



INSTITUT DES  
**ACTUAIRES**

# Panorama des pratiques de provisionnement Non-Vie

## Présentation du Rapport ASTIN

Pierre Miehe, Hervé Odjo

*Congrès des Actuaires,  
17 juin 2016*

# Plan de la présentation

- Protocole du panorama ASTIN des pratiques de provisionnement Non-Vie
- Présentation des résultats du marché français
- France vs Italie et Allemagne
- Présentation des résultats mondiaux
- RBC vs Solvabilité II et futur du provisionnement
- Questions

# Plan de la présentation

- **Protocole du panorama ASTIN des pratiques de provisionnement Non-Vie**
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# Qu'est-ce que l'ASTIN ?




- Première section de l'**Association actuarielle internationale** (AAI), fondée en 1957
- **Objectif**: promouvoir la recherche actuarielle, notamment en assurance non vie.
- **2 000** membres dans près de **50 pays**.
- Publie deux fois par an l'**ASTIN Bulletin**
- Organise chaque année un **colloque international**.
- L'ASTIN, c'est aussi l'assistance aux pays où l'actuariat est en cours de développement (Inde, Croatie, Chili, Zimbabwe, Pologne...)
- L'association finance également la participation aux **congrès internationaux de jeunes chercheurs de ces pays**.

# Protocole

- **Working Party** lancé au 4<sup>ème</sup> trimestre 2015
- **Périmètre**: pays avec un total de primes non-vie >1MUSD
- **Appel à candidats** dans chacun des pays ciblés. 42 nominations par le Comité ASTIN.
- **Questionnaire**: questions fermées. Rempli par les compagnies d'assurance sur base volontaire de janvier à avril 2016.

### ASTIN NLRBP WP - Company Questionnaire



**1. Company information**

Market	<Unfilled>	<b>Notice: Type</b> Multinational: operates on 2 or more continents Regional: operates on several countries National: one of the main players of the market
Type	<Unfilled>	
Size (Written Premium)	<Unfilled>	

**2. Reserving project & data process**

Calculation periodicity	<Unfilled>
Appointed actuary	<Unfilled>
Peer review	<Unfilled>
Data received from IT	<Unfilled>
Reserving software used	<Unfilled>
Workflow, process & doc	<Unfilled>
Resources	<Unfilled>
Resources allocated to data prep	33%
... to running models	33%
... to reporting	34%
Governance	<Please enter any specific governance type in place>

**3. Standard claims: triangle-based methodologies**

Percentage	<Unfilled>	<b>Notice:</b> Main method: one of the methods used to get the best estimate (even if combined with other methods) Peer method: used to check the main methods Information: used for statistical or internal reporting purpose Unused: not calculated or calculated but not taken into account
Loss ratio	<Unfilled>	
Chain ladder	<Unfilled>	
Bornhuetter-Ferguson	<Unfilled>	
Cape Cod	<Unfilled>	
Average cost	<Unfilled>	
De Vylder	<Unfilled>	
Fisher-Lange	<Unfilled>	
GLM	<Unfilled>	
Munich Chain Ladder	<Unfilled>	
Other	<Please list other used methods>	

**Deterministic**

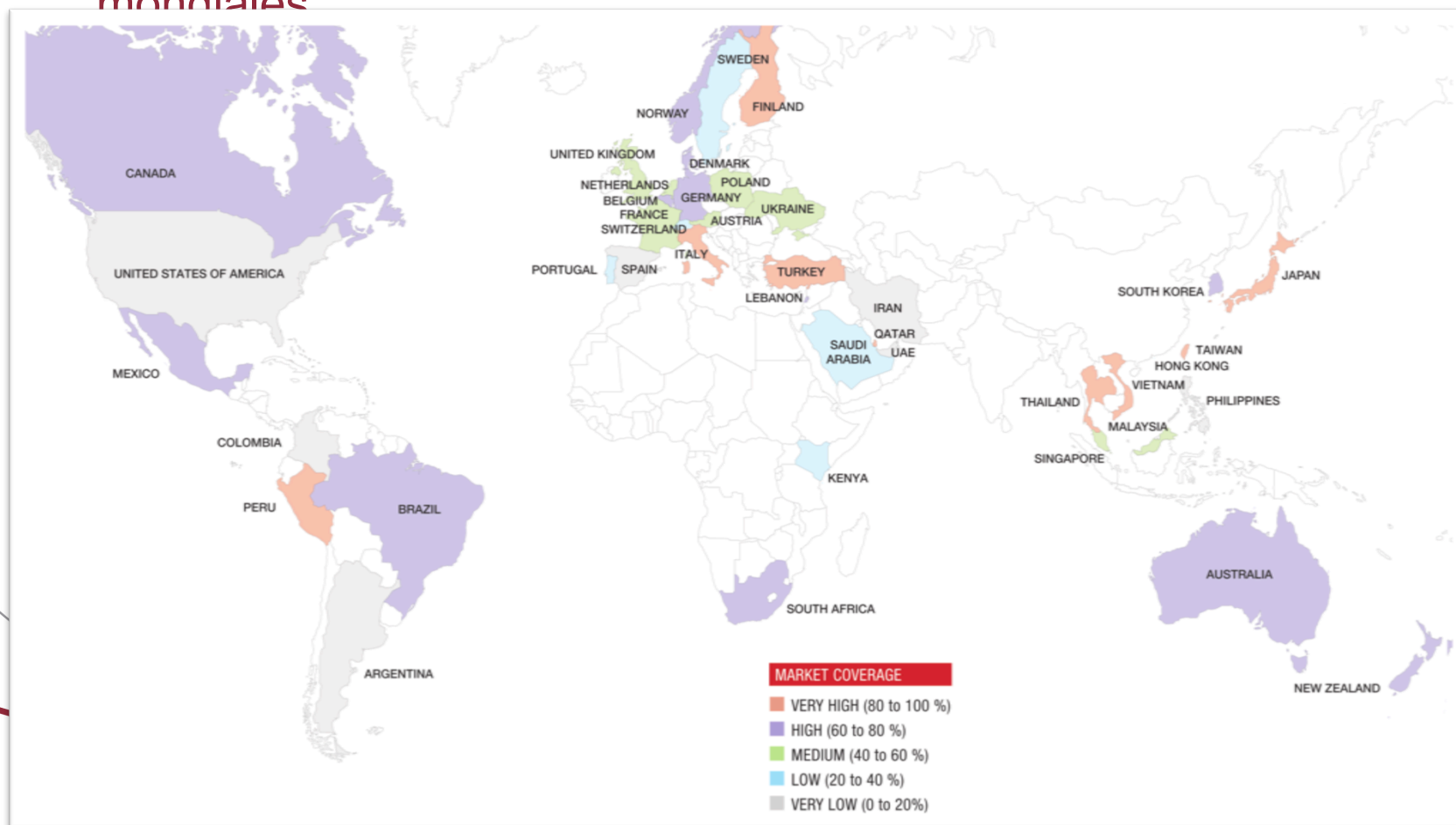
Market-based std dev	<Unfilled>	<b>Notice:</b> Main method: method used to calculate the distribution/VaR/other risk measure (even if combined with other methods) Peer method: used to check the main methods Information: used for statistical or internal reporting purpose Unused: not calculated or calculated but not taken into account
Internal calibration	<Unfilled>	
Mack	<Unfilled>	
Merz & Wüthrich	<Unfilled>	
GLM	<Unfilled>	
Bootstrap / CL	<Unfilled>	
Bootstrap / BF	<Unfilled>	
RJMCMC	<Unfilled>	
Other	<Please list other used methods>	
CoV: favoured method	<Unfilled>	

**Stochastic**

**4. Standard claims: individual claims-based methodologies**

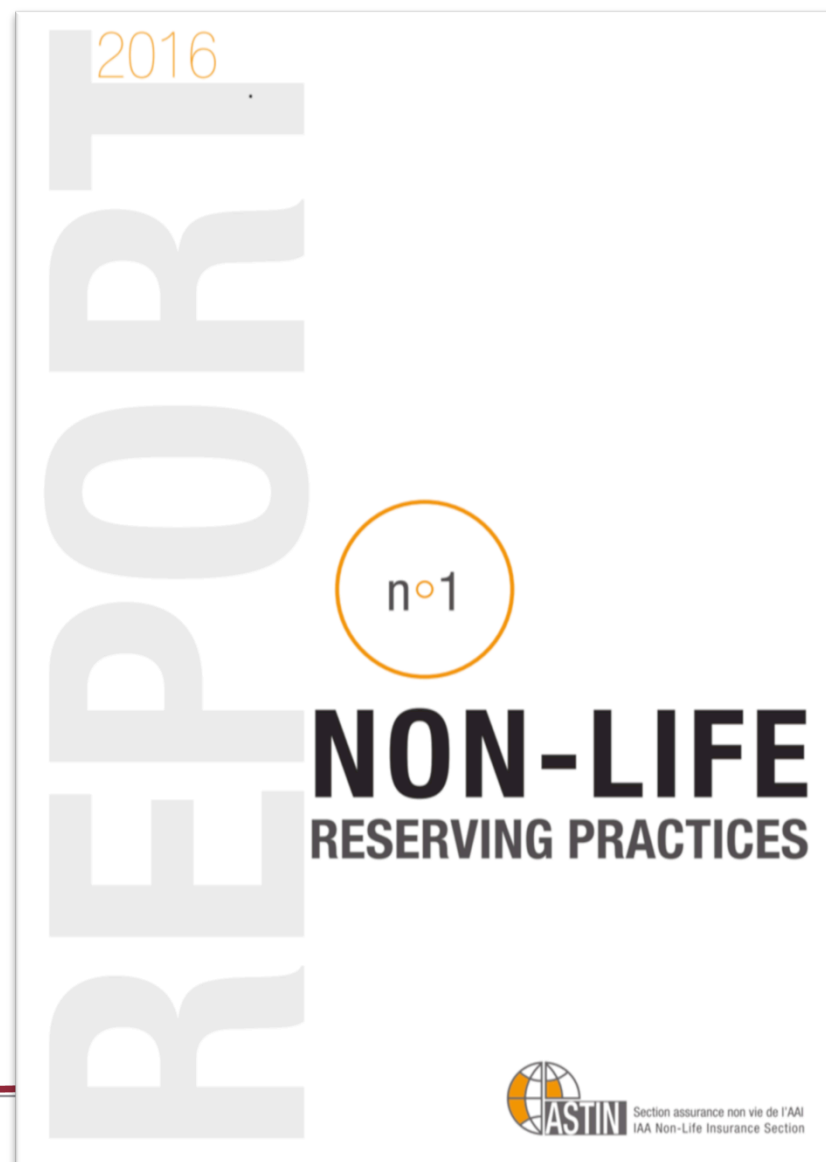
# Protocole (2)

- 42 pays participants, représentant 87% des primes non-vie mondiales



# Protocole (3): le rapport

- **100** pages détaillant les résultats du projet:
  - Protocole
  - Résultats mondiaux
  - **39** rapports pays
  - Sections sur Solvabilité II, US Gaap/RBC et futur du provisionnement
- Consultable sur le site de l'ASTIN





# Plan de la présentation

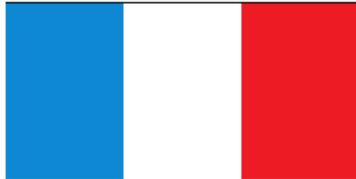
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# France

EUROPE

# FRANCE

Full member association



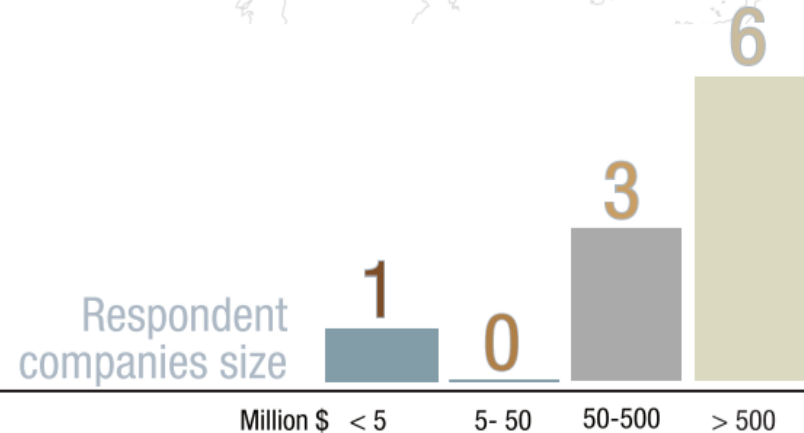
Population: 66.1 million  
Insurance premiums: MUSD 270,520  
Non Life premiums: MUSD 97,759  
NL premium/capita: USD 1,479

Local GAAP:  Discounting  Appointed/signing actuary

Respondents market share: █ █ █ █ █

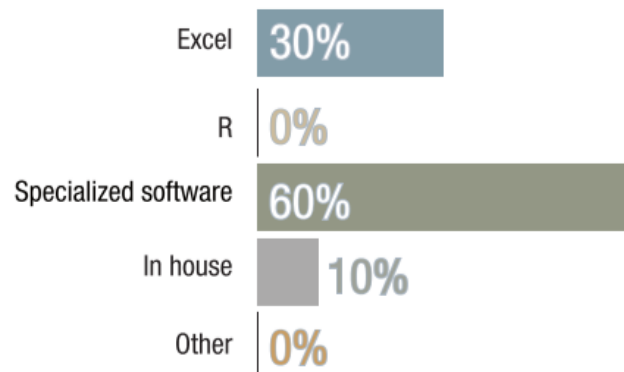


Country report by  
Hervé ODJO  
herve.odjo@odjo-actuaire-conseil.com

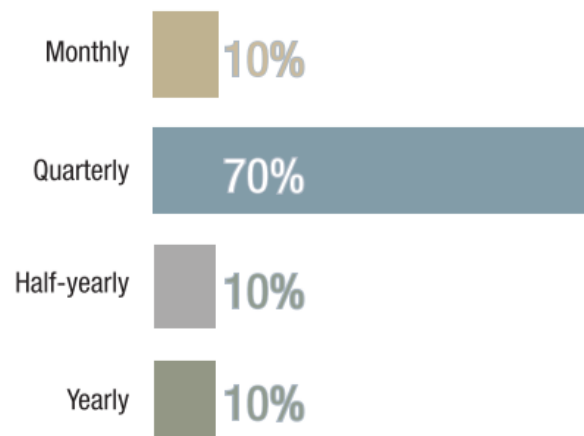


# France (2)

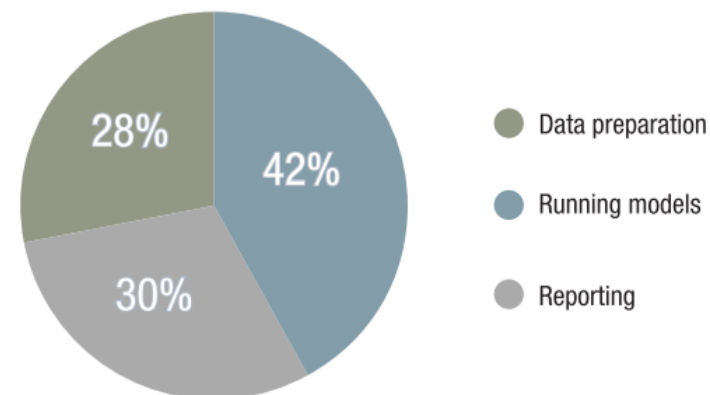
## Reserving tool



## Reserving exercise periodicity



## Resources split



# France (3)

## 1. Standard claims: triangle-based technologies

	Main method	Peer method	Informational	Unused	
DETERMINISTIC	Percentage	10%	0%	10%	80%
	Loss ratio	50%	20%	10%	20%
	Chain ladder	100%	0%	0%	0%
	Bornhuetter-Ferguson	60%	0%	10%	30%
	Cape Cod	10%	0%	0%	90%
	Average cost	80%	10%	0%	10%
	De Vylder	10%	0%	0%	90%
	Fisher-Lange	10%	0%	10%	80%
	GLM	0%	10%	0%	90%
	Munich Chain Ladder	0%	0%	0%	100%
	Market-based std dev	0%	10%	0%	90%
STOCHASTIC	Internal calibration	20%	0%	10%	70%
	Mack	30%	20%	0%	50%
	Merz & Wüthrich	30%	0%	20%	50%
	GLM	0%	10%	0%	90%
	Bootstrap / CL	30%	20%	10%	40%
	Bootstrap / BF	30%	0%	0%	70%
	RJMCMC	0%	10%	0%	90%

## 2. Standard claims: individual claims-based technologies

	Main method	Peer method	Informational	Unused
Percentage	0%	10%	0%	90%
ICR (Antonio-Plat)	0%	0%	0%	100%
ICR (Chalnot-Gremillet)	0%	0%	0%	100%
ICR (other)	0%	0%	10%	90%

# France (4)

## 3. Other claims

Annuities	Deterministic math. reserves	80%	N/A	20%	Other modalities	0%
Asbestos	N/A	67%	Survival Ratio	11%	Other modalities	22%
Disability/workers comp.	N/A	70%	Experience tables	20%	Other modalities	10%
Decennial/construction liab.	Regulatory	40%	N/A	30%	Other modalities	30%
Credit	N/A	100%	Regulatory	0%	Other modalities	0%

## 4. Adjustments / misc.

Past inflation	Not treated	67%	Flat assumption	22%	Other modalities	11%
Future inflation	Not treated	67%	Flat assumption	33%	Other modalities	0%
Discounting	Dvt patterns-based	56%	Not treated	33%	Other modalities	11%
Discount type	Yield curve	100%	Flat rate	0%	Other modalities	0%
Development patterns	Chain ladder/paid	100%	De Vylder	0%	Other modalities	0%
Diversification effect	Not calculated	50%	Correlation matrix	30%	Other modalities	20%
Large claims	Treated separately	90%	Treated jointly	10%	Other modalities	0%
Reinsurance / retrocession	Claim per claim	50%	Proportional assumption	30%	Other modalities	20%
Subrogations	N/A	30%	Not calculated	20%	Other modalities	50%
Ibnr contract allocation	Not allocated	70%	Split using weights	30%	Other modalities	0%
Equalization reserve (local)	No eq. reserve	70%	Calculated	30%	Other modalities	0%
Risk Margin	Proxy	40%	Projected	30%	Other modalities	30%
Ibnyr and Ibner diff.?	No	60%	Yes	40%	Other modalities	0%

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# Allemagne

EUROPE

# GERMANY

Full member association



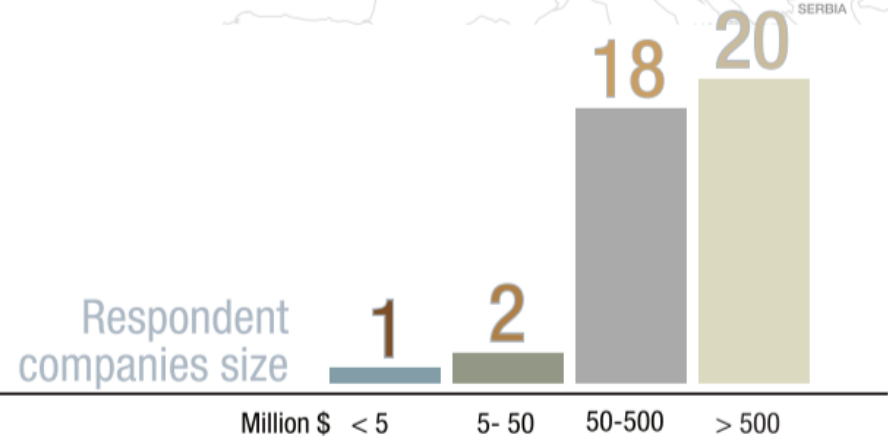
Population: 82.3 million  
 Insurance premiums: MUSD 254,644  
 Non Life premiums: MUSD 136,170  
 NL premium/capita: USD 1,655

Local GAAP:  Discounting  Appointed/signing actuary

Respondents market share: █ █ █ █ █

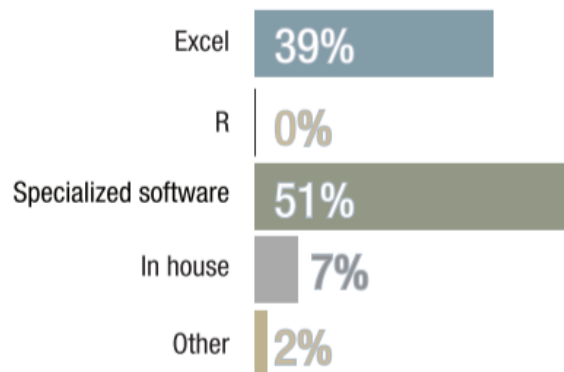


Country report by  
 Michael RADTKE  
[michael.radtke@fh-dortmund.de](mailto:michael.radtke@fh-dortmund.de)

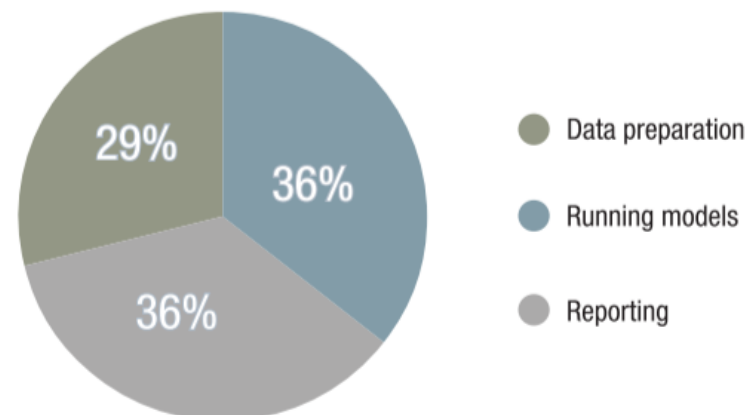


# Allemagne (2)

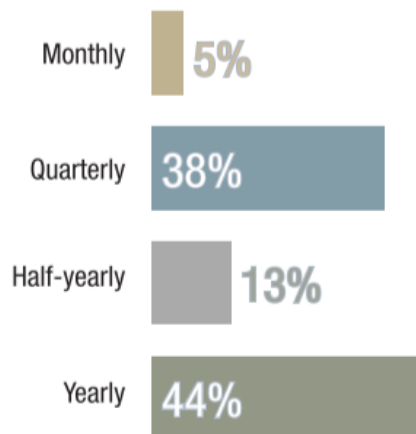
## Reserving tool



## Resources split



## Reserving exercise periodicity





# Allemagne (3)

## 1. Standard claims: triangle-based technologies

	Main method	Peer method	Informational	Unused		
DETERMINISTIC	Percentage	8%	15%	8%	70%	
	Loss ratio	20%	13%	20%	48%	
	Chain ladder	78%	20%	0%	2%	
	Bornhuetter-Ferguson	40%	15%	20%	25%	
	Cape Cod	10%	0%	8%	83%	
	Average cost	5%	10%	10%	75%	
	De Vylder	0%	0%	0%	100%	
	Fisher-Lange	0%	0%	3%	98%	
	GLM	3%	0%	10%	88%	
	Munich Chain Ladder	3%	8%	10%	80%	
	STOCHASTIC	Market-based std dev	13%	8%	10%	70%
		Internal calibration	29%	5%	20%	46%
Mack		38%	13%	30%	20%	
Merz & Wüthrich		20%	3%	8%	70%	
GLM		3%	0%	6%	91%	
Bootstrap / CL		27%	2%	10%	61%	
Bootstrap / BF		3%	0%	5%	93%	
RJMCMC		0%	0%	0%	100%	

## 2. Standard claims: individual claims-based technologies

	Main method	Peer method	Informational	Unused
Percentage	24%	0%	2%	73%
ICR (Antonio-Plat)	0%	3%	0%	98%
ICR (Chalnot-Gremillet)	0%	0%	0%	100%
ICR (other)	0%	0%	0%	100%

# Allemagne (4)

## 3. Other claims

Annuities	Deterministic math. reserves	76%	N/A	17%	Other modalities	7%
Asbestos	N/A	87%	Survival Ratio	7%	Other modalities	7%
Disability/workers comp.	N/A	77%	Market/statutory tables	13%	Other modalities	10%
Decennial/construction liab.	N/A	80%	Other	13%	Other modalities	7%
Credit	N/A	81%	Other	9%	Other modalities	9%

## 4. Adjustments / misc.

Past inflation	Not treated	85%	Flat assumption	8%	Other modalities	8%
Future inflation	Not treated	70%	Year per year	18%	Other modalities	13%
Discounting	Dvt patterns-based	73%	Not treated	12%	Other modalities	15%
Discount type	Yield curve	95%	Flat rate	5%	Other modalities	0%
Development patterns	Chain ladder/paid	78%	Other	23%	Other modalities	0%
Diversification effect	Not calculated	53%	Correlation matrix	38%	Other modalities	10%
Large claims	Treated jointly	63%	Treated separately	33%	Other modalities	5%
Reinsurance / retrocession	Projection of net triangles	29%	Proportional assumption	27%	Other modalities	44%
Subrogations	Not calculated	50%	N/A	15%	Other modalities	35%
Ibnr contract allocation	Not allocated	76%	Split using weights	18%	Other modalities	5%
Equalization reserve (local)	Calculated	51%	No eq. reserve	49%	Other modalities	0%
Risk Margin	Projected	51%	Not calculated	24%	Other modalities	24%
Ibnyr and Ibner diff.?	No	98%	Yes	3%	Other modalities	0%

# Italie

## EUROPE

# ITALY

### Full member association



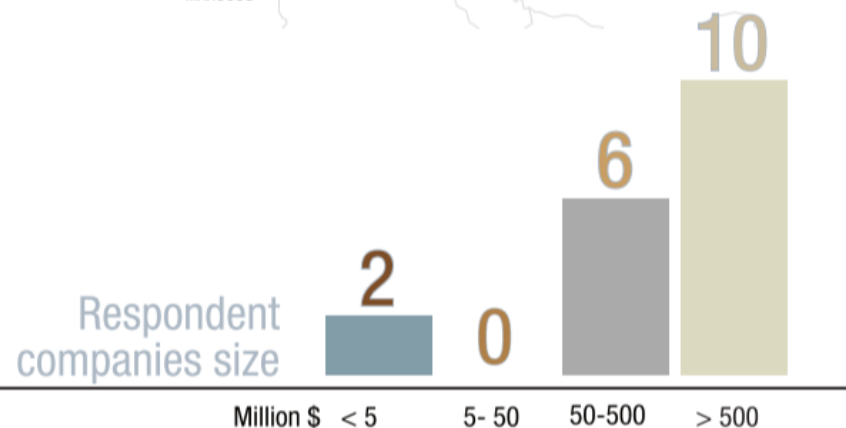
Population: 60 million  
Insurance premiums: MUSD 194,735  
Non Life premiums: MUSD 49,443  
NL premium/capita: USD 824

Local GAAP:  Discounting  Appointed/signing actuary

Respondents market share:

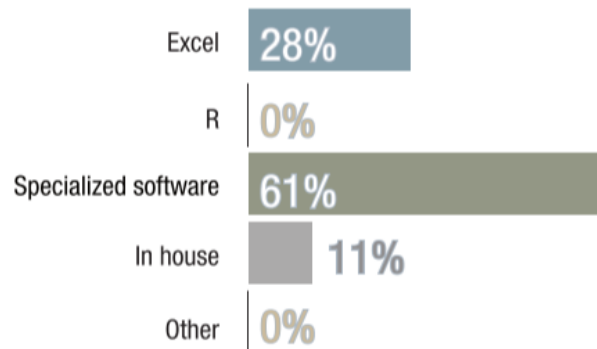


Country report by  
Rocco CERCHIARA  
cerchiara@unical.it

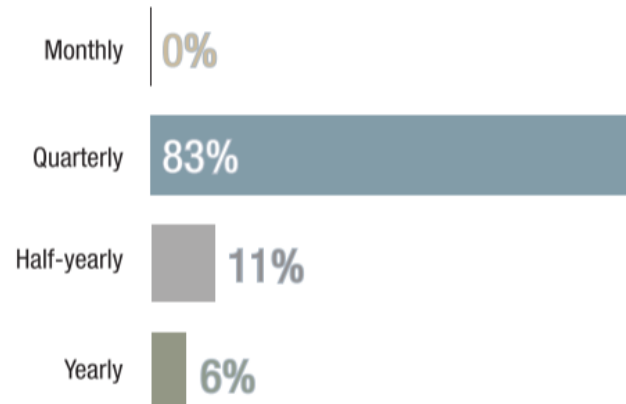


# Italie (2)

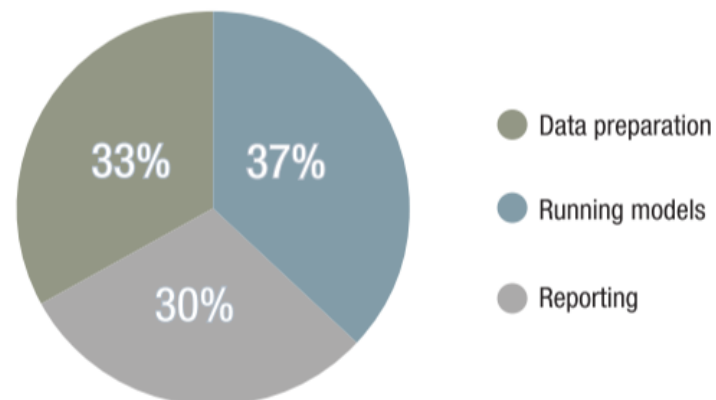
## Reserving tool



## Reserving exercise periodicity



## Resources split



# Italie (3)

## 1. Standard claims: triangle-based technologies

	Main method	Peer method	Informational	Unused		
DETERMINISTIC	Percentage	13%	13%	6%	69%	
	Loss ratio	25%	19%	38%	19%	
	Chain ladder	94%	6%	0%	0%	
	Bornhuetter-Ferguson	47%	24%	24%	6%	
	Cape Cod	0%	13%	0%	87%	
	Average cost	20%	20%	33%	27%	
	De Vylder	0%	0%	0%	100%	
	Fisher-Lange	7%	13%	20%	60%	
	GLM	0%	7%	0%	93%	
	Munich Chain Ladder	0%	0%	0%	100%	
	STOCHASTIC	Market-based std dev	7%	0%	7%	87%
		Internal calibration	0%	0%	14%	86%
Mack		41%	12%	12%	35%	
Merz & Wüthrich		20%	20%	7%	53%	
GLM		0%	7%	7%	87%	
Bootstrap / CL		19%	0%	25%	56%	
Bootstrap / BF		0%	7%	7%	87%	
RJMCMC		0%	0%	0%	100%	

## 2. Standard claims: individual claims-based technologies

	Main method	Peer method	Informational	Unused
Percentage	14%	0%	0%	86%
ICR (Antonio-Plat)	0%	0%	0%	100%
ICR (Chalnot-Gremillet)	0%	0%	0%	100%
ICR (other)	0%	0%	0%	100%

# Italie (4)

## 3. Other claims

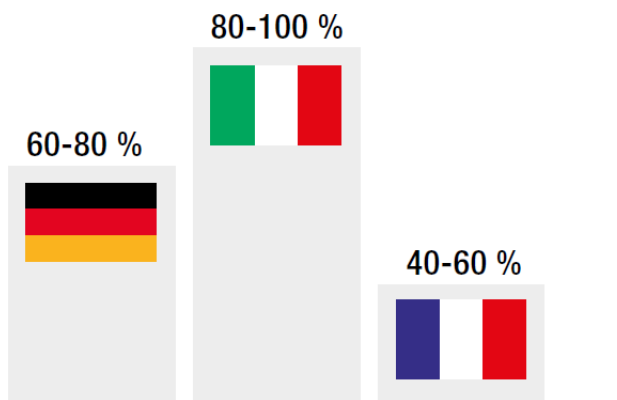
Annuities	N/A	92%	Deterministic math. reserves	8%	Other modalities	0%
Asbestos	N/A	77%	IBNR vs OSL benchmark	15%	Other modalities	8%
Disability/workers comp.	N/A	69%	Market/statutory tables	15%	Other modalities	15%
Decennial/construction liab.	N/A	67%	Regulatory	17%	Other modalities	17%
Credit	N/A	67%	Regulatory	25%	Other modalities	8%

## 4. Adjustments / misc.

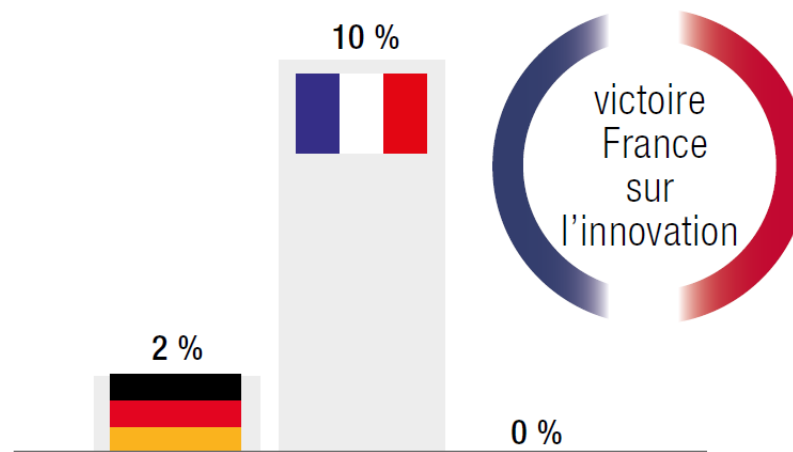
Past inflation	Not treated	60%	Year per year	40%	Other modalities	0%
Future inflation	Not treated	57%	Year per year	29%	Other modalities	14%
Discounting	Dvt patterns-based	59%	Percentage	18%	Other modalities	24%
Discount type	Yield curve	94%	Flat rate	6%	Other modalities	0%
Development patterns	Chain ladder/paid	82%	N/A	12%	Other modalities	6%
Diversification effect	Not calculated	59%	Correlation matrix	35%	Other modalities	6%
Large claims	Treated separately	47%	Treated jointly	41%	Other modalities	12%
Reinsurance / retrocession	Proxy	29%	Proportional assumption	29%	Other modalities	41%
Subrogations	Not calculated	35%	Projection of net triangles	18%	Other modalities	47%
Ibnr contract allocation	Not allocated	33%	Individual claims reserving	33%	Other modalities	33%
Equalization reserve (local)	No eq. reserve	67%	Calculated	27%	Other modalities	7%
Risk Margin	Projected	44%	Proxy	44%	Other modalities	13%
Ibnyr and Ibner diff.?	No	53%	Yes	47%	Other modalities	0%

# Résultats du match

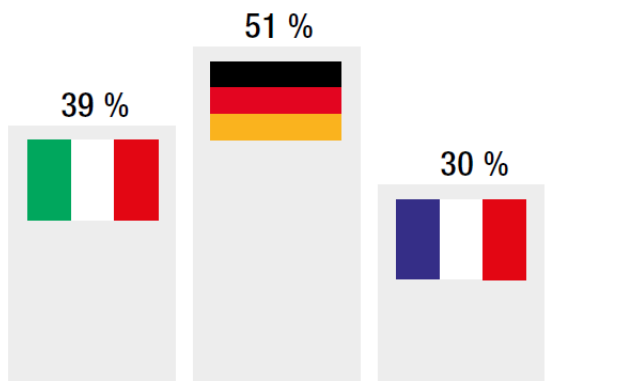
## Représentativité



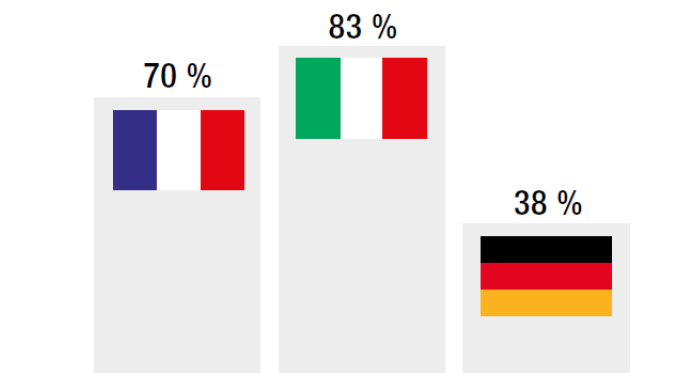
## Utilisation Big Data



## Calcul de la marge de risque avec SCR projection

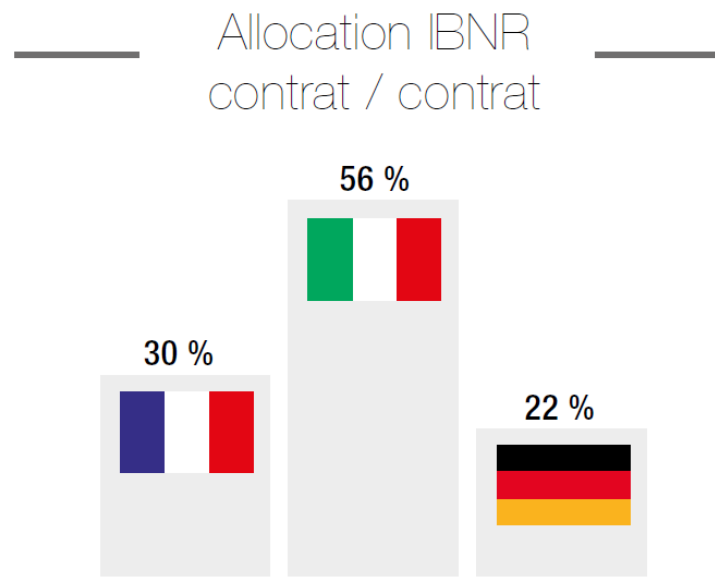


## Périodicité des calculs plus fine

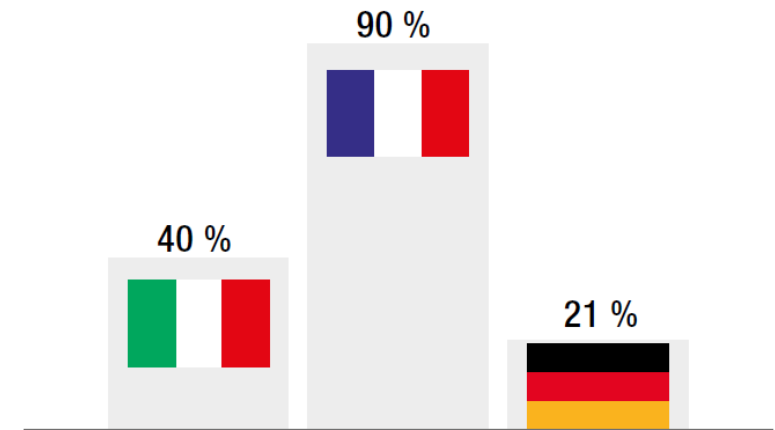


Eclairer les risques, tracer l'avenir

# Résultats du match (2)



Méthodes spécifiques



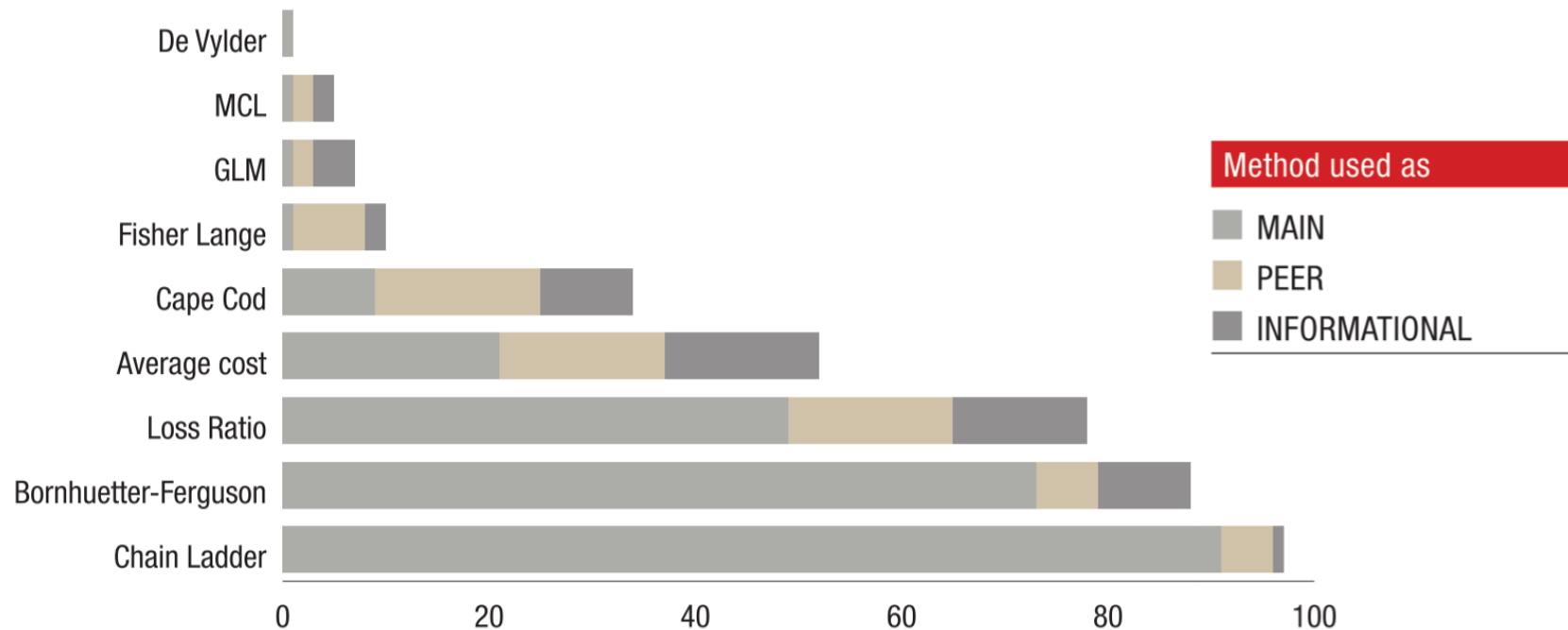
Coûts moyens très utilisés en France (90 %), MCL en Allemagne (21 %), Fisher Lange en Italie 40 %  
En stochastique, seule la France utilise la méthode complexe de RJMCMC (10 %).



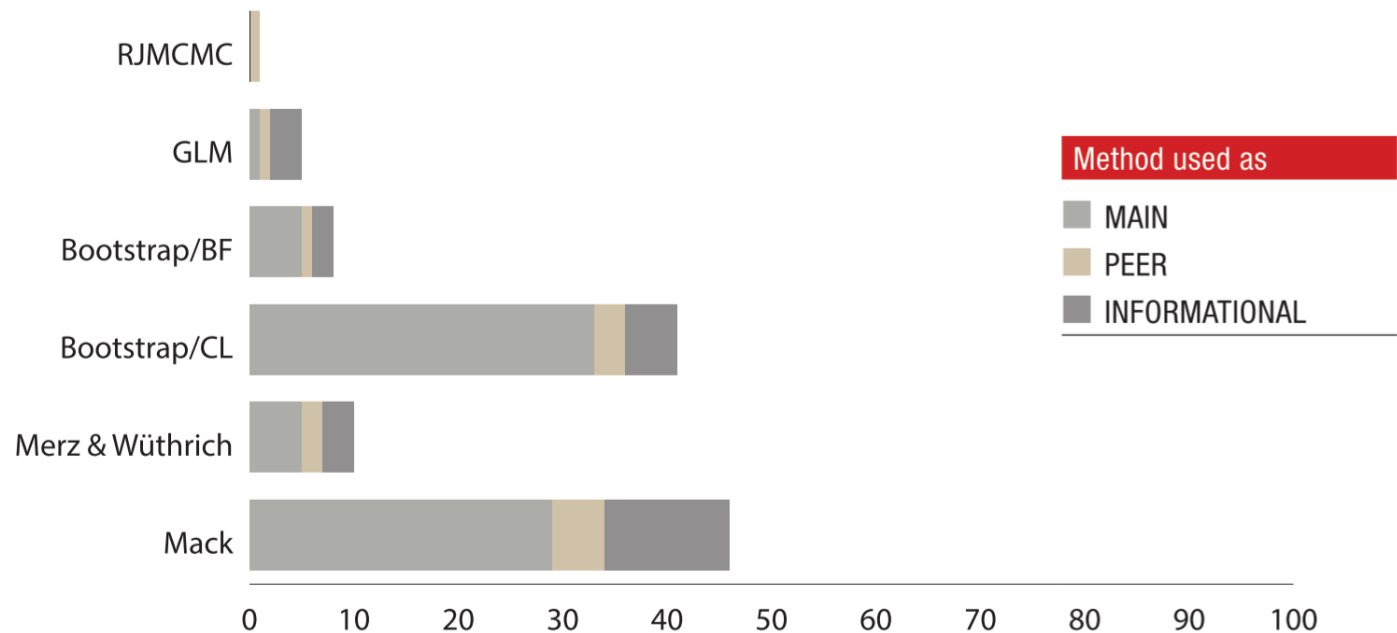
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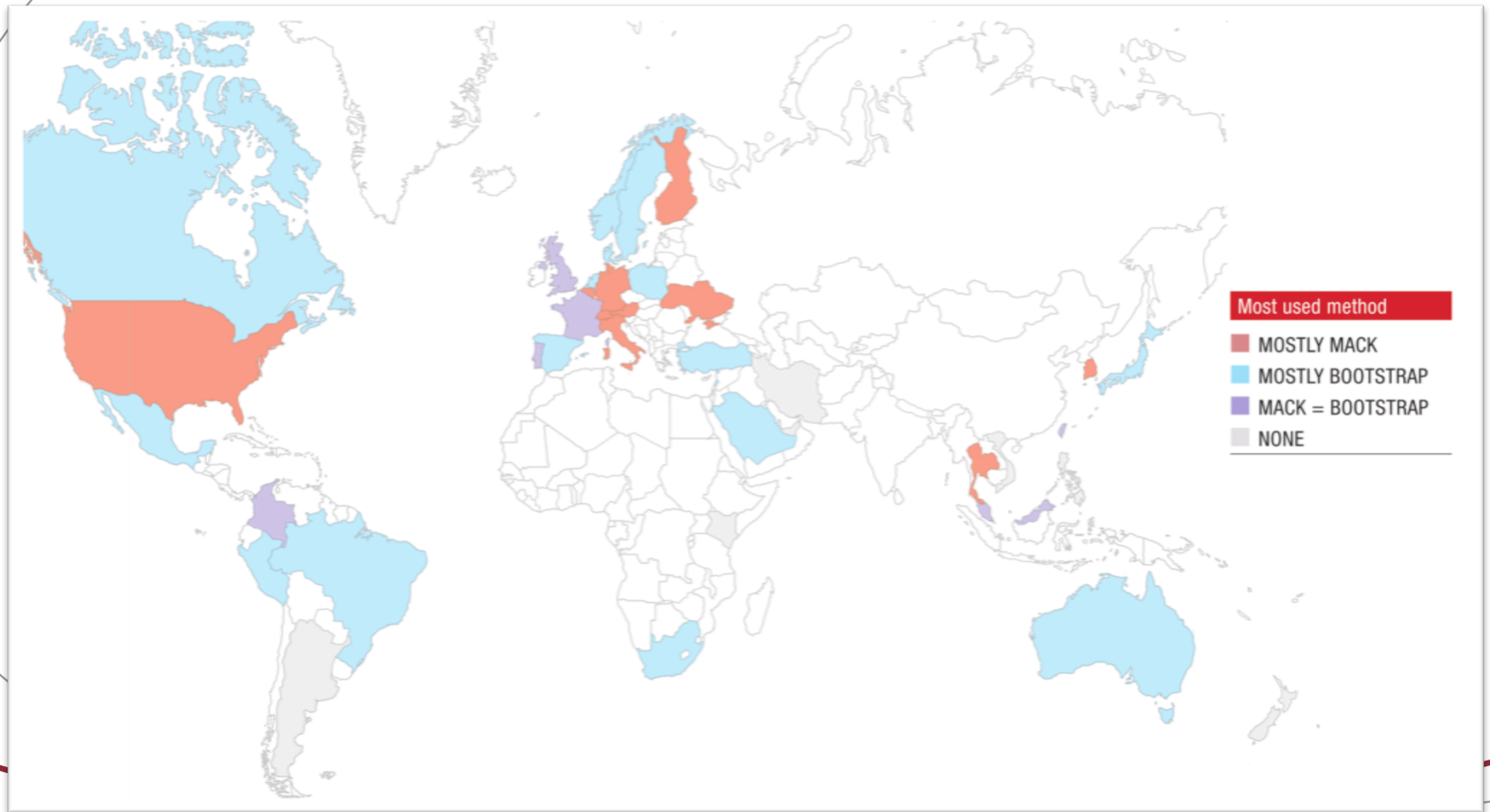
# Principales méthodes déterministes



# Principales méthodes stochastiques

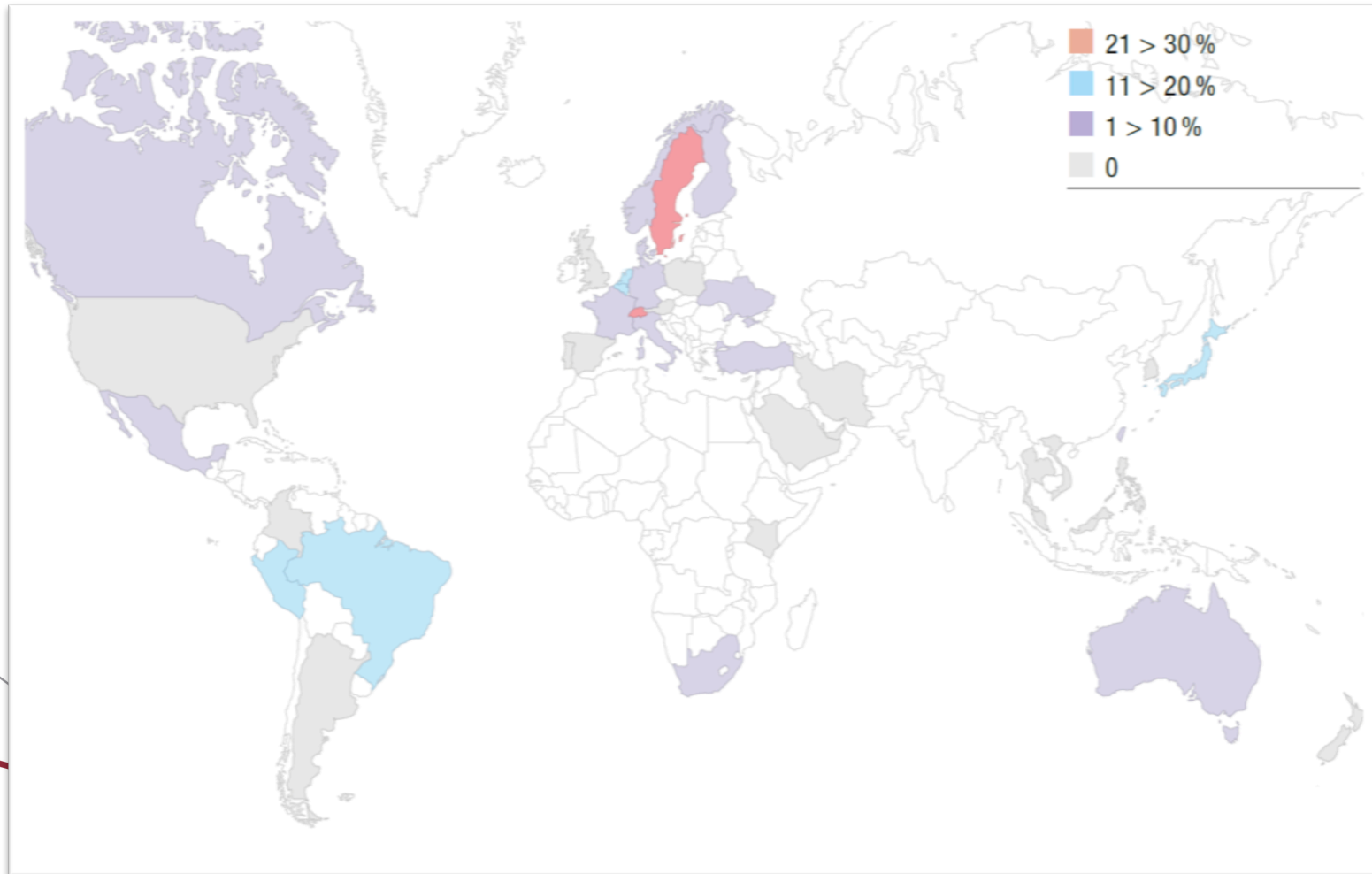


# Mack vs Bootstrap



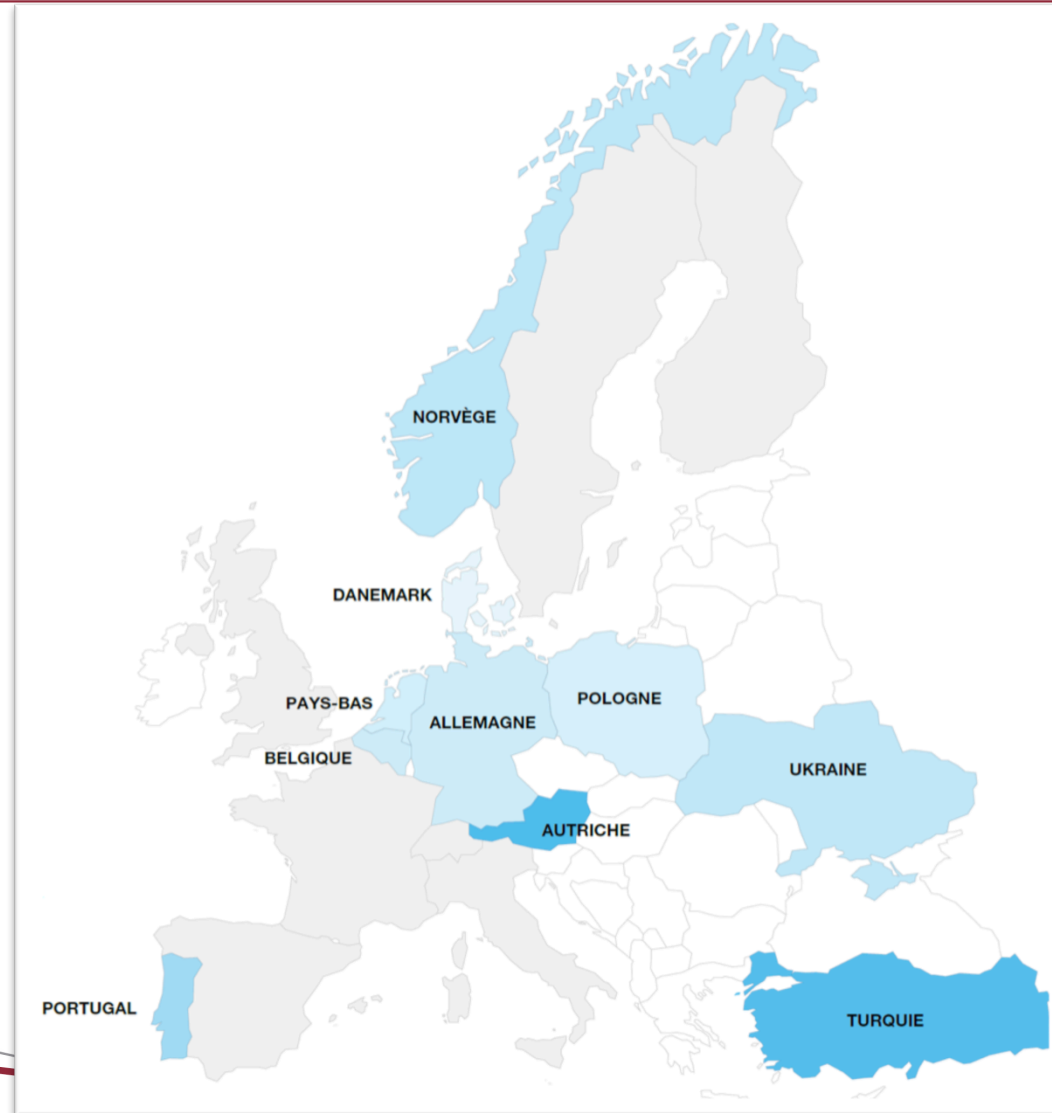
# Utilisation de méthodes de provisionnement sinistre/

S

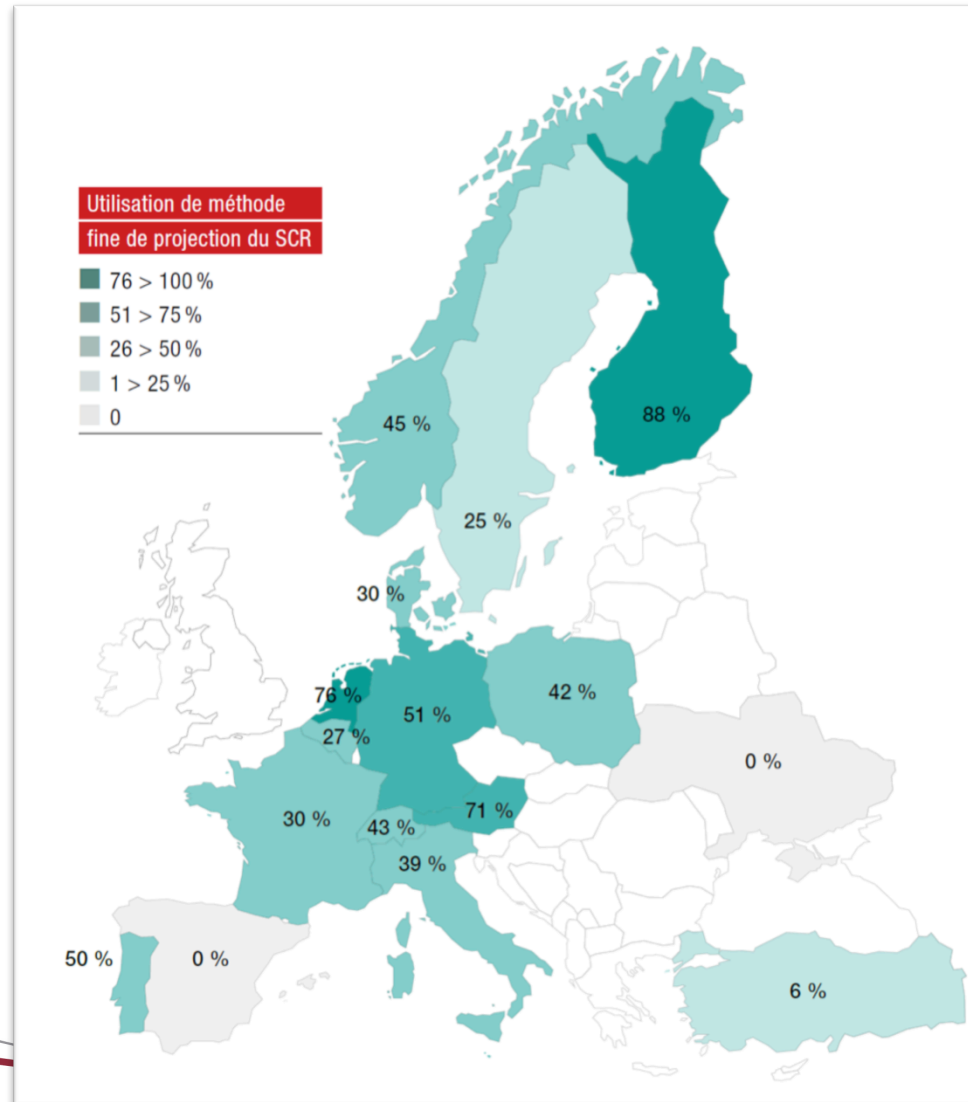


# Propagation de Munich Chain Ladder

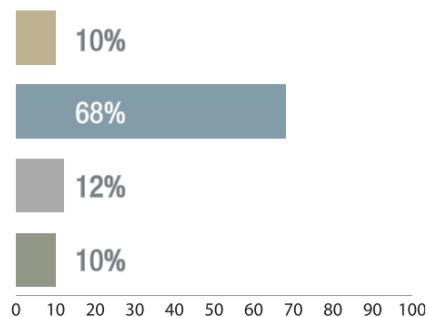
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# Calcul détaillé de la Marge de Risque SII



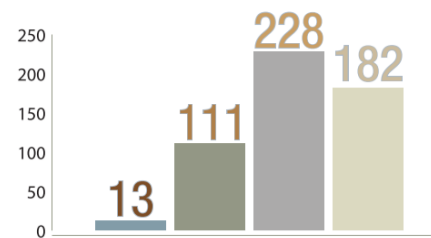
## Reserving exercise periodicity



Over 2/3 of insurance companies calculate their reserves quarterly.



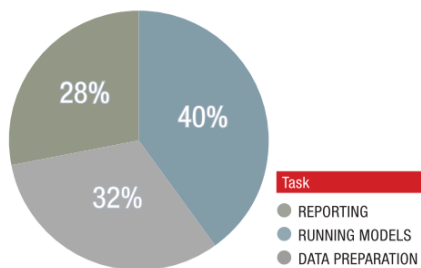
## Respondent companies size



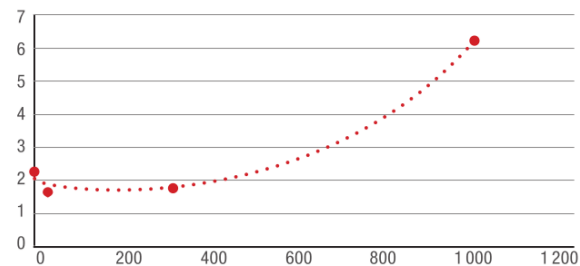
Most respondents are medium-big size companies, with premiums over 50M USD.



## Resources split



## Average number of companies vs companies size





# Logiciels utilisés & divers

Zone	Country	Nb reserving process/year	IBNR alloc. contract/cont.	Software used				
				Excel	R	Specialized	In-house	Other
<b>World</b>		<b>4</b>	<b>24%</b>	<b>39%</b>	<b>0%</b>	<b>27%</b>	<b>25%</b>	<b>9%</b>
North America	Canada	3	46%	29%	0%	54%	17%	0%
North America	USA	4	17%	33%	0%	0%	50%	17%
Europe	Austria	5	14%	43%	0%	29%	29%	0%
Europe	Belgium	5	40%	27%	0%	53%	20%	0%
Europe	Denmark	7	60%	40%	10%	20%	10%	20%
Europe	Finland	5	12%	8%	0%	92%	0%	0%
Europe	France	4	30%	30%	0%	60%	10%	0%
Europe	Germany	3	22%	39%	0%	51%	7%	2%
Europe	Italy	4	56%	28%	0%	61%	11%	0%
Europe	Netherlands	5	18%	24%	0%	71%	6%	0%
Europe	Norway	8	55%	45%	9%	9%	9%	27%
Europe	Poland	9	33%	42%	0%	42%	8%	8%
Europe	Portugal	5	63%	25%	0%	63%	0%	13%
Europe	Spain	3	0%	0%	0%	100%	0%	0%
Europe	Sweden	7	0%	25%	0%	25%	25%	25%
Europe	Switzerland	5	57%	29%	0%	29%	43%	0%
Europe	Turkey	5	33%	19%	3%	33%	3%	42%
Europe	Ukraine	5	17%	25%	42%	0%	17%	17%
Europe	United Kingdom	6	0%	13%	0%	88%	0%	0%
Asia	Hong Kong	4	50%	50%	0%	50%	0%	0%
Asia	Japan	4	0%	88%	0%	13%	0%	0%
Asia	Malaysia	6	31%	67%	0%	25%	0%	8%
Asia	Philippines	4	0%	100%	0%	0%	0%	0%
Asia	Singapore	5	50%	100%	0%	0%	0%	0%
Asia	South Korea	4	63%	88%	0%	0%	0%	13%
Asia	Taiwan	8	50%	81%	6%	6%	0%	6%
Asia	Thailand	7	82%	73%	9%	9%	9%	0%
Asia	Vietnam	6	56%	100%	0%	0%	0%	0%
Latin America	Argentina	4	0%	50%	0%	50%	0%	0%
Latin America	Brazil	11	50%	56%	0%	41%	0%	3%
Latin America	Colombia	4	50%	0%	0%	100%	0%	0%
Latin America	Mexico	11	55%	25%	5%	25%	30%	15%
Latin America	Peru	9	57%	29%	0%	43%	14%	14%
Oceania	Australia	5	37%	89%	0%	5%	0%	5%
Oceania	New Zealand	7	50%	100%	0%	0%	0%	0%
Middle East	Iran	1	0%	100%	0%	0%	0%	0%
Middle East	Lebanon	4	100%	33%	0%	11%	56%	0%
Middle East	Qatar	8	100%	50%	0%	0%	50%	0%
Middle East	Saudi Arabia	4	33%	67%	0%	0%	33%	0%
Middle East	UAE	9	33%	100%	0%	0%	0%	0%
Africa	Kenya	6	29%	100%	0%	0%	0%	0%
Africa	South Africa	4	35%	26%	0%	74%	0%	0%

# Plan de la présentation

- Protocole du panorama ASTIN des pratiques de provisionnement Non-Vie
- Présentation des résultats du marché français
- France vs Italie et Allemagne
- Présentation des résultats mondiaux
- **RBC vs Solvabilité II et futur du provisionnement**
- Questions

# RBC vs Solvabilité II

- Standards de provisionnement publiés par l'American Academy of Actuaries
- Principes également publiés par la Casualty American Society
- RBC ajoute une provision à la provision comptable, basée sur des facteurs de risques, là où SII propose un calcul de Marge de Risque basé sur la modélisation propre à la compagnie.
- Pas d'actualisation dans RBC.
- SII basé sur un horizon à un an, pas de limite dans RBC.

# RBC vs Solvabilité II (2)

- Commentaire de Chandu Patel (USA)

*“On an overall basis, the RBC framework is more uniform and easier to implement in a consistent manner across all companies. On the other hand, Solvency II framework is more nuanced but allows a Company to estimate its own risk margins. Hence I believe the Solvency II regime leads to more individual regulatory scrutiny.” - Chandu Patel*

- **Section « Future of Reserving » du rapport**
- **Facteurs impactant la viabilité des méthodes actuelles**
  - Continuité des cadences passées et plus généralement capacité des données passées à expliquer le futur
  - Capacité des méthodologies à prendre en compte les modifications de l'environnement assurantiel
  - Capacité de répondre aux demandes croissantes en matière de reporting

# Futur du provisionnement (2)

- **Comment les actuaires peuvent-ils profiter des derniers développements pour s'améliorer?**
  - Data Mining
  - Capacité à analyser de plus en plus de données
  - Collaboration avec d'autres professions: spécialistes IT, mathématiciens, data scientists...
  - Formations et réseau actuariel

# Futur du provisionnement (3)

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*“I believe big data and better data in general will lead to a better understanding of the underlying trends and therefore assist the actuary in his/her analysis. However, I don’t believe the fundamental approach to reserving will change”*

**Chandu Patel, USA**

*“Are the actuarial teams sufficiently trained in computer science to handle the latest technology, and for example switch to individual claims reserving?”*

**Suzanne Patten, Australia**

Éclairer les risques, tracer l’avenir

# Plan de la présentation

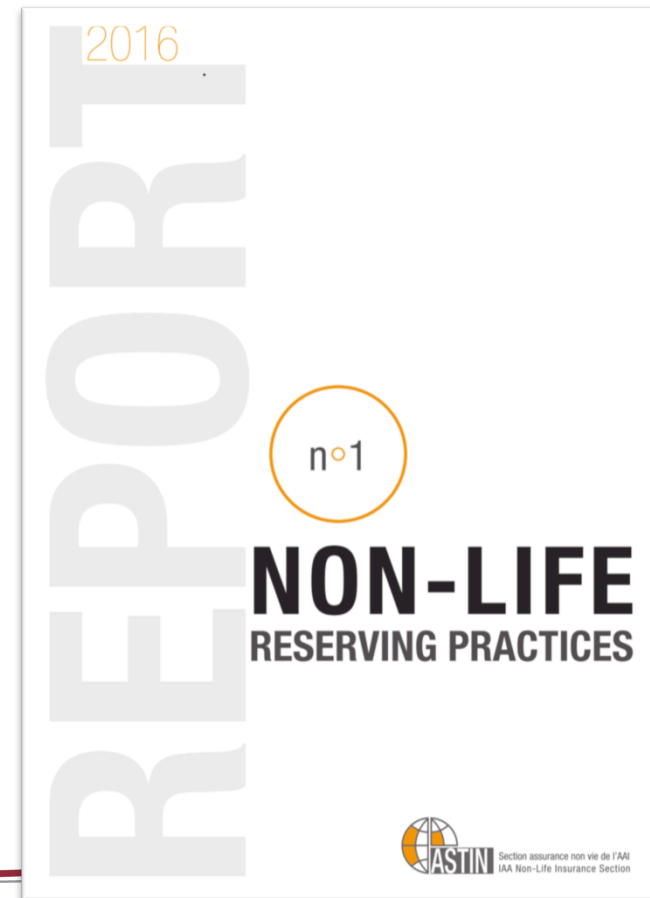
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# Merci pour votre attention!

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# Questions?



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