

Pricing Seminar 2010
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Model monitoring in personal lines

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Agenda

- 1. RBSI strategy and pricing models**
2. The need to prove the models to the non-actuarial audience
3. Model governance structure
4. Creating shared understanding of the models between model users
5. Explaining the models and monitoring if they work
6. Monitoring model risk
7. Discussion

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RBSI strategy and pricing models

- RBSI wants to fully utilise the market's largest historical claims and customer behaviour database
- More data = better models
 - Improved multivariate claims models
 - Improved multivariate demand elasticity models
- We are developing new processes
 - improving the link between the information produced and used in pricing and reserving
- But how do we ensure the effective implementation of these new models?

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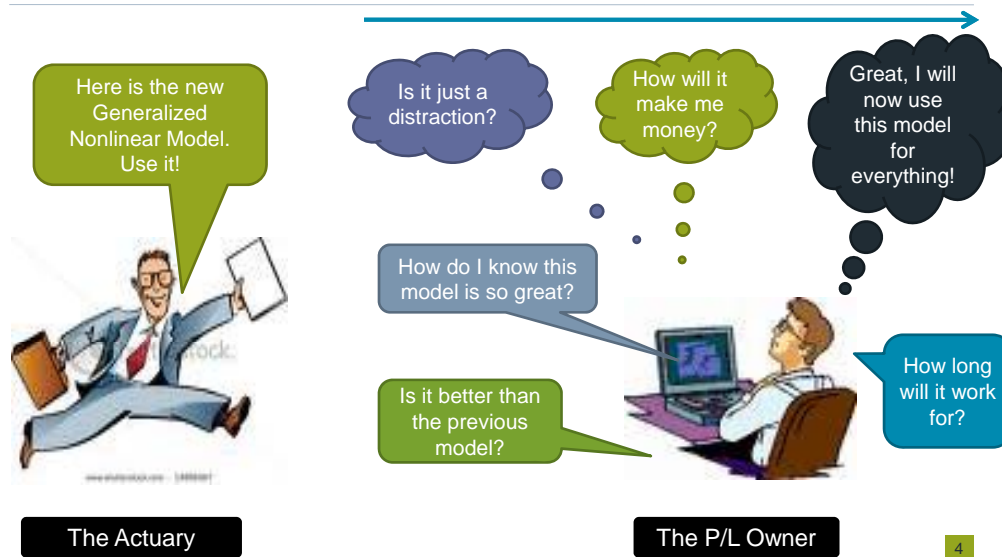
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What happened next



Questions asked by non-actuaries

- Which models do you use to advise me on my business?
- How do I know the model is good?
- What is the new model better at compared to the old model?
- What assumptions are the models most sensitive to?
- What is the most risky component of the model?
- How much time should we spend maintaining this model?
- Can I use the model to solve every problem?

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Modelling governance

Modelling Governance Board

Head of analytics

Finance

Head of commercial

Mandate of the Board

- Ensure technical excellence of the models
- Approve new models for specific use
- Approve new applications of old models
- Approve new versions of old models
- Review performance of old models

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Modelling governance & Technical Actuarial Standard M

- Technical Actuarial Standard M becomes effective in 2011 and encouraged wide adoption
- The RBSI governance process already follows the same principles:
 - Unambiguous documentation of the model purpose
 - Proof of “fit for purpose”
 - Clear identification of data used and cleansing processes
 - All assumptions documented
 - Limitations spelled out

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Creating shared understanding of the models through Model Registration Certificates

- Model ID
- What is being modelled?
- Who built, who checked?
- What is the purpose?
- How to monitor?
- How often to review?
- What if it's wrong?

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Model Registration Certificates help manage model usage (1)

- Certificate section “What does this model predict?”
 - *“Ultimate claim in December 2008 money, as at 24 months of development, including the following, additional claims and provisions*”
- Certificate section “What should the model be used for?”
 - *“In optimisation, to reflect movement of NCD Category in the population over time.”*
- Certificate section “Who built this model, who reviewed it, number of people competent in building these models?”

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Model Registration Certificates help manage model usage (2)

- Certificate section “Impact on this function if the model is wrong”
 - *Fails to capture the shift in NCD Category distributions could lead to sub-optimal pricing recommendations*
- Certificate section “How often should this model be refreshed?”
 - *Refresh at least every 3 months, rebuild every year*
- Certificate section “Most likely trigger to invalidate this model”
 - *Change in marketing offers and introducing new marketing messages, big changes in competitive landscape, channel business mix change*

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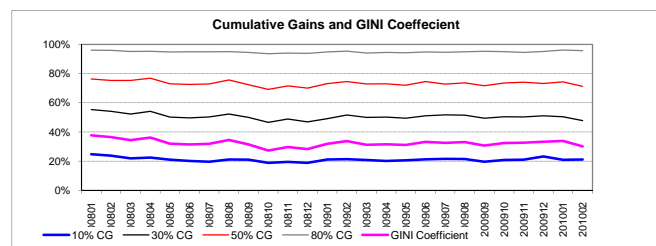
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What is too confusing and complicated to explain

- Measures which involve any advanced statistical concepts are not very well received by non-actuarial users (GINI, U-statistics, ROC curve)
- Example: GINI coefficient can be explained as cumulative gains curve. But the coefficient depends on the sample mix, not just model performance



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Monitoring models – three main aspects of model performance

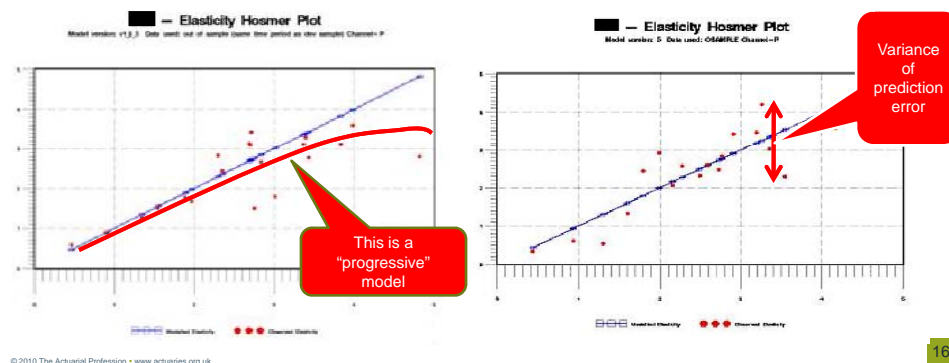
1. Overall prediction level
2. Variance of prediction errors
 - Actual vs. predicted
 - Average (square) errors by buckets or prediction bands
3. Is this a “progressive model” or a “conservative model”?

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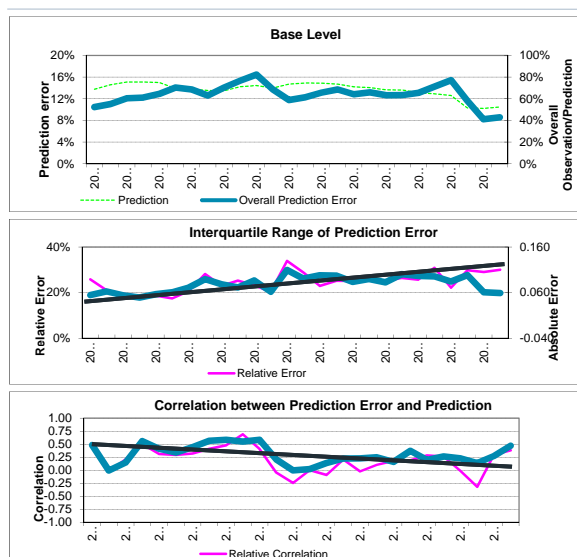
Actual vs. predicted by prediction band

- Still the most effective way of monitoring and communicating model performance
- Simple and useful diagnostics can be built from these charts



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Three main aspects of model performance



- This model consistently over predicts
- Over time this model explains less and less of the random effect
- Over time this model is becoming more "conservative"

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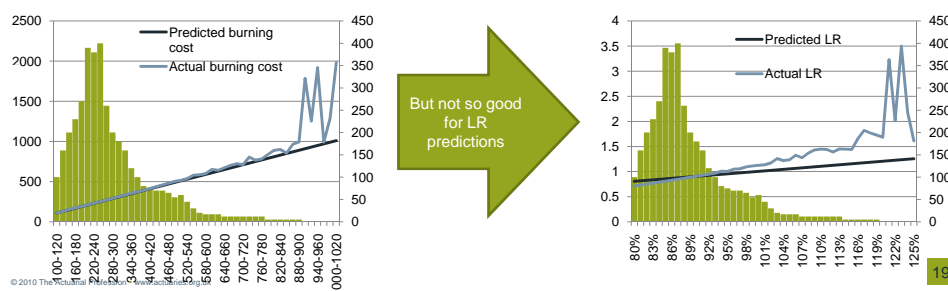
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The risk of misusing the models

- The other end of the spectrum is the temptation to expand the application of the signed off models
- Modelling Governance Board monitors if the models are safely used through the organisation
- Example:



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Model risk – what should worry us

- Not all model performance issues are equally bad for all applications
- We are improving our understanding of which model issues are important for the approved applications of the models
- Example: models by error type for optimisation

	Profit margin improvement from optimisation	Rating curve changes (optimisation) %	Volume improvement from optimisation	Volume improvement from optimisation -5%	Base rate change	Profit margin improvement from optimisation +5%
Model 1 →	1.00	0.0%	1.00	0.0%	0.0%	0.0%
Model 2 →	1.00	0.0%	1.03	0.2%	-0.2%	0.0%
Model 3 →	1.00	0.0%	0.97	-0.2%	0.2%	0.0%
Model 4 →	0.99	0.0%	1.02	-0.6%	-0.9%	0.1%
	1.00	-0.2%	1.03	0.0%	-0.1%	0.8%
	1.00	0.2%	0.97	0.2%	0.3%	0.8%
	1.00	0.4%	1.36	3.4%	-3.7%	0.4%
	1.00	-1.7%	0.88	-0.5%	1.3%	4.3%
	1.00	1.8%	1.06	4.2%	-3.8%	1.2%
	1.00	-0.2%	0.60	-4.1%	3.4%	0.9%
	1.00	0.7%	1.10	4.8%	-4.7%	1.2%
	1.00	-0.2%	0.96	-1.0%	1.2%	4.6%

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