From USA-accounting to EU-Solvency 2 Directive
Market-consistency through European insurance

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Introduction

- Since the beginning of years 00', various regulation changes in EU life insurance (Solvency 1, Solvency 2) have led actuarial practitioners to consider new ways to valuate their assets and liabilities

- Oriented towards the accounting *fair valuation* tendency from Anglo-Saxons countries: new accounting IFRS norms (2002)

- Various issues mainly linked to the introduction of two very complex finance-linked notions
  - The risk-neutral valuation
  - The market-consistency (MC)

- This presentation deals with the why, what and how of MC in insurance.
Short bibliography

Some accounting follow-up

MC in insurance
Agenda

Introduction

- **Accounting historical features**
- Solvency II & market-consistency
- From wording to practice
- Implementation

Conclusion
Accounting historical features
Brief history of international accounting through IASC/IASB evolutions

- **1973 - IASC creation** in London by national accounting institutions (Australia, Canada, France, Germany, Japan, Mexico, Holland, UK, USA), 140 institutions in 104 countries

Lack of legitimacy… but efficient strategy

- **July 1995** - working program IOSCO (including SEC) + IASC to get a recommendable corpus for transnational issuers on transnational markets (see Chiapello (2005))
- **November 1995** - EC (COM 95 (508)) accounting harmonisation: a new strategy vis-a-vis international harmonisation

And following IA validations in early 00’

- **May 2000** - IOSCO resolution “IOSCO members [are recommended] to use the 30 IASC 2000 standards” but not validated by the SEC…
- **2001** - IASC renamed IASB, which members are chosen by IASCF (located in Delaware)
- **July 2002** - **EC Regulation No 1606/2002** (IFRS for listed companies)
- **November 2002** - Convergence agreement IASB/FASB
- **2008** - New joint conceptual framework FASB/IASB

**November 2009** - Directive 2009/138/CE Solvency II
Accounting historical features
Fair valuation

“Fair value is the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction. “

**Level 1 (mark to market)**
**Level 2 (mark to model with market parameters)**
“The fair value is estimated on the basis of the results of a valuation technique [= by DCF] which makes the maximum use of the market inputs and relies as little as possible on entity-specific inputs”

**Level 3 (mark to model without market parameters)**
see Jarolim & Öppinger (2012)

**Market value in accounting?**
• How comes market value, DCF, mark-to-model…is fair?

**Theoretical basis: efficient market (Friedman 1953, Fama 1969,…)**
• The market prix embeds full knowledge at all time. **Exists only if the price is updated continuously to balance any socio-economic (...) change**
Agenda

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Conclusion
Insurance liabilities are complex and (especially in Europe) not hedged or linked to financial markets

⇒ Mismatch between assets market price and liabilities fair value

The EC is well aware…

2004 EC Q&A:
“What is the Commission's response to concerns over mismatches under IAS 39 between accounting for assets and liabilities in the insurance sector?
The Commission is aware that there is a mismatch issue between assets and liabilities in the insurance sector, which will be dealt with in the Phase II [2006... then 2017 IFRS 17] of the Insurance”...

⇒ While assessing solvency regulation (highly necessary after 2007 crises), choice of a mix between level 2 and level 3, “market-consistency”
Solvency II & market-consistency
Wording solution: Market consistency

Solvency 2 (2009/138/CE)

Introduction:
“The calculation of technical provisions should be consistent with the valuation of assets and other liabilities, market consistent and in line with international developments in accounting and supervision.”

Article 75:
”The value of technical provisions shall correspond to the current amount insurance and reinsurance undertakings would have to pay if they were to transfer their insurance and reinsurance obligations immediately to another insurance or reinsurance undertaking.”
➔ Trading/market price (adaptation of IAS 39 level 1)

Article 76:
“The calculation of technical provisions shall make use of and be consistent with information provided by the financial markets and generally available data on underwriting risks (market consistency).”
➔ Level 2 intuitions...
Solvency II & market-consistency
Explaining MC

Library SOA (proceedings 5/05’) Financial Economics vs. Traditional Actuarial Methods/Back to Basics: Risk Neutral vs. Real World

• “Market consistency is a function of how you set your input parameters. You can have a market-consistent model if you feed in an appropriate drift and a volatility structure that reflects the current market condition.
• “So risk-neutral, by definition, doesn't mean market-consistent, But if your parameters are right, your risk-neutral model gives market-consistent values.”

Kemp M.(2009):
"A market consistent value of an asset or liability is its market value, if it is readily traded on a market at the point in time that the valuation is struck, and, for any other asset or liability, a reasoned best estimate of what its market value would have been had it been readily traded at the relevant valuation point."
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• From wording to practice
• Implementation

Conclusion
From wording to practice
MC in practice

Collective understanding of solvency accounting for European actuaries:
• **DCF based on risk-neutral simulations**
• **Models calibration on market data**

→ Standard practical process to valuate the economic own funds / Best Estimate of Liabilities

1. Choice of financial models to be used in the Economic Scenarios Table (EST)
2. Extraction of economic assumptions at the calculation date
3. Calibration of risk-neutral models to market data
4. Simulation of an EST through H years
5. Use of the table in the undertaking’s ALM model and DCF valuation
From wording to practice
Step 2 - the EIOPA (regulatory) curve

- EIOPA - Technical documentation of the methodology to derive EIOPA’s risk-free interest rate term structures (05/16)

“EIOPA is required to publish the risk-free interest rate.”

Adjustments of the swap curve
- Credit Risk Adjuster
- Volatility Adjuster

Convergence towards
- Ultimate Forward rate
From wording to practice
Step 3 calibration of the IR model

Standard calibration of an IR model as at 12/31/N:

- **EIOPA curve recovery**
- **Market data recovery:** *swaptions implied market volatility matrix*
  - Black/LN or Bachelier
- **Calculation of market prices matrix (Black/Bachelier formula)**

In parallel…

- **EIOPA curve recovery**
- **Choice of the IR model** used to simulate economic scenarios
  - LIBOR Market Model, shifted LMM, with stochastic volatility…
- **Calculation of a model prices matrix**
  - Prices depending on the model parameters $\theta$
From wording to practice
Any consistency issue?

EIOPA RIR + Market swaptions IV ≠ Market prices ?!

Q&A QIS5 (2010)
“The answer to [question 21] asks us to include the appropriate liquidity premium for both projecting and discounting. In this way, assets roll up and get discounted at the same rate. The answer does not give any indication of whether or not we accept that option prices will change.”

“Your understanding of the answer to question 21 is correct [...] 

• The convention in the over-the-counter option market is to use swaps as risk-free rates. As QIS5 is based on a different relevant risk-free rate, market option prices and market IV can no longer be replicated simultaneously

• The asset models should nevertheless be market-consistent and comply with [QIS 5].”

• [Followed by the strategy to be used to call it market-consistent]
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Implementation 1
MC testing 2020

Standard MC processes as at 12/31/2019 (steps 1-5)
But different replicated market data are tested, parts of the 30x30 swaption IV matrix

Simulation scheme:
- DDLMM IR model
- 2000 simulations + antithetic variables
- 30y horizon

Realistic toy ALM model
\[ \Rightarrow \] Real impact should be higher

6 different scenarios tables
\[ \Rightarrow \] The same simulation seed was used for every scenarios tables
\[ \Rightarrow \] diff. between matix 6-10x6-10 (94.2\%±9\%) and 30x30 (100\%±8.5\%) is 5.8\%±0.8\%

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A proposition **to add inertia to the calibration data**

- El Karoui (2017) test 4 calibrations of IR model based on different swaption implied volatilities matrixes
  - 12/31/14, « cross 10/10 » (v1)
  - 12/31/14, « cross 5/5 » (v2)
  - Averaged v2 on October 14’
  - Averaged v2 on Oct. & Nov. 14’

- LMM Model, 1000 simulations, no variance reduction technique

- Based on 3 distinct savings portfolios « market-type »
  - Standard ALM rules (dynamic lapse, assets rebalancing, MGR,…)

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**Implementation 2 (1/2)**

Use of averaged data 14’

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**v2**

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Update of calculations 12/29/17

- Negative interest rates for first maturities (LMM → DDLMM, log-normal IV/Black formula → normal IV/Bachelier formula)
- This time IV are +/- decreasing between October and December
- More precise variable of interest: VIF

For more objectivity in valuation
- We consider 2000 scenarios
- With variance reduction (antithetic variables)
- Same simulation seed
- For more stability: IV matrix 20x20

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Agenda

Introduction
- Accounting historical features
- Solvency II & market-consistency
- From wording to practice
- Implementation

Conclusion
Conclusion

• It is clear globalization was polarized on USA and liberalization via de-regulation and free market

→ Is market price fair?

→ Can investor-oriented pricing and insurance solvency be linked?

• As of today, MC = Window dressing in solvency assessment
  = manipulation, comparability issues and hazard...

• Remind IAS39:
  Market data use but “as little as possible […] entity-specific inputs”

Major interrogations on the EU choice to link accounting (fair value) and Capital requirement assessment (MC) for insurance…
Thank you!...
Objective: provide information to investors

IASC- conceptual Framework (1989) 10th section
“While all of the information needs of these users cannot be met by financial reports, there are needs which are common to all users. As investors are providers of risk capital to the entity, the provision of financial reports that meet their needs will also meet most of the needs of other users that financial reports can satisfy.”

New joint conceptual framework FASB/IASB (2008) OB2
“The objective of general purpose financial reporting is to provide financial information about the reporting entity that is useful to present and potential equity investors, lenders and other creditors in making decisions in their capacity as capital providers.

Information that is decision-useful to capital providers may also be useful to other users of financial reporting who are not capital providers.”

Appendix
Accounting valuation principle