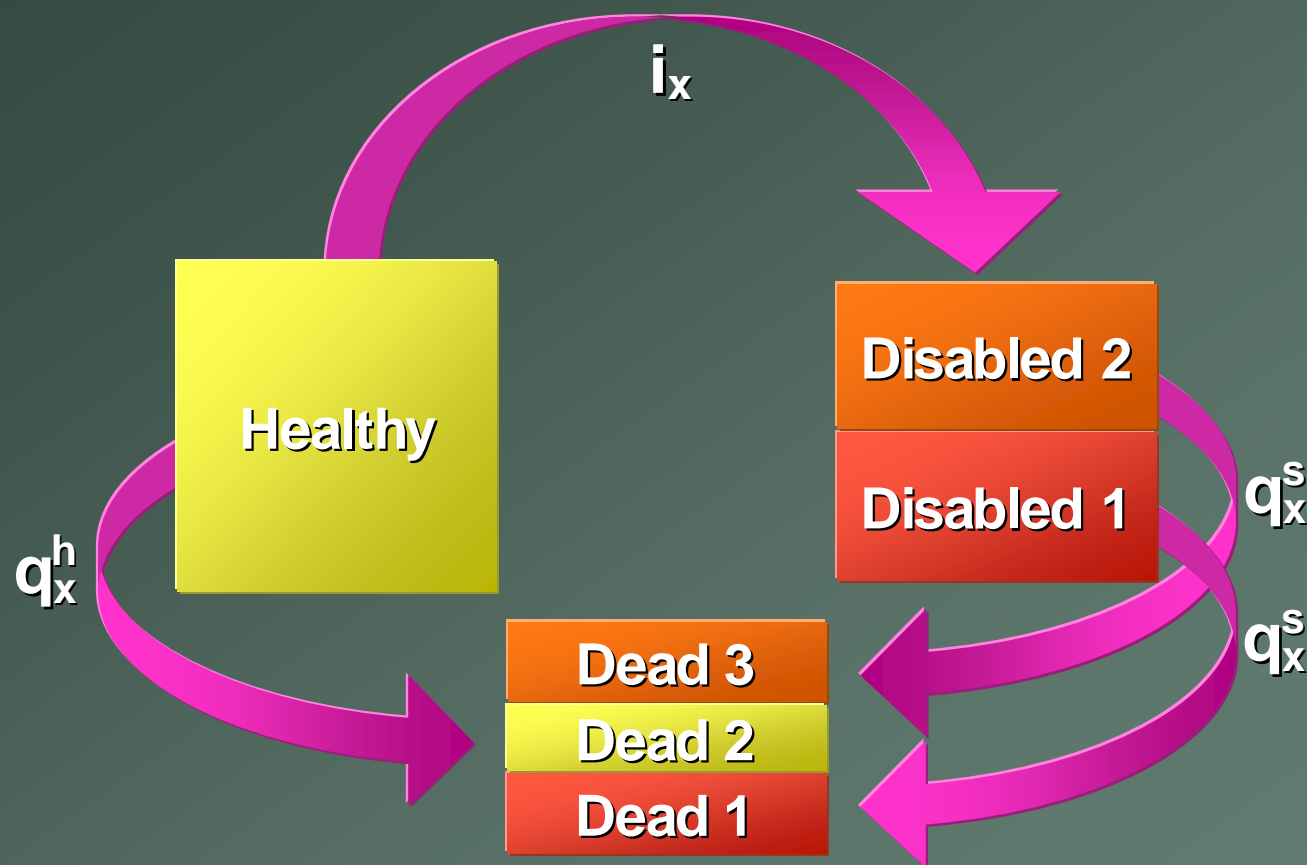


Some Conclusions

**Consider “Health States”
in the population**



Some Conclusions

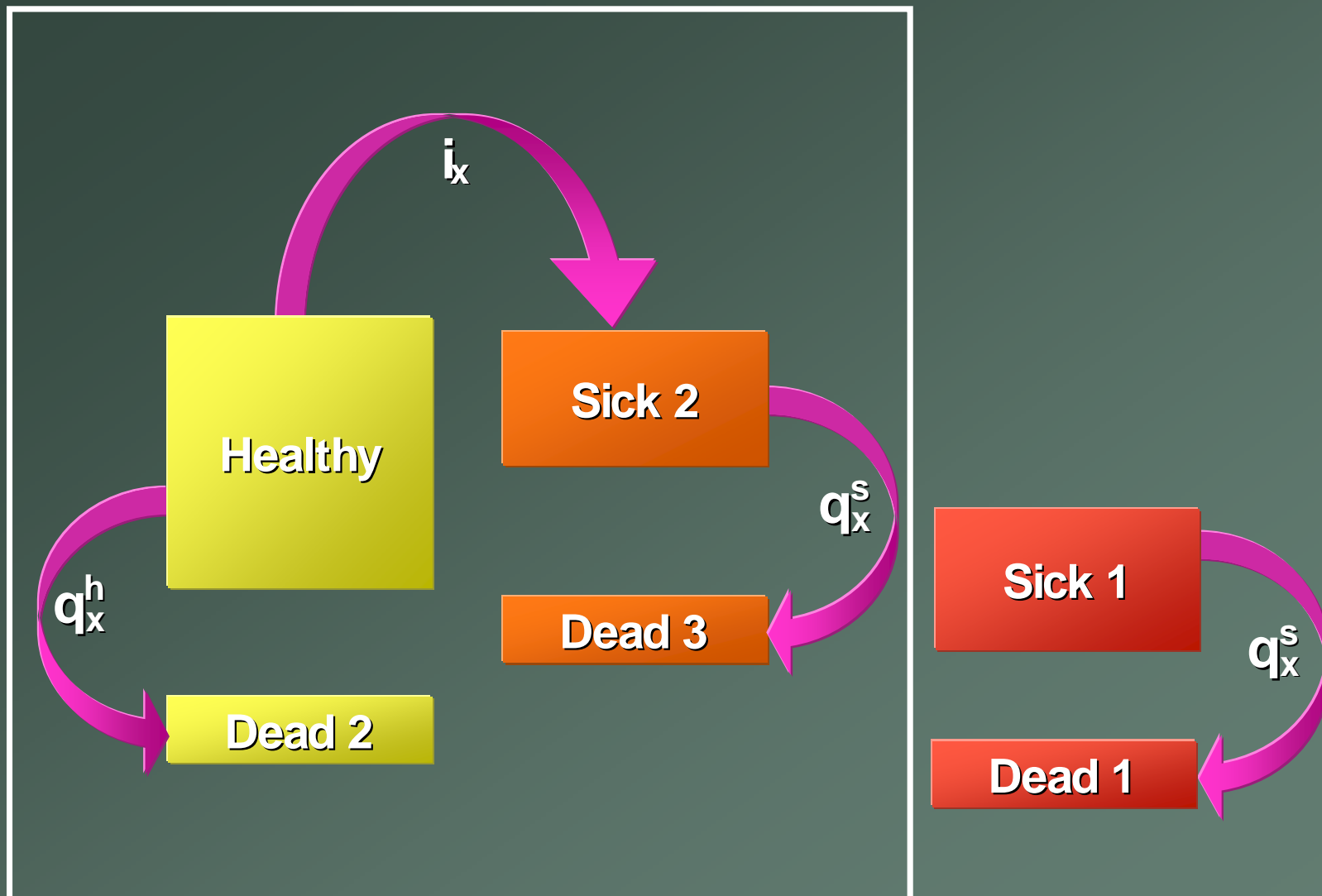




Some Conclusions

**Now consider a portfolio
of underwritten lives**

Some Conclusions



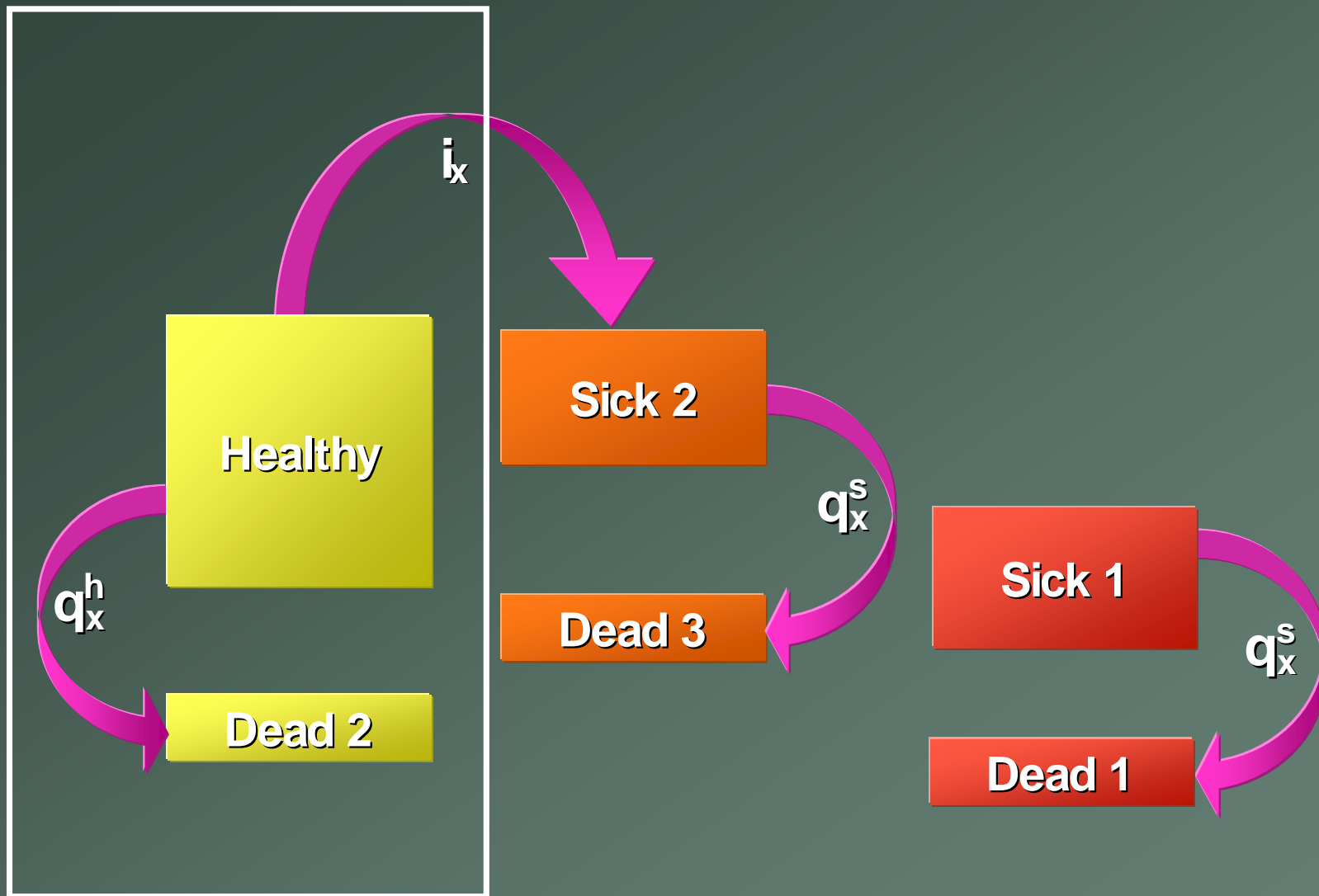


Some Conclusions

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



Some Conclusions





Some Conclusions

		No Accel Riders	With Accel Riders	
BY AGE BAND	Age 0 to 9	100%	88%	} Accident hump
	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%	
BY DURATION	Duration 0	100%	91%	} Underwriting effect
	Duration 1	100%	75%	
	Duration 2	100%	68%	
	Duration 3	100%	66%	
	Duration 4	100%	65%	
	Duration 5+	100%	72%	
		Total	100%	



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**

