Market Risk –

Life Insurers Compared to Banks

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Agenda

- Definition of market risk capital
- How market risk arises in banks and life insurers
- Outline of bank and life insurer capital standards for market risk
- Comparison of bank and life insurer regulatory capital for market risk
- Discussion of key differences
- Questions & discussion

Definition of market risk capital

- Capital held for the possible loss of value due to changes in market prices or market interest rates
  - Components are often referred to as asset price risk and interest-rate risk
- There are two types of market risk that need to be considered:
  - General risk is the impact of changes in stock market indices or interest rates
  - Specific risk is the impact of credit events or the individual features of a security

How market risk arises

- For life insurers, market risk arises primarily due to mis-matches between assets and liabilities.
- For banks, market risk arises from two primary sources:
  - The positions held in the trading book; and
  - Any mis-matched interest rate exposure between loans and deposits.
- The risk management of bank's trading books is characterized by active frequent management of exposures and matching out positions when exposures escalate.
- Historically, life insurer exposures have not been managed as actively, and there are often other considerations (e.g. policyholder reasonable benefit expectations).

Life Insurance Resilience Reserve

- Compares impact of shock yield changes on assets and liabilities
  - Yield change sizes are fixed in actuarial standards
  - Asset diversification allowed for with yield changes
- Considers worst combination of yield changes by asset class
- No stated risk tolerance for defined capital adequacy parameters:
  - Only reference is to 99% probability of sufficiency over 12 months for special risks (Section 5.2.5 of AS3.04)

Bank Market Risk (APS 113)

- For trading positions, there is an option of an internal model or a standard model:
  - Most large banks use an internal model
- Internal model may be based on a number of alternative methodologies:
  - Monte-Carlo, historical simulation, formula basis
- Risk tolerance is 99% probability of sufficiency over 10 days
- Capital charge is subject to a scaling factor of 3 to 6
  - 3 to 5 allows for quality of risk management processes
  - Additional 0 to 1 depends on track record of the model

Bank Interest-Rate Risk (APS 117)

- Banks may be required to use an internal model for the interest-rate risk of the banking book if an internal model is used for credit and operational risk
- Internal model based on 99% probability of sufficiency over 12 months (Para 23 of APS117)
- Internal model must meet quantitative and qualitative requirements
- If not required to use an internal model then standard reporting of interest rate risk is required
- Not included in examples as requirements are not final

Comparison of Risk Tolerance

- No stated risk tolerance for life companies – best indication is 99% probability of sufficiency over 12 months
- Bank interest-rate risk is based on 99% probability over 12 months
- Bank market risk is based on 99% probability over ten days
  - For consistency with a 12 month measure, a scaling factor of 5 would need to be applied (assuming i.i.d events)
- Depending on quality of risk management, APRA applies a factor of between 3 and 5
  - A lower factor would reflect the benefit of active risk management (e.g. daily monitoring of risk position)
- In theory, the risk tolerance appears to be reasonably consistent

Example Scenarios

- Five example scenarios (each position is 10,000 units)
  A. Long equity (asset) : short cash (liability)
  B. Long cash (asset) : short fixed interest (liability)
  C. Combination of A and B
  D. Long fixed interest (asset) : short cash (liability)
  E. Combination of A and D
- All capital is invested in cash
- No allowance for specific risk or credit risk
- No allowance for tax (all values on a gross basis)
- Bank market risk is based on historical simulation using two years of data and a scaling factor of 5 (with no other adjustments)

Results

Asset : Liability	Life Insurer: Capital Adequacy	Bank Trading Book: Market Risk[a,c]
A. Equity : Cash	3,456	1,959
B. Cash : Fixed Interest	1,243	1,115
C. Combination of A&B[b]	4,700 (100%)	2,256 (73%)
D. Fixed Interest: Cash	1,782	1,661
E. Combination of A&D[b]	4,316 (82%)	2,144 (59%)

a) The bank trading book capital has a scaling factor of 5.
b) Percentage is the ratio of combined capital charge to sum of separate capital charges.
c) The market risk analysis uses Bloomberg data.

Discussion points from results

- Equity risk capital is much lower on the bank model
- No diversification benefit between assets and liabilities on the life insurer model
  - The bank model reflects zero correlation in this case
- The life insurer diversification factor is distorted because it is applied to yield changes not asset value changes
- The bank method using historical simulation can result in very high diversification adjustments

Equity Risk Capital is Lower on Bank Model

- The bank equity risk capital is based on the low historical volatility of the ASX 200 in 2004 and 2005.
- A back-calculation based on AS3.04 would suggest that the life insurer capital is based on equity volatility of 15%
  - High compared to recent history
  - But not unreasonable based on overseas indices or a longer history
- A market view of equity volatility based on traded options is around 12% (SFE)

Year	Historical volatility of ASX 200
1998	15.6%
1999	12.6%
2000	14.1%
2001	13.0%
2002	11.4%
2003	10.0%
2004	6.8%
2005	9.8%

Tillinghast analysis based on Bloomberg data

How adaptive should capital parameters be?

Diversification between assets and liabilities

- Historically, the interest rate markets and equity markets exhibit low correlation
  - The correlation was zero in 2004 and 2005
- For life insurers
  - A -100% correlation is assumed for an equity investment backing a fixed interest liability
  - Based on zero correlation, the diversification adjustment would be a 22% reduction in capital levels
- For banks, the correlation is implied by the historical experience

Should life insurer capital standards allow for correlation between assets and liabilities?

Life insurer diversification should be applied to value changes not yield changes

- Under a VaR approach, the capital for fixed interest and equity would be combined as follows (assuming zero correlation):
  - Combined Capital = square root of
    [equity capital^2 + fixed interest capital^2]
  - $= (3{,}456^2 + 1{,}782^2)^{½} = 3{,}888$
  - Diversification factor = 3,888 / (3,456+1,782) = 74%
- Under the Capital Adequacy standard, the diversification factor is based on after-shock value changes but then applied to yields
- This results in some distortion and a diversification factor of 82% for the example shown

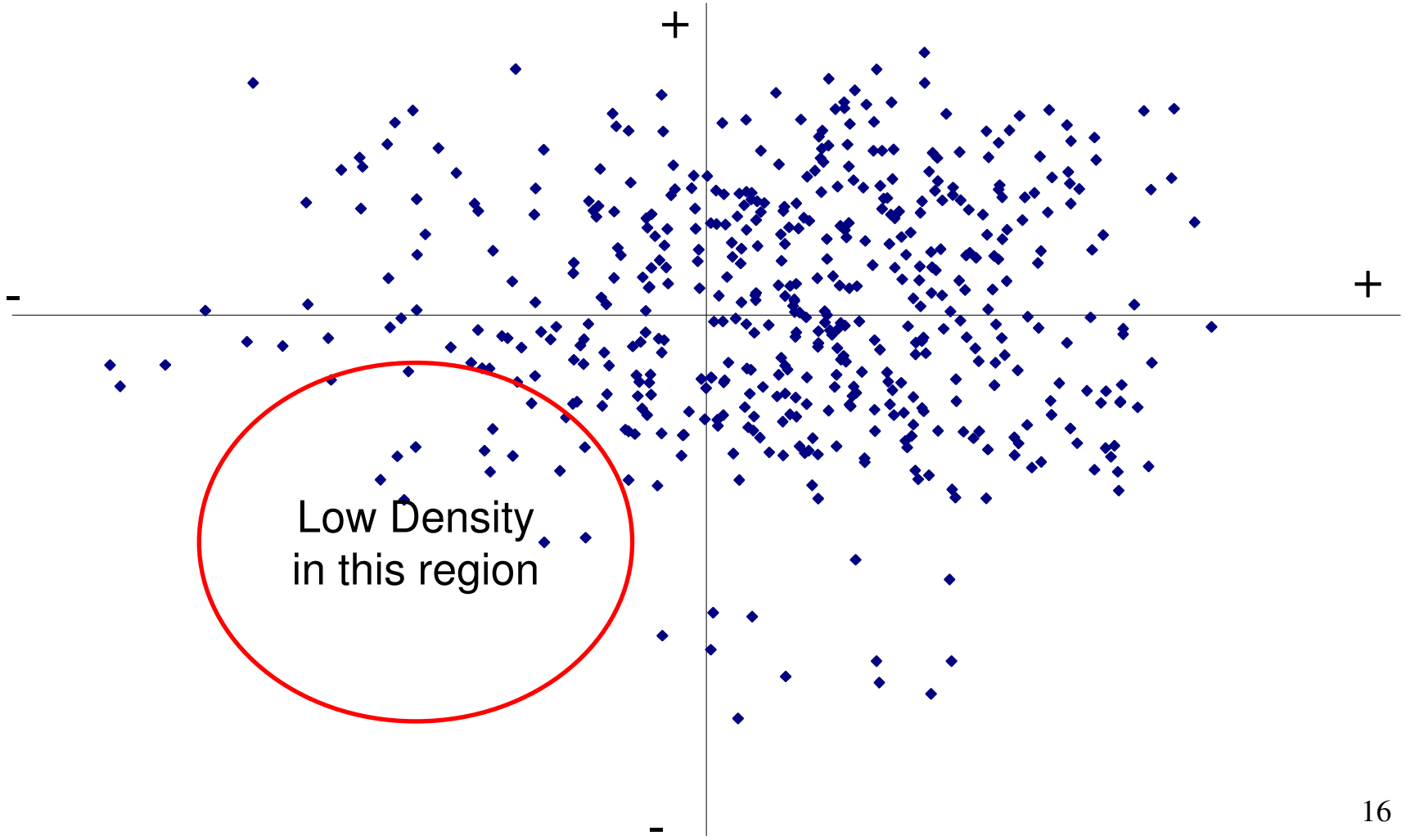
The method for applying diversification in the resilience reserve should be revised.

Can the diversification allowance under the bank method be excessive?

- In our example, the Portfolio E diversification factor is 59%
  - This suggests negative correlation of 31%
- The scatter plot explains why – the history set has relatively few cases where both asset changes are negative

Are negative implied correlation factors sensible?

Scatter Plot of equity and bond historical returns



Internal model for life insurance?

- The standard method for life insurance is of necessity crude
  - Lack of diversification benefits may result in a much lower probability of ruin than intended
  - Not updated for recent volatility estimates

- An internal model method for life insurance would be consistent with banking standards
  - Would require significant investment in models
  - But should improve the understanding of risk positions

Should life insurers have the option to use an internal model?