



AFIR MUNICH
LIFE 2009

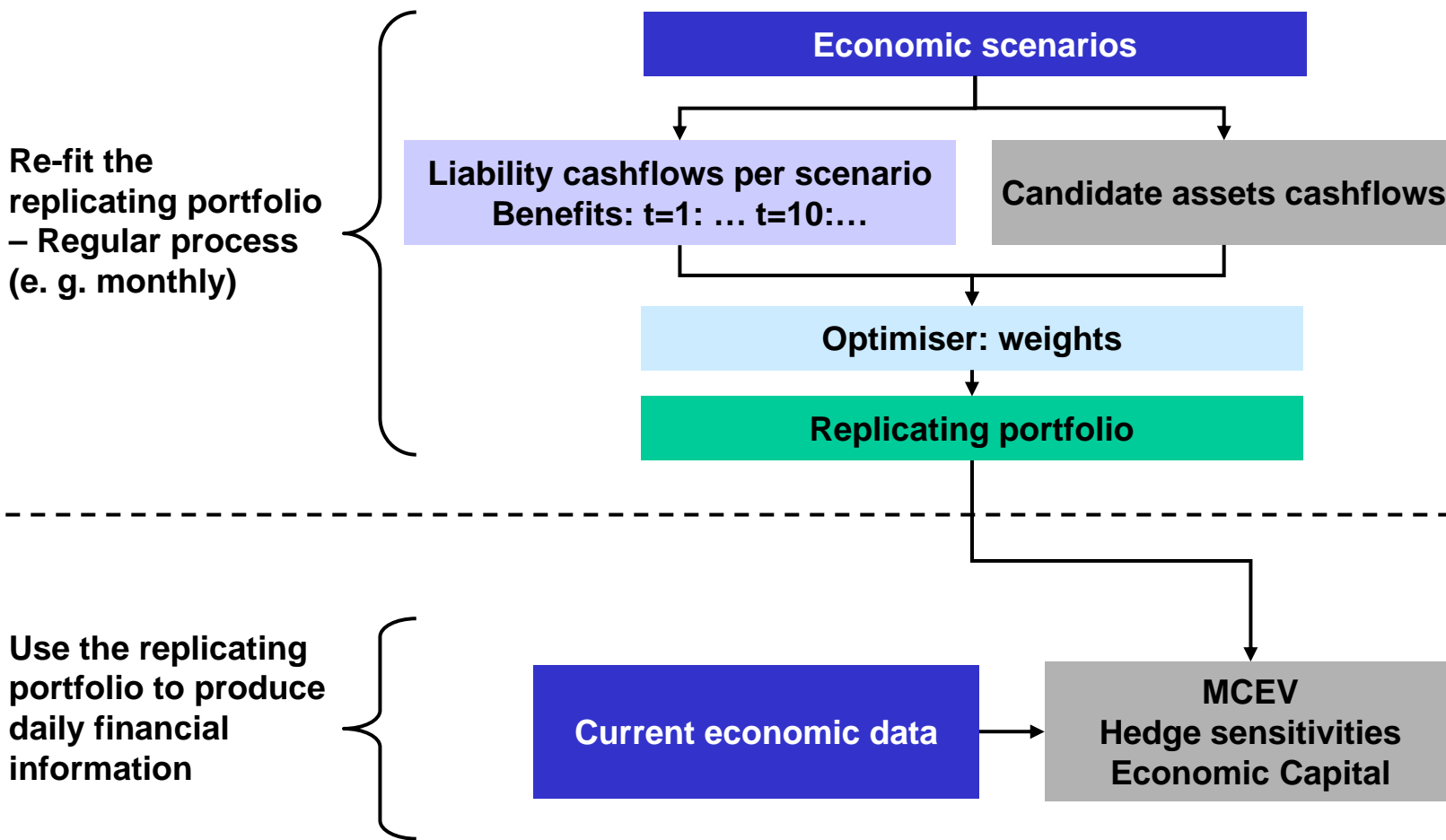
Replicating Portfolios in life insurance business: Use and limitations



Today's investigation:

- The robustness of Replicating Portfolios
 - How should Replicating Portfolios (RPs) be designed to be adequate for future application, i.e. to give reasonable results under changed capital market conditions?
 - Is the correlation coefficient a reliable indicator for the goodness of a Replicating Portfolio?

RPs and where they come from:



You never know what you're gonna get:

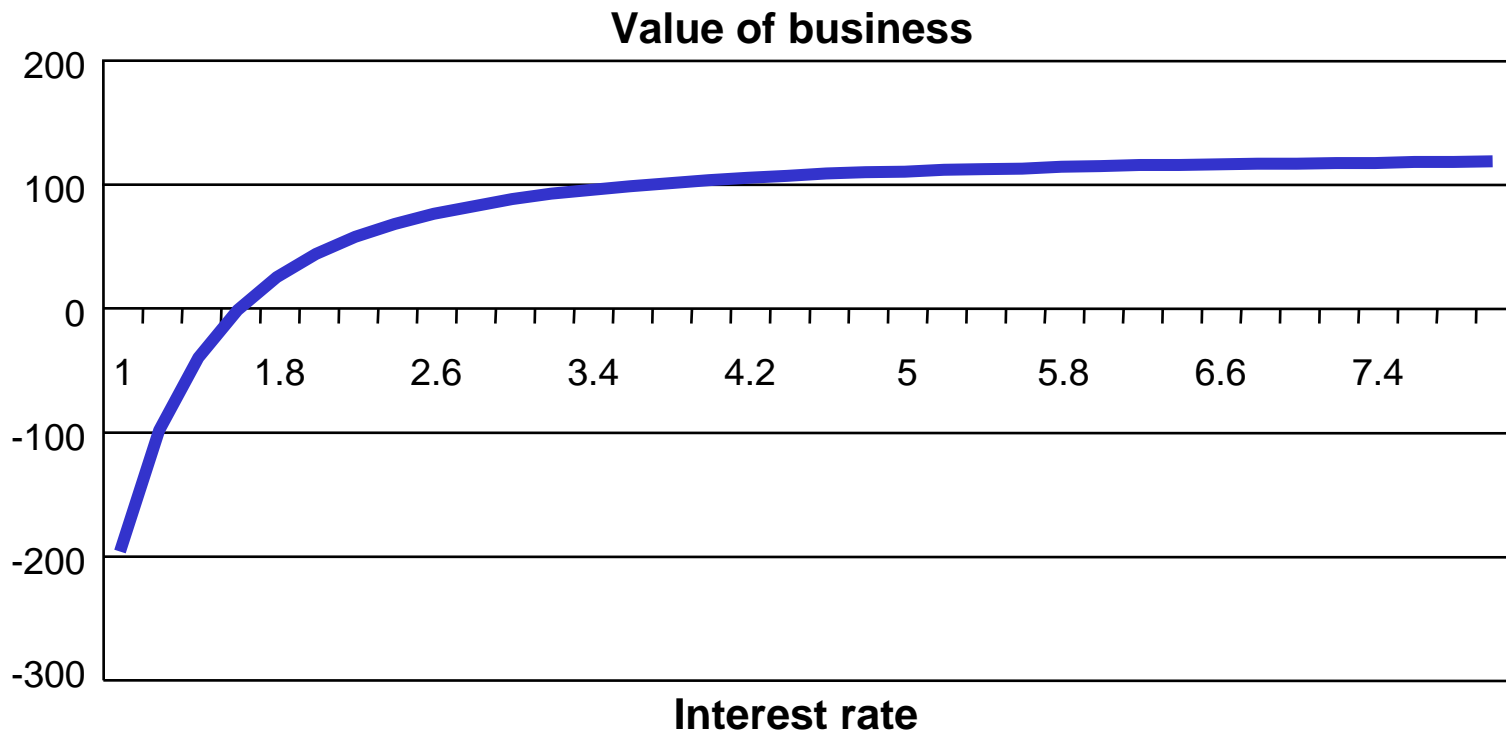
- Replicating Portfolio shall help you to calculate “business values” (e.g. MCEV)
 - in the future
 - under unknown future capital market conditions
 - instead of running the whole business model
- Therefore: The Replicating Portfolio does not need to be “optimal” today – but robust enough for tomorrow!

Try to “span the space”:

- Take several scenario sets as basis for the calibration of a Replicating Portfolio
 - real world, risk neutral
 - shifts in interest, equities, volatilities
- Nevertheless: You have to do more!
 - The trouble can be named: It’s the randomness of the **shape of the interest rate curve**

A simple example:

- The “value of business” is a concave function of interest rates at $t = 1$:



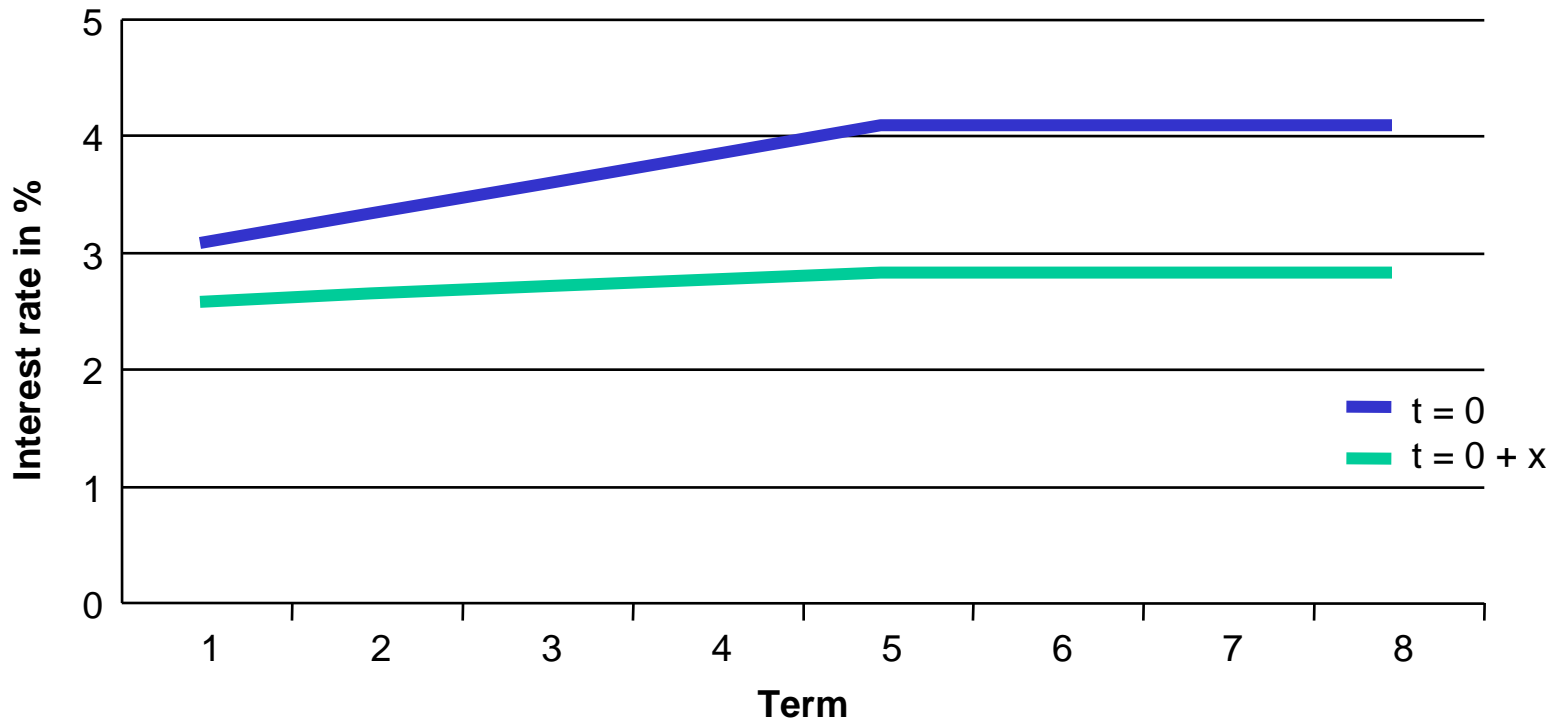
A simple example:

- Candidate assets are
 - Cash
 - 2- and 6-year zero coupon bond
 - Receiver and Payer Swaptions with
 - term = 1 year
 - tenor = 5 years
 - strike = 4%
- Optimisation is done by “least squares”

A simple example:

- As an example – a flattened shape at $t = 0 + x$ with $x = 1$ month (e.g.)
- with minor changes of volatility at $t = 0 + x$

Change of interest rate curve



Results:

The “value of business” is:

$t = 0$	86,1
$t = 0 + x$	34,6

Three different Replicating Portfolios have been calculated for Monte-Carlo simulations at $t = 0 + x$:

Shift	Shift + Vola	Shift + Vola + Shape
- 20,3	- 3,2	34,3

Resume:

- Span the whole space!
 - Include many different scenario sets
 - “Generate” scenario sets with significantly different shapes of interest rate curve
 - Include also deterministic scenario sets
- Don’t trust the correlation coefficient!
 - In our example, the best replicating portfolio was always worst in the sense of the correlation coefficient....

Presenter's contact details

Thorsten Wagner

Senior Manager

Financial Risk Management

KPMG AG

Barbarossaplatz 1a

50674 Köln

Tel. +49 221 2073 5380

Fax +49 1802 11991 1271

thorstenwagner@kpmg.com

© 2009 KPMG International. KPMG International is a Swiss cooperative. Member firms of the KPMG network of independent firms are affiliated with KPMG International. KPMG International provides no client services. No member firm has any authority to obligate or bind KPMG International or any other member firm vis-à-vis third parties, nor does KPMG International have any such authority to obligate or bind any member firm. All rights reserved.

The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavour to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.