Institute and Faculty of Actuaries

dynamo ANALYTICS

Technology in Commercial Lines Pricing

Giro 2013

What we going to look at…

Institute and Faculty of Actuaries

- Observations from the market
- World is changing – event, data and technology driven
- Examples of how companies have responded
- Platforms and Tools for bringing different views together
- What need to be thinking next.

Observations from current market

- Commercial lines about writing a balanced book.
- Loss cost pricing methods – experience rating and exposure – focussed on account level.
- Risk pricing information not sufficient for optimal decision making
- Getting pricing 5% wrong for large commercial risks not key issue, not knowing exposures could be!
- Risk framework can provide valuable information on:
  - Risk accumulations and risk limits
  - Capital allocation and shareholder value
  - Relative value add – compared to similar risks in portfolio
- External information feeds provide valuable additional information and optimise process

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World is changing

Impact on Commercial Lines Pricing is evident and will be huge:

1. Starting from a low base – Lloyds curves and experience rating models
2. Actuarial review of models recent, and not all organisations
3. Rating methods very much focussed on account level and data on underlying risks now becoming accessible.
4. Capital and portfolio models insight into relative risks, capital allocation and aggregation
5. External model impact
6. Accumulations management non negotiable
7. Sophistication contagious – don't be left behind

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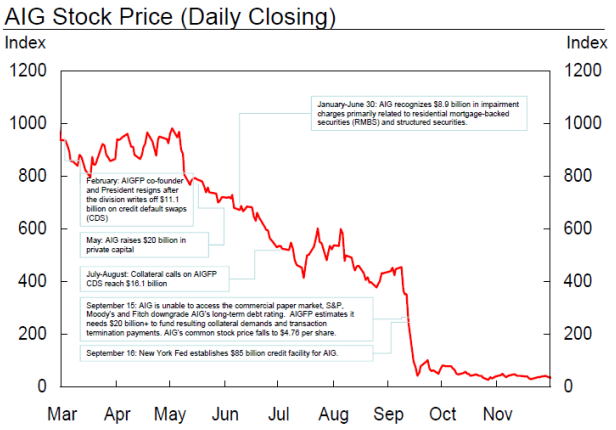
Exposure Management
AIG $440 bn – one sided CDS exposure



Sources: Google Finance; Federal Reserve Bank of New York.

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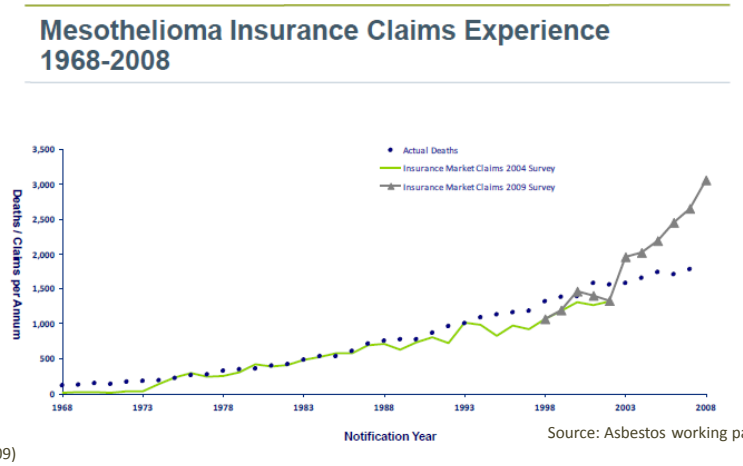
Emerging Risks
The unknown unknowns



Source: Asbestos working party (2009)

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2011 Catastrophe Losses
Non modelled territories

US wind premium is largest source of GI premium globally…

NZ Quakes, Japan EQ and Tsunami, Joplin Tornadoes, Brisbane Floods, Californian wildfires, Thai Floods

- Exposures not monitored, not adequately allowed for in Capital.

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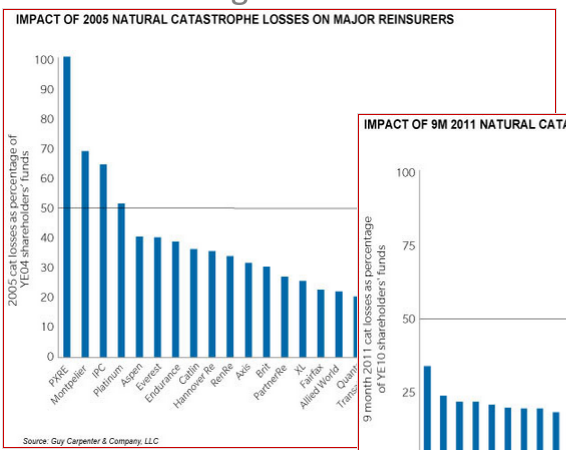
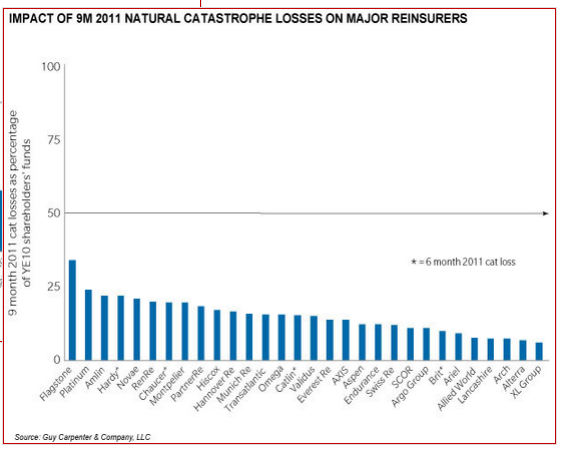
Exposure management has improved in recent times…
but not enough





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Technology changes impacting insurance industry

- Systems for recording data
- Systems for accessing data in timely way
- Increase in volumes of relevant external data available
- Processing power needed to crunch data
- Models and techniques
  - Capital Models
  - Catastrophe Models
  - Other external Models
- Portfolio and Predictive analytics
- Next generation pricing platforms and tools – excel not the answer to everything!
- Flow between functions

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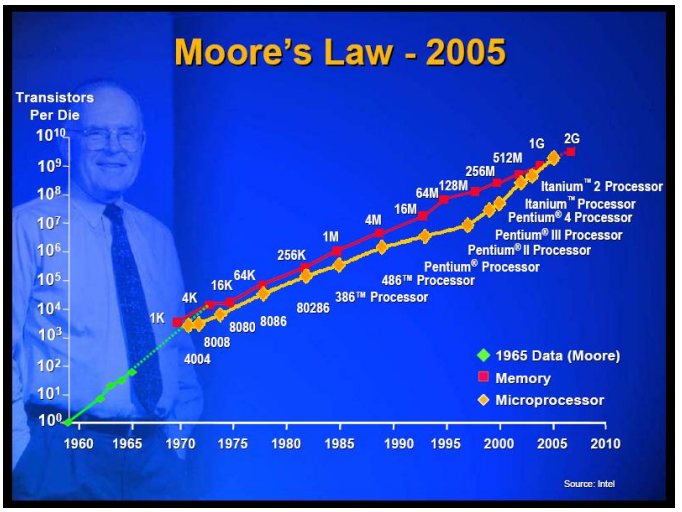
Data and processing power



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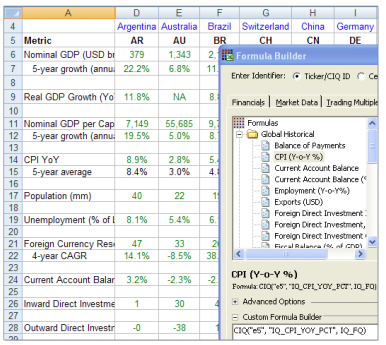
Data

Problem is not lack of data anymore, problem is becoming
…what data to look for
…how to get hold of it
…and what to do with it – rating factor and model?
…what frequency (ZOOM) to look at
…who else has got it and how are they using it against me!

External data providers:

- Capital IQ
- Advisen
- Company Watch
- D&B

…and MANY other



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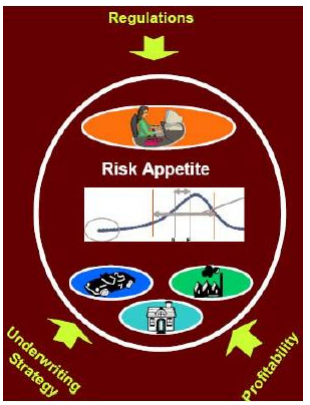
Capital model impact

- Provide holistic view of risk for firm of writing a balanced portfolio of risks.
- Brought understanding of risk based framework and RoE.
- To parameterise UW risk components, risk level information is aggregated and insurers starting to take portfolio view of risk.



- Most insurers would at least aim to have some sort of capital allocation by class and within classes.
- Most insurers would have some capital loading in pricing
- Setting risk limits – max accumulations tolerate by peril
- More appropriate reinsurance structures appropriate for risk profile of accounts. Have a model to understand value and gross to net volatility.

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Catastrophe Model

- Reinsurance and cat insurance pricing and capital pretty much driven by models.
- Give a view of AAL (expected loss) and uncertainty at account level.
- Aggregates exposures to give view of capital at defined risk appetite for portfolio.
- Granularity and quality improving at every broker submission

Challenges:

- Models have big known and (possibly bigger) unknown limitations
- Can change market price and credit rating on new model release
- Additional granularity sometimes bring unintended consequences!

Positives:

- Data cleansed – market getting used to better data
- Most exposures captured – sum insureds, risk details
- Insurers have a handle on maximum exposures for modelled territories, the best insurers also for non-modelled

Even though models are not fully trusted, drive RI pricing and capital requirement, so at risk level very important.

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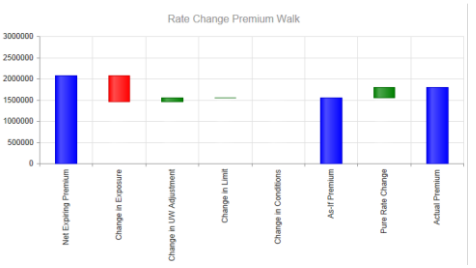
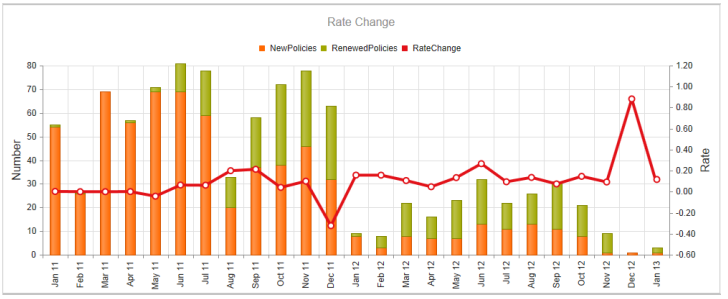
Rate change and technical pricing

- Key driver of model development
- Requires better data, more sophisticated modelling
- Account and portfolio view





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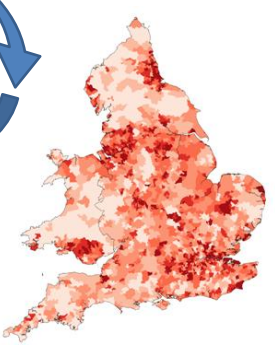
Optimal decision making

Information on individual risks:

- Risk and Rating factors
- Technical price
- Adequate pricing for non-systemic impacts

Information flow



Information on portfolio impact:

- Capital loadings
- Risk accumulations and marginal impact
- Systemic, Contingent, Risk drivers

Challenge – how do I get portfolio view into pricing models

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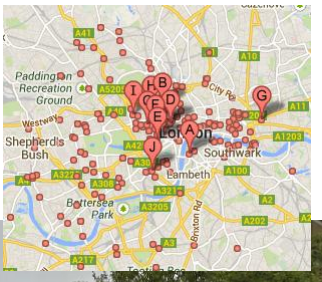
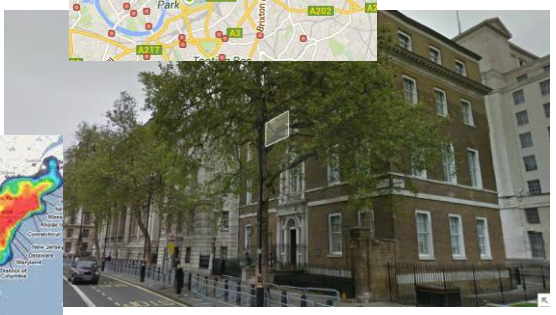
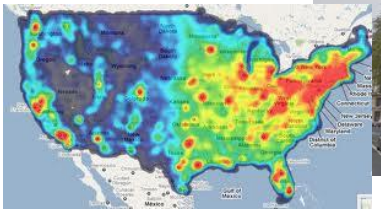
Perspectives of data







At every level of detail, information reveals insights about the risk.

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Property

Locations

+ Add new item | ✓ Save changes | ⊘ Cancel changes

Location ID	Description	Street	Town	County	Country	PostCode	Construction	Occupation
320	Prop1	5th Street	Townville	Stateville	United Countries	A12 B	Flammable	Steel Mills
321	Prop2	9th Avenue	Townville	Stateville	United Countries	A15 D	Normal	Semiconductor Manufacturers
322	Prop1	5th Street	Townville	Stateville	United Countries	A12 B	Flammable	Steel Mills
323	Prop2	9th Avenue	Townville	Stateville	United Countries	A15 D	Normal	Semiconductor Manufacturers

Fire Ratings

Location ID	Description	Exposure	Technical Rate	Adjusted Rate	LayerExposure	Loss Curve ID	FGU Premium	ILF %	Layer Premium	
320	Prop1	176,481,500	0.2250 %	0.2250 %	10,000,000	2	397,083	51.0120 %	202,563	Edit
321	Prop2	382,851,200	0.2250 %	0.1000 %	10,000,000	2	382,851	37.6710 %	144,227	Edit
322	Prop1	176,481,500	0.2250 %	0.2250 %	10,000,000	2	397,083	51.0120 %	202,563	Edit
323	Prop2	382,851,200	0.2250 %	0.2250 %	10,000,000	2	861,415	37.6710 %	324,511	Edit

- Granular data leads to granular rating
- Can now see drivers of Fire AOP and Cat rating
- Rate change monitoring – pick up on data changes (e.g. was one property, now many)

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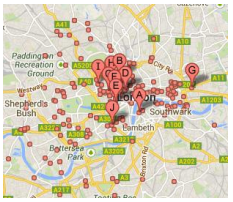
Property



- Tools would now have pricing dashboard
- Premium split by peril, sum of calculated risk level rating
- Underwriter has access to portfolio modelled AAL and 1-in-250 at point of underwriting, split by peril
- How risks aggregate for XOL and Primary risks are now an issue – if data representation changes
- Can see rate change for each layer, split by change in limits and exposure, and pure rate change
- A number of companies now have platform not based in Excel
- More sophisticated – have impact on portfolio of this account (marginal impact)

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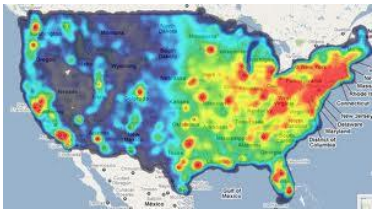
Portfolio Level



- Frequent underwriter meetings discussing aggregate exposure by peak peril area
- Have discussion of in force book relative to risk limits
- Capital model updating SCR in light of exposure changes
- Have insight into overlapping exposures for other classes
- Marginal Impact analysis – done for upcoming renewals based on modelled aggregate (return on marginal impact)

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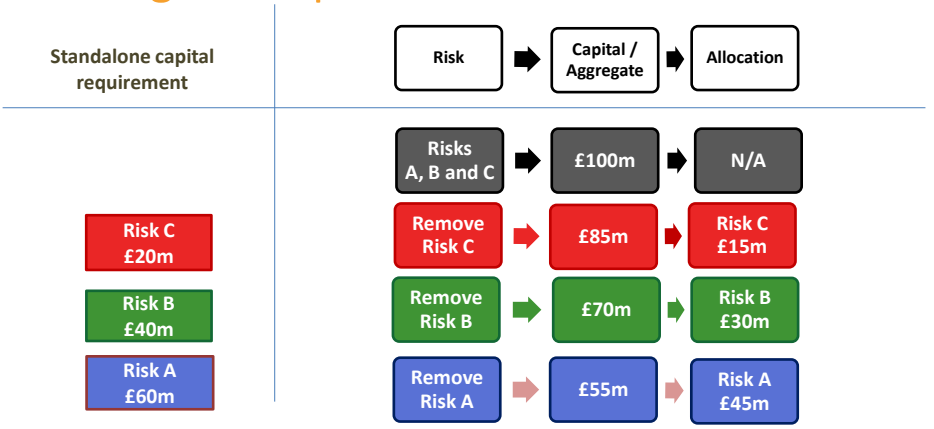
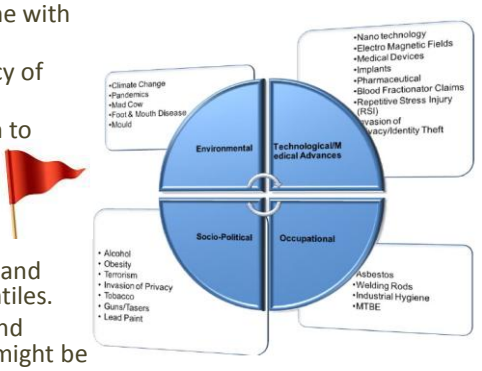
Marginal Impact



- Metrics to look at:
  - Return on marginal impact
  - (1 – AOP Loss ratio) / Marginal impact
- This model works well for renewal books.
- For new business more challenging as have to add risk to portfolio model

Casualty Lines

- Risk level - Granular information allow rating based on schedule breakdown by operations (and exposure).
- Portfolio level - can identify emerging risks and risk limits for emerging risks in line with risk appetite
- Reverse stress testing to test adequacy of portfolio capital requirement
- At pricing level, use risk flag approach to identify exposures to emerging risks.
- Dashboard - For each policy can calculate and show exposure or limits to peril
- Aggregate exposure at portfolio level and investigate accumulations and percentiles.
- Economic links should be identified and modelled with time series. Inflation might be a big issue.



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What about other classes? Granular information

Class of Business	Rating sophistication
Binders / delegated	Move from account level burning cost to detailed exposure and loss information (personal lines level)
Financial Institutions	Detailed data feeds – of rateable assets split by retail and investment banking. Weighted rating factor of turnover by operation.
Supply chain BI	Detailed information on operations by geographical (political risk) as well as industry concentration. Details of upstream and downstream suppliers at account and **portfolio** level.
Commercial D&O	Credit scoring models (insolvency), share price option volatility (class actions), accounting basis changes and operations exposed to regulatory risks. Can even run a director health check!

- The list goes on…as long as I understand the perils, I can find objective information that can help describe and set relativities between accounts for those factors.
- Do one-way, two-way and GLM analysis on premiums a year after implementation to investigate correlations and cross terms.

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Need the right platform

Need a 3 tier platform for data flow between pricing models and portfolio data:

Interface:
- **record pricing information**
- **display benchmarks and portfolio summaries**

Business Logic:
- **Read data AAL and accumulations from exposure management tables**
- **Transform data aggregations and groupings for accumulation reports**
- **Fetch information on similar risks**
- **Produce referral or review lists**

Data store:
- **Store quote and pricing information**
- **Retrieve portfolio information**

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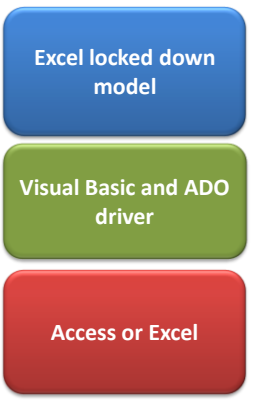
Excel data model

Excel not the best platform, although can make work:
- Excel should only be the interface and not store multiple versions of data.
- Should have ability to generate unique references and to link to portfolio data on set of unique criteria.
- Visual basic and ADO commands can link to database tables using unique references



Difficulties:
- Version control
- Duplicate database entries and with Access even duplicate databases
- Database size gets big very quickly, especially if storing quotes NTU and multiple years of data
- Data integrity key if using for decision making
- Limits to what can be done before *"Excel has stopped working. Microsoft is looking for a solution"*

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Web interfaced SQL model

Web based pricing model:

- Underwriters can log into server anywhere, even on their iPAD.
- Interface decoupled from other layers – used for data capture and reporting.
- Coded business layer can have complex operations and reports and always have access to up to date rating tables
- Strong link between exposure management, rating and portfolio tables – SQL based

Difficulties:

- Upfront investment and cost
- Can be inflexible depending on design
- Large amount of data entry not great in html interface – making experience rating hard to include

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Aim – Underwriting at heart of process

Underwriters

- Rating of risks is locked down, with no ability to overwrite technical price calculation
- Rating manual will always use latest parameters and framework
- Restricted quotes on risks outside underwriter authority or rating manual, with a robust referral process to insurer
- Contains a complete history of current and renewal quotes
- Accessible from any web-enabled location

Chief Underwriter

- Real-time dashboards of risks quoted and bound and of exposure
- Complete control over referrals outside of underwriting mandates
- Aggregation analysis across all classes or underwriters

Chief Actuary

- Complete and easy control over rating framework and parameters
- Instantly update rating frameworks and parameters for all underwriters
- Automatic analysis of technical price to written price, and of rate change on renewals
- Complete analysis of quotes bound and quotes N.T.U.
- All data in one place, in the same format, for further interrogation

Chief Finance Officer

- Real time view of premiums written, premiums bound, and outstanding quotes

Head of IT

- User security through Microsoft ASP platform
- Robust .net and SQL architecture

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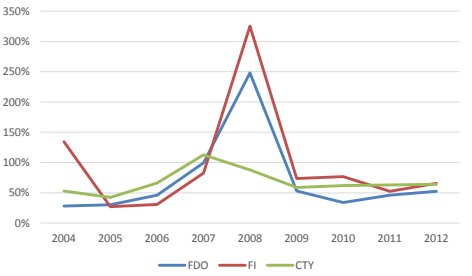
Economic links to pricing

Rating factors dependant on economic cycles:

- Can impact multiple classes
- Impacts on certain industries more pronounced and more exposed to either frequency or severity losses
- Some classes have little or no claims in the good times, but completely different story during recession



Approach:

- Actual rating factor linked to economic indicator
- Inflationary loadings vary using ESG
- Have risk limits vary – need view of in force book

Conclusions

- Many areas where technology is improving the sophistication in commercial lines world
- Conventional methods not always the most useful and does not give you the full picture
- Companies making the investment will reap the rewards in terms of capital and pricing

Questions

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