Institute and Faculty of Actuaries

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Should you be reserving judgement over your reserving judgements?

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Remember the Green Cross Code?

Stop …using BF where development is non-monotonic

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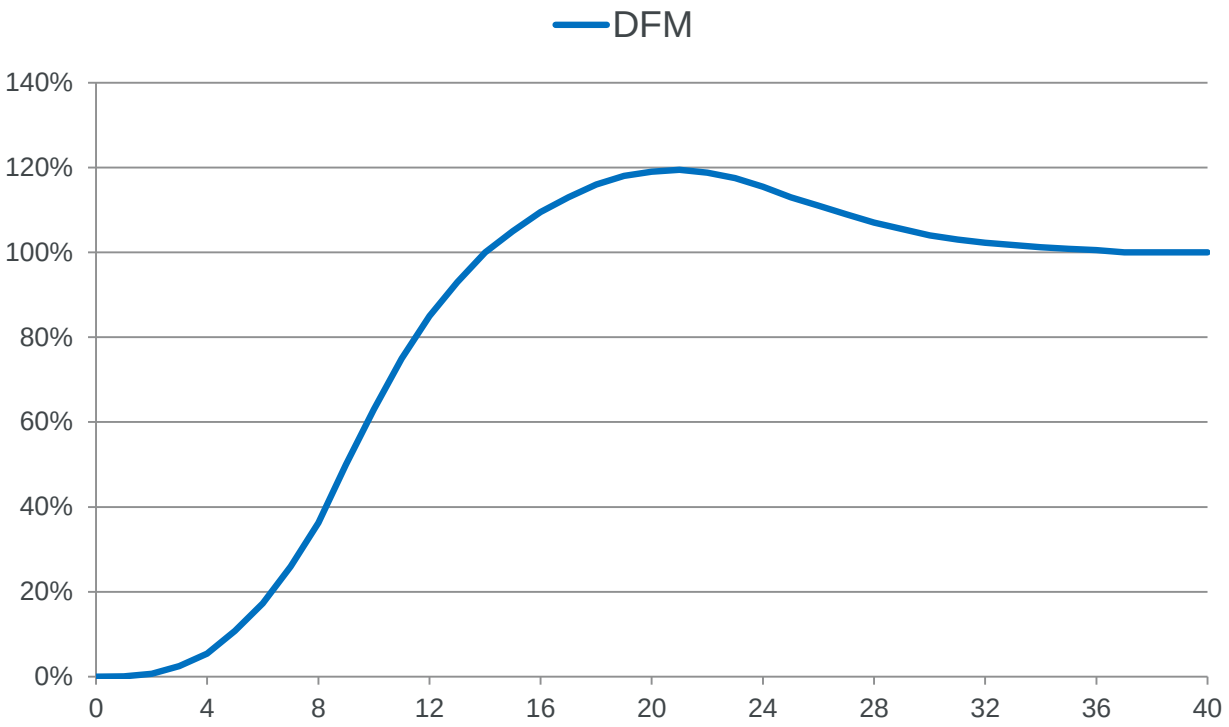
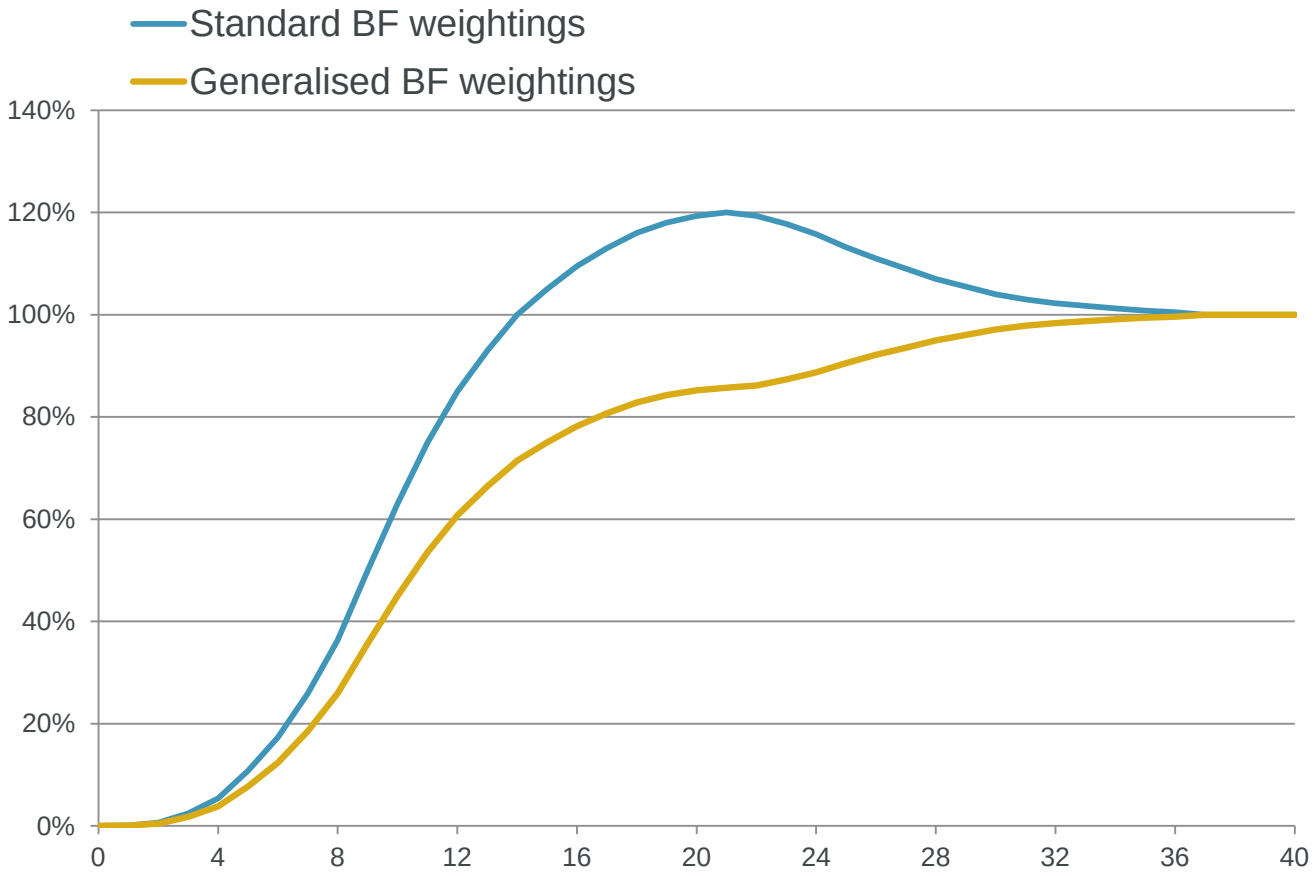


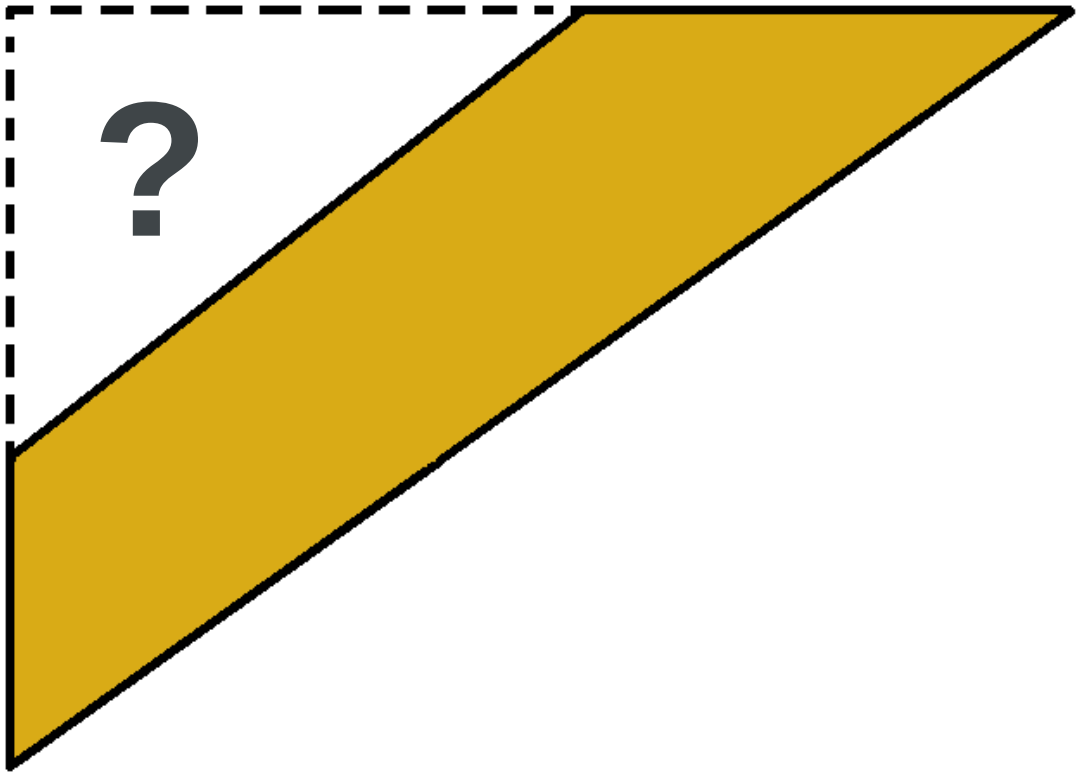
- BF clearly gives odd answers when the DFM weighting >100% and the apriori weighting <0%.
- but how much earlier does it provide a poor weighting?
- Arguably, it's not appropriate for the whole curve.
- so might there be a generalised method that removes the unwanted "retrograde motion"…
- …and exactly replicates the BF weightings in cases where the curve only develops monotonically?

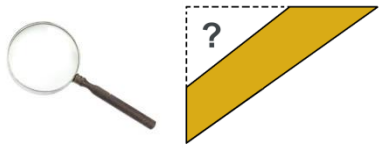
A generalised BF method



- Method:
  - take the absolute value of the DFM increments.
  - aggregate these and rescale to 100%.
- Benefits:
  - for monotonic curves, this replicates the standard BF weightings.
  - For non-monotonic curves, provides a method that won't give obviously daft results (ie the result always lies between the DFM and apriori estimates).
- Limitations:
  - beware unintended wobbles in the development.
  - the granularity of the development periods matters for non-monotonic curves. Different granularities will give different weightings.

Look …for the missing part of the triangle





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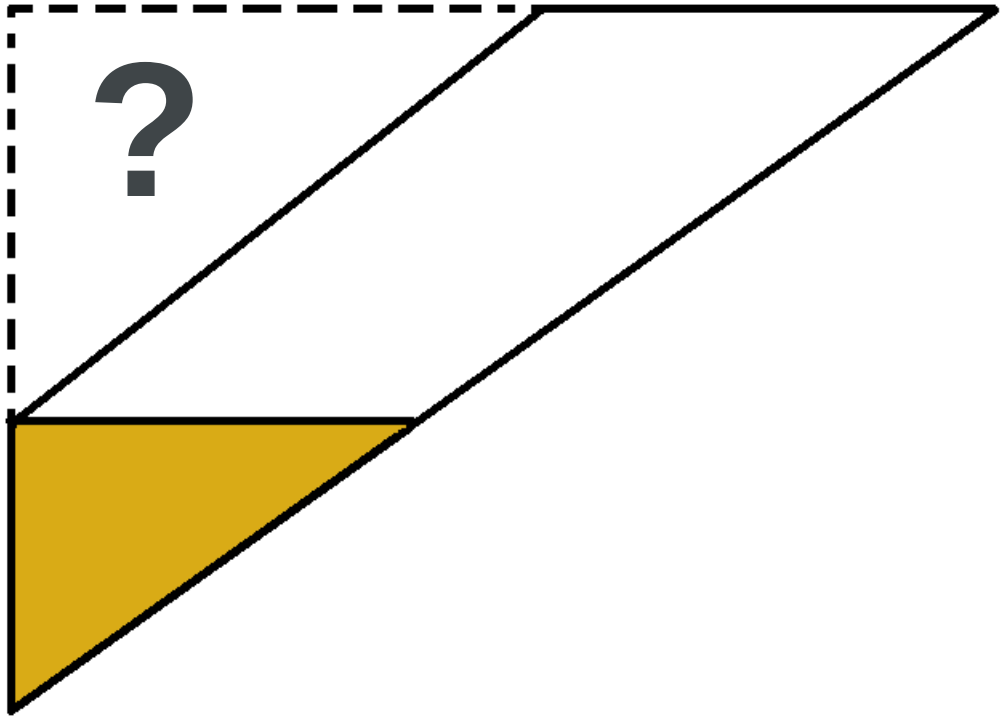
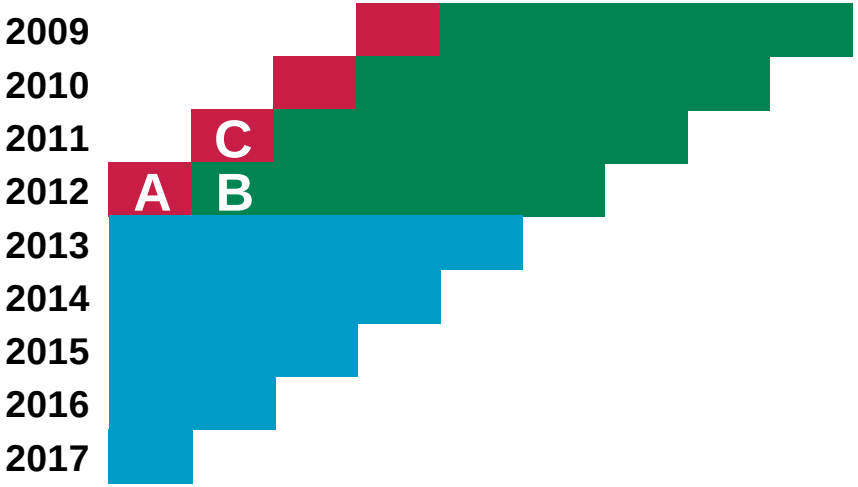


INCREMENTAL TRIANGLE

- You're reserving a long tailed line of business, but you're missing part of the incremental triangle, eg due to data issues as a result of a transfer of business from elsewhere.
- If you ignore this data then you need to make a (heroic!) tail assumption. It'd be nice to use the incremental data from older years to set the tail assumption.
- However, you can't do this with standard chain ladder approaches.

Filling in the missing part of the triangle



CUMULATIVE 'TRIANGLE'

INCREMENTAL 'TRIANGLE'

- To use standard chain ladder methods we need the cumulative values for the starting diagonal of the old years.
  1. Start with the first development period. Fill in the first cell (A) of the diagonal by taking an average of the amounts across the 2013 & post years.
  2. For the second development period of the diagonal (C), first find the cumulative amount for 2012 (B) by adding the incremental amount for the second development period (b) to A. Then take an average over 2012 & post in order to find C.
  3. Repeat!
- Can now use standard chain ladder methods.
- The approach assumes that the exposure across all years is the same. You can extend the approach to allow for changes in exposure.
- An alternative approach would be to use incremental triangle methods.

Listen …to other sources of information

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Listen …to other sources of information

- Gather pertinent information from underwriters, claims managers, finance, policy wording etc.
- and (in)validate your models against this information.
- For example:
  - how long are the policy cover terms?
  - how long are typical reporting or settlement delays?
  - how much of the risk has been earned and when?
  - how long are the cohorts you are modelling? eg underwriting year, accident quarter
  - have there been any process changes in underwriting, reporting or claims handling that might affect the development curve in future and how?

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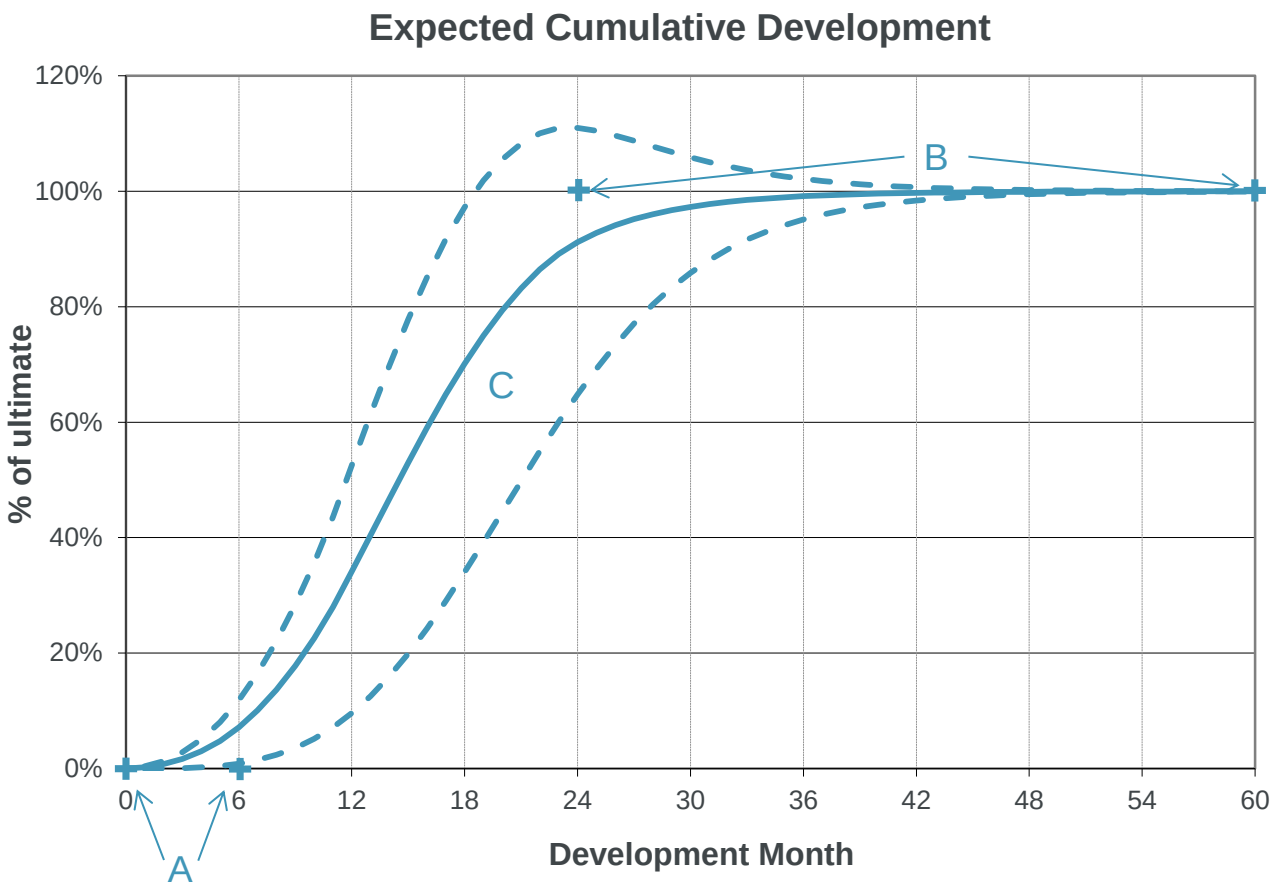
Tips for validating your models



A. When should we start to observe development?
   - did the business incept at dev month 0?
   - or did it incept later?

B. When should we expect to reach ultimate?
   - what's the earliest if all claims were reported immediately?
   - are there any limitations on when claims can be made?

C. How do we expect to get from 0 to 100%?
   - did we underwrite business uniformly throughout?
   - do the risks earn uniformly or not?
   - how quickly will claims be reported and reserved?
   - is over- or under-reserving a feature?

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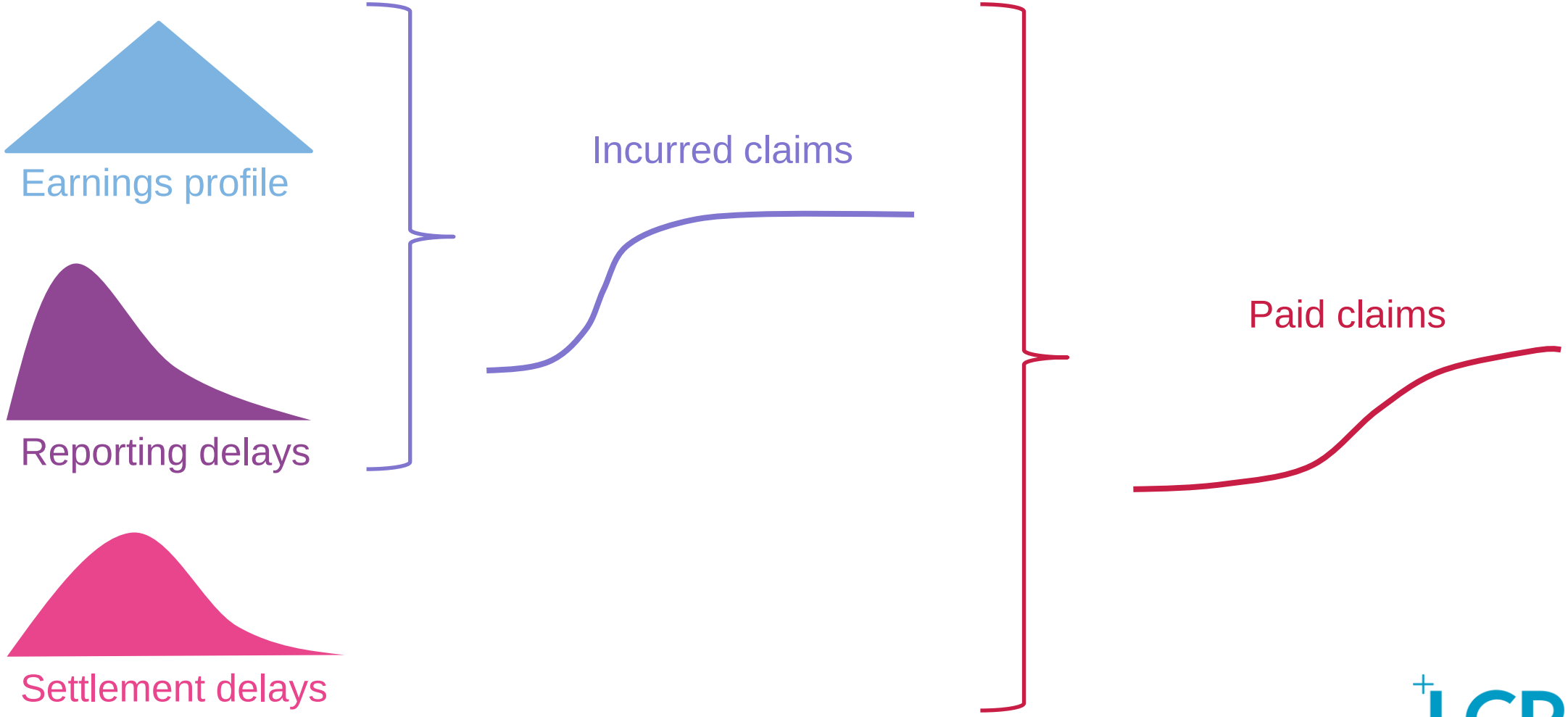
An alternative method for building or validating models



"Actuarial Modelling: not as good as it should be?" P Ellis and R Murray - Momentum Conference 2012

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Think …about the potential impact of claims inflation

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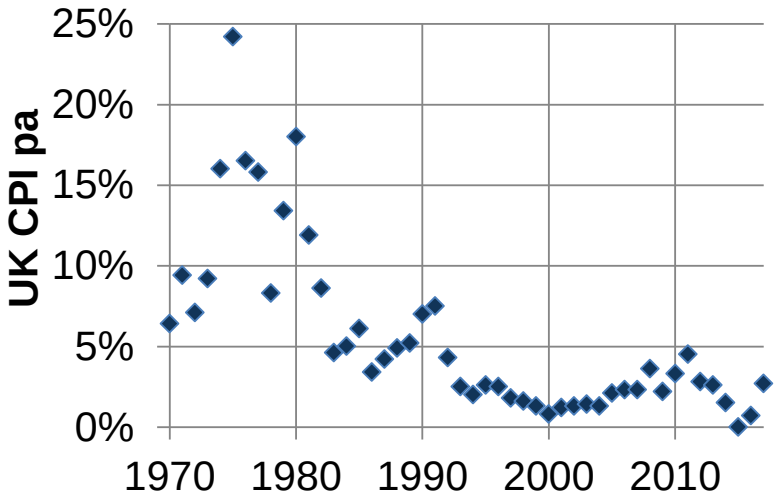
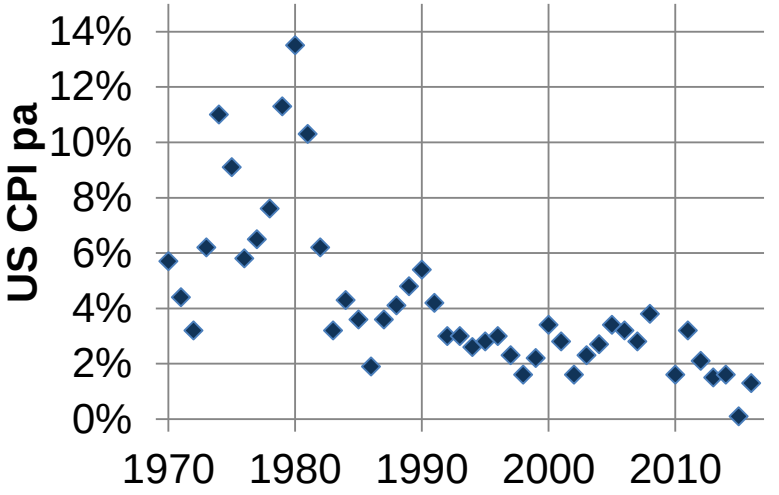


Brexit?



Trump?

- Price inflation has been reasonably stable in recent years, but might not be in the future.
- Most common reserving methods (eg paid and incurred chain ladder) assume that past claims inflation is a good indicator of future claims inflation.
  - Have you thought about how wrong the reserves could be if this isn't the case?
  - Are you communicating this uncertainty?
- Estimating past claims inflation is difficult and time consuming.
- However, using an approximation you can estimate the effect of a change in claims inflation without needing to estimate past claims inflation.

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The (very simple!) approximation

Line of business A

YoA	Reserves (£m)	Term to settlement (years)
……	5	2.0
2015	10	2.8
2016	20	3.5
2017	40	4.0
Total	**75**	**3.6**

		D	E	= ((1 + E) ^ D) - 1	
LOB	**Reserves (£m)**	**Term to settlement (years)**	**Inflation rate change (pa)**	**% impact on reserves**	**Impact on reserves (£m)**
A	75	3.6	2.0%	7.3%	5
B	150	5.0	2.0%	10.4%	16
C	40	1.3	2.0%	2.5%	1
Total	**265**	**4.0**	**2.0%**	**8.3%**	**22**

- You need a payment pattern, but you should have that from TPs work.
  1. For each line of business, calculate term to settlement of reserves using the payment pattern.
  2. Calculate the overall term to settlement across all years for the line of business.
  3. For each line of business, a change in claims inflation of, eg 2% pa, gives a % change in the reserves of $((1 + 2\%)^{\text{settlement term}} – 1)$.
- This gives a quick estimate of the overall impact on the reserves for specified changes in claims inflation, without needing to estimate past claims inflation.
- But it is an approximation. How good is the approximation?

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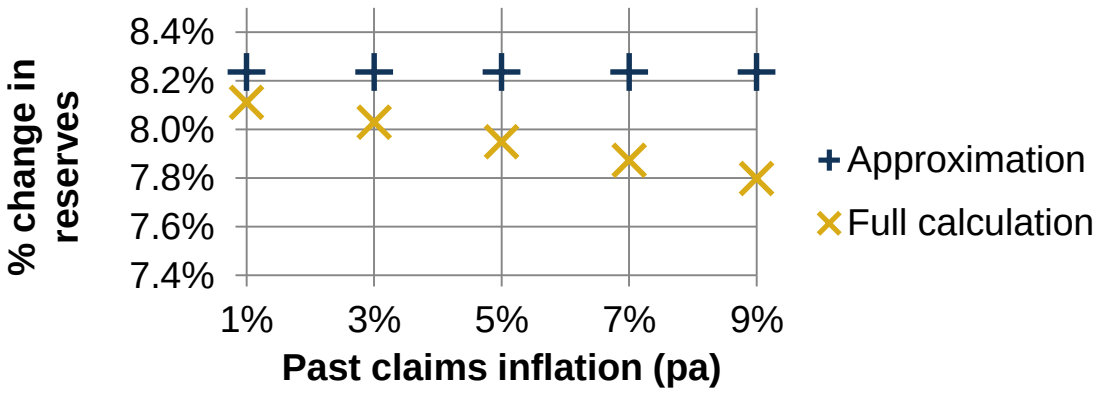
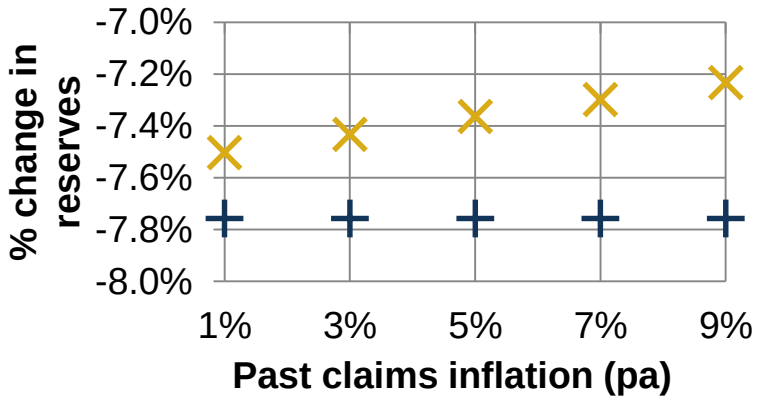
How good is the approximation? (1)

Accuracy under different past claims inflation rates *(term to settlement of 4 years)*

Increase of 2% pa



Decrease of 2% pa

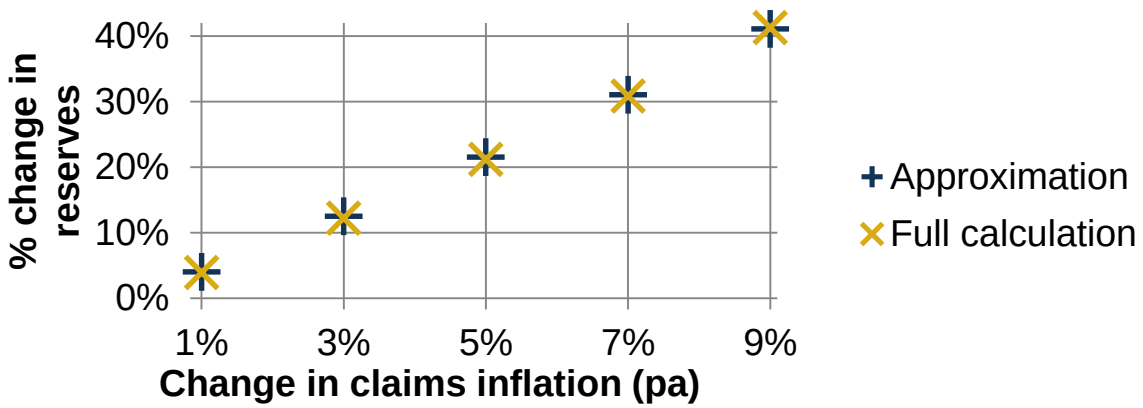


The approximation:

- gives results which are close to the full calculation
- is further away from the full calculation for larger values of past claims inflation
- is further away for a decrease than an increase in claims inflation

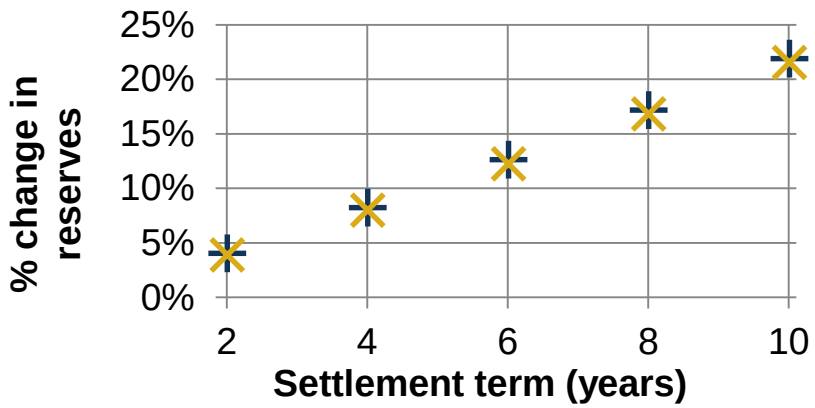
How good is the approximation? (2)

Accuracy under different changes in claims inflation



Term to settlement of 4 years, past claims inflation of 4% pa

Accuracy under different settlement terms



Past claims inflation of 4% pa, change in inflation of 2% pa

- The approximation is further away from the full calculation for:
  - larger changes in claims inflation; and
  - larger terms to settlement. For a term of 30 years, the approximation gives a change of 81.3% compared to 85% using the full calculation.

In summary

Remember to…	Judgements we may be making	Ideas for challenging judgements or overcoming limitations
Stop… using BF where development is non-monotonic	• DFM provides a good basis for BF weighting • BF method can(not) be used for non-monotonic development curves	Generalised BF method
Look… for the missing part of the triangle	• Lack of full history means we can't use certain data in the triangle	You can fill in the missing history and use the data
Listen… to other sources of information	• We don't have enough data, so we have to use a benchmark • Wider sources of information provide context, but do not enable us to (in)validate our models	Take account of other sources of information and work out how you can use them to validate (or adjust) your existing models
Think… about the potential impact of claims inflation	• Past levels of claims inflation will persist in the future • It's too difficult or time-consuming to quantify the effects of inflation	Rather than ignore the issue of inflation, use a simple approximation to estimate and communicate the potential impact

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Questions

Comments