GIRO Conference and Exhibition 2012
Juggling uncertainty: the actuary’s part to play
Growth markets, their exposure to catastrophe risk and challenges to modelling

Dr. Sebastian Rath
Insurance growth markets in a globalising world call for both identification and modelling of new risks.
Growth markets, their exposure to catastrophe risk and challenges to modelling

Agenda

2011 loss experience

- Nat Cat (95%)
- Man Made (2.1%)
- Aviation (0.6%)
- Maritime (1.6%)
- Rail (0%)
- Mining (0.3%)
- Collapse (0%)
- Misc (0.4%)

2011 Insured Loss USD 115,814M
Growth markets, their exposure to catastrophe risk and challenges to modelling

Management challenges

Key challenges for the next years are

- Trends: drivers, opportunity and cost
- Growth: change, governance
- Implications: ratings, investor community

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Management challenges
1. Models responding to trends

The never ending challenge of catching-up with reality

Globalisation Effect
Both, the pace of demographic trends in the emerging markets and the continuing trend to further integrated global markets will lead to an increasing gap in un-modelled risks.

Those risks are regional, with distinct risk profiles. They will remain diverse until more unified insurance products will have established.
Management challenges
2. Models responding to growth and change

Growth and change are both challenges. In emerging markets they require quantification of new, evolving risks. The Model Governance and the Model Change Policy, face challenges:

- **Governance & Process**
  - process management around modelling and change
  - clarity and transparency

- **Model change & Sources**
  - well defined, clear rationale
  - clear identification

- **Type of Change & SCR impact**
  - differentiation
  - materiality of changes

- **Communication & Action**
  - Communication at Risk Carrier, Regulator, Rating
  - Validation and Testing, RI purchase, capital impact
Management challenges
2. Models responding to growth and change

Model changes may affect, amongst others, the overall level of risk, capital requirements and a risk carrier’s rating. Aspects that rating agencies use are:

**QUANTITATIVE**
- Exposure
- Premium (tax, expenses)
- EP curves (gross, net)
- Tail losses at various return periods

**QUALITATIVE**
- Competitive position
- ERM
- Operating performance (capitalization)
- Financial flexibility (liquidity)

**GOVERNANCE**
- Understanding modelling & change
- Risk carriers responsible for adequacy of adjustments to model results.

**Emerging Market Risk**
Recognized as significant and most challenging aspect of tail risk modelling as catastrophe event may cause shocks

**Katrina 2005** *RI sector downgraded as a whole*
**Thailand 2011** *Selective downgrades of over-exposed carriers*
Model changes may affect, amongst others, the overall level of risk, capital requirements and a risk carrier’s rating. Aspects that rating agencies use for catastrophe risk specifically are:

- **MODEL USE**: Rating agencies are not prescriptive e.g. choice of cat-models
- **RATING PROCESS**: Multiple models are assessed in cat-survey processes stress-testing PML estimates against latest view of risk
- **CAPITAL ADEQUACY REQUIREMENTS**: Loaded for carriers that are not fully incorporating latest views on PML calculations

**Example**

- 2011 US hurricane model upgrades
- Some PML calculations loaded by 25-50%
Management challenges
3. Models responding to trends

Capital modelling for emerging market risks will reflect the balance of opportunities, risk and cost.

- risk is transient
- so are opportunities and modelling requirements
- leveraging strategic advantages and competing regulatory regimes
- commercializing market insights and liberalisation
- access new distribution channels or leverage existing ones
- shape global products for the regional demographic trends
Management challenges
3. Implications for models

Capital modelling for emerging market risks will reflect the balance of opportunities, risk and cost.

Megatrends and components of the insurance business model
Management challenges
3. Implications for models

Capital modelling for emerging market risks will reflect the balance of opportunities, risk and cost.

Emerging Markets

Opportunity  Attract investors with transparent profit numbers, explained diversification, risk adjusted returns, cash generation and dividends. Demonstrate future relevance.

Risk  Higher cost of capital. Uncertain risk profile in new market.

POPULATION
Insurance demand in cities increases
• Business models aging faster than customer preferences
• Commoditized products, competition by price
• Regional diversity of risk profiles

GOVERNANCE
Integration into diverse markets
• Risk of shareholder dissent
• Perception of green-washing
• Loss of talent

TECHNOLOGY
More web based application
• Customer relationship increasingly transactional and commoditized
• Consistency and market presence
Growth markets, their exposure to catastrophe risk and challenges to modelling

Data & Knowledge

Key challenges for the next years are

<table>
<thead>
<tr>
<th>Premium</th>
<th>growth markets, opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk</td>
<td>learning, trends, monitoring</td>
</tr>
<tr>
<td>Modeling</td>
<td>granularity, inherent uncertainty, appropriateness</td>
</tr>
</tbody>
</table>
Data in Growth Markets
1. Premium Growth

Insurance Penetration > Global > GI > 2010

- The choice of new target markets is non-trivial
- Large global risk carriers may afford a strategy to pursue growth in most emerging markets at the same time
- Medium and smaller risk carriers require a more targeted approach

Source: Swiss Re Economic Research & Consulting

Martin Senn, CEO, Zurich Financial Services

*FT, August 27, 2012*

*We are not picking any of the particular countries out, but look for global diversification. We are seeking to expand in the Middle East ..., Asia Pacific and Africa.*
Data in Growth Markets
1. Premium Growth

Premium Growth Trends > Global > GI > 2010-12 > high level

Two key drivers: Financial Crisis & Cat
- Slow growth, high unemployment, lower income
- Natural disasters driving regional real growth in non-life insurance premiums

Impact
- GI premium growth generally weaker than Life with the exception of cat affected areas
- Low or negative real premium growth in a majority of countries
- Constrained demand for workers’ compensation; Strong competition for motor insurance

The future global insurance market is more strategic, maintaining and modelling current and future trends.
Data in Growth Markets
1. Premium Growth

Premium Growth Trends > Global > GI > 2010-12 > granular

- **Chile (post cat):** 14.7% growth post 27/02/2010 earthquake for earthquake and motor insurances.
- **EU (recession):** Driven by macro-economy. Slow growth for commercial business.
  - **Ireland:** Capacity withdrawn, e.g. professional indemnity insurance.
  - **Czech Republic:** increased competition in motor market.
  - **Slovak market:** Declining premium in motor and property insurance; Motor in a long-term adverse situation.
  - **Slovenian market:** increases in assistance insurance and credit insurance.

Risk carriers of all sizes will assess underwriting strategy more frequently using information at macro and regional levels.
A new dimension for cat-risk models

Data in Growth Markets

2. We keep learning about risk

Thai floods 2011

USD 12 billion loss
(USD 10 billion more expensive in insured and economic losses than any other flood event)

70% of insured losses written outside Thailand

Global impact

Supply chain models

A new dimension for cat-risk models

The traditional approach of modelling local exposure, local hazard and local vulnerability to assess the localized financial risk requires a new dimension in a globalised world: the global connectivity of local business and the impact of its interruption.
Data in Growth Markets
3. Inherent uncertainty

Premium Growth Trends > EM?


Annual Real Gross Premium Growth (%) [GI]

- Iceland
- Malaysia
- Estonia
- Korea
- Chile
- Singapore
- Hong Kong
- Ireland
- Mexico
- Belgium
- Portugal
- Italy
- Israel
- Slovenia
- Czech Republic
- Slovak Republic
- Japan
- Germany
- Austria
- Spain
- Swedish
- United States
- France
- Switzerland
- Finland
- Australia
- Turkey
- Poland
- Ireland
- Hong Kong
- Singapore
- Chile
- Korea
- Estonia
- Malaysia
- Iceland

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3. Inherent uncertainty

‘Premium/GDP’ > Global (EM) > 2011

- DMs have ratios of about 3%.
- EMs with growth potential as their GDP grows.
Data in Growth Markets
3. Inherent uncertainty

GLR Variation > Global > Property
“Coefficient of Variation of Gross Loss Ratio”

- Property insurance risk in Greece and Mexico does not behave as in other developed markets.
- More volatility in emerging markets (x2).

Emerging Markets: Average = 48.1%

Developed Markets: Average excl. Greece and Mexico = 22.5%
Data in Growth Markets
3. Inherent uncertainty

GLR Variation > Global > Motor

“Coefficient of Variation of Gross Loss Ratio”

Motor insurance risk in Greece exceeds other developed markets (at pre-2012 crisis levels).
More volatility in emerging markets (x1.5).

Emerging Markets:
Average excl. Greece = 17.8%

Developed Markets:
Average excl. Greece = 11.5%
Data in Growth Markets
3. Inherent uncertainty

Key messages

Level of Risk & Volatility
• Notably higher in Emerging Markets

Sources
• Risk is more than we capture in modelled factors

Requirements
• Capture the complete picture of risk requires regional SWOT analysis
Growth markets, their exposure to catastrophe risk and challenges to modelling

Key challenges for the next years are

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td>risk appetite, performance</td>
</tr>
<tr>
<td>Capital Model</td>
<td>controlling risk &amp; growth</td>
</tr>
<tr>
<td>Communication</td>
<td>use test &amp; ORSA</td>
</tr>
</tbody>
</table>

Methods & Assumptions

- **Data & Knowledge**
- **Methods & Assumptions**
- **Decisions & Strategy**
- **Management Challenges**
Data in Growth Markets
1. Risk appetite and performance

Approach

- Risk Appetite
  - Market Growth Potential
  - Market Screening and U/W volatility
  - Regional SWOT

Internal complexities
External complexities
Nat Cat Effect
Data in Growth Markets
1. Risk appetite and performance

Underwriting Volatility > Americas
“Coefficient of Variation of Loss Ratio”

Performance screening requires detailed information by LoB together with frequent, reliable and consistent updates.
Data in Growth Markets
1. Risk appetite and performance

Market Potential > Americas

“GDP growth” for EM

Performance forecasts require detailed data together with hindcast assessments increasing reliability and consistency.
Volatility in Market Risk > Global

**INTERNAL CONSTRAINTS**
- Legacy models constrain rapid responses
- Limited research, forecasting & analytics
- Unexpected level of volatility undermines board level confidence.

**EXTERNAL COMPLEXITY**
- Unique set of challenges: Interplay of regulatory uncertainty with market risk, liquidity risk, credit and counterparty risk.

Volatility in times of a perfect storm …

The clash of sovereign debt crisis and regulatory uncertainty drives volatility for risk carriers.

Additional pressure arises from perceptual and reputational risk.

Impact on cost base and capital investment decisions.
Regional SWOT > APAC > Vietnam, Thailand, South Korea, Taiwan

**STRENGTH**
- GI penetration rising
- Market patently open to foreign multi-nationals with access to global capital
- Developed regulatory regime
- GI market well diversified away from motor insurance

**OPPORTUNITIES**
- GI market emerging from period in which most lines contracted
- Expected growth in commercial lines as economies expand

**WEAKNESS**
- Number of larger companies are still cartel like companies with close links to governments
- Investment strategies complex (lack of large and liquid markets for suitably long-dated fixed income securities)
- Local GI carriers lack competition, scale and pricing power.

**THREATS**
- Market volatility
- Regulation and investment restrictions
- Growth potential constrained by GDP growth rate
- Substantive Nat-Cat Risk
- Political risk with potential to limit economic growth

**Development trends (2008-2015)**

Premium income increasing in small markets, e.g. in Vietnam more than Thailand.

Market penetration for medium sized markets increasing, e.g. more for South Korea than Taiwan.
Nat Cat Effect > Risks

• Climate change may substantially increase insured losses.
• It may threaten the investment performance on which risk carriers rely to meet liabilities.

Nat Cat Effect > Opportunities

• Protecting crop yields.
• Low correlation products.
• GDP growth drives demand for LoBs such as property, health and business interruption.
1. Risk appetite and performance

Nat Cat Effect > Focus on risk aggregation for un-modelled risk

Urban aggregation by size class and potential risk of multiple natural disasters – 2025

- No hazard
- Hazard not in top 3 deciles
- 1 Hazard in top 3 deciles
- 2 Hazard in top 3 deciles
- 3+ Hazard in top 3 deciles

City population:
- 750k-1M
- 1-5M
- 5-10M
- +10M

Schematic representation based on: United Nations Department of Economic and Social Affairs, 2011
Data in Growth Markets
1. Risk appetite and performance

Nat Cat Effect > Focus on risk aggregation for un-modelled risk

Top 10 Emerging Market Flood Hotspots - today

- Mexico
- Brazil
- Argentina
- Russia
- Azerbaijan
- Kazakhstan
- China
- India
- Thailand
- Vietnam

Based on: Swiss Re, 2012
Methods and Assumptions for Growth Markets
2. Controlling Risk and Growth

Macro Economic Risk
- Insurance risk
- Regulation
- Central banking
- Sovereign risk
- Liquidity risk of risk carriers
- Contagion effects of systemic risk
- Counterparty risk
- Monitoring asset bubbles
- Offshore currency trends

Enterprise Risk
- Corporate governance
- Insurance company mgmt.
- Assets valuation under uncertainty
- Value maximization in volatile markets
- International trade & risk mgmt.
- Liquidity & treasury mgmt.
- Hedging enterprise risk
- Capital structure & credit ratings
- Risk management & accounting
- Internal auditing & risk mgmt.
- Accounting & financial fraud
- Fraud detection & internal control

Capital Model
Stress & Shock Tests
Market Environment

EM Risks
ORSA Effect

• More transparency
• Higher degree of comparability
• More awareness around risk identification and monitoring process adequacy
• Frameworks emphasizing actionable risk management processes
• Considerable degree of evidence around risk management performance internally and externally
Growth markets, their exposure to catastrophe risk and challenges to modelling

Decisions & Strategy

Key challenges for the next years are

<table>
<thead>
<tr>
<th>Capital Model</th>
<th>Decision support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Judgment</td>
<td>Execution &amp; simplicity</td>
</tr>
<tr>
<td>Implementation</td>
<td>Target operating model</td>
</tr>
</tbody>
</table>
Complex decision support modelling only informs judgement

- Models, such as Bayesian ones, can inform on the basis of a set of known information and assumed probabilities.
- Reasoning uses propositions whose truth or falsity is yet uncertain. Initial probabilities are updated in the light of new, relevant data.

**OBJECTIVIST**

Probability *objectively* measures the plausibility of propositions.

**SUBJECTIVIST**

Requirements of rationality and coherence are deemed important. Probability corresponds to a *personal belief*.

**Expert Judgement challenges two interpretations of the 'probability' concept**

- Variants of Bayesian probability (objective or subjective) differ in interpretation and construction of the prior probability.
Simplicity enables execution

Market Selection & Model of Entry

Preparation for Market Entry

Implementation

Market Assessment

Acquisition

Internal Capability Assessment

Alliance / Joint Venture

Market Selection & Positioning

“Greenfield”

Assessment of Entry options

• Identify the market
• Develop sourcing opportunities
• Decide form of investment & control
• Consider operating model from tax perspective
• Identify & approach potential targets & partners
• Building & validating business plan
• Location & site assessment
### Decision and Strategy

#### 3. Target Operating Model

**Target operating model flexibility supports implementation**

<table>
<thead>
<tr>
<th>Business unit decision support</th>
<th>Shared services</th>
<th>Centres of excellence</th>
<th>Group wide projects</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-located business partners teams up-skilled to strategic decision support</td>
<td>Data processing</td>
<td>Reporting &amp; planning</td>
<td>Capital &amp; Risk</td>
<td>Risk appetite</td>
</tr>
<tr>
<td></td>
<td>Transaction processing, GL and consolidation</td>
<td>Oversight of internal and external reporting</td>
<td>Treasury and capital management</td>
<td>Risk framework</td>
</tr>
<tr>
<td></td>
<td>Data modelling</td>
<td>Technical accounting and actuarial</td>
<td>Financial risk management (including WP governance)</td>
<td>Monitoring and reporting</td>
</tr>
<tr>
<td></td>
<td>Financial system support</td>
<td>Planning and forecasting</td>
<td>Tax</td>
<td></td>
</tr>
<tr>
<td>Business planning, performance management for Bus and strategic/decision support activities</td>
<td>All activity up to and including ledger close, basic modelling and preparation of reports</td>
<td>Review, analysis, interpretation and reporting</td>
<td>First line risk and capital activities</td>
<td>Second line risk activities</td>
</tr>
</tbody>
</table>
Questions or comments?

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The views expressed in this presentation are those of the presenter.