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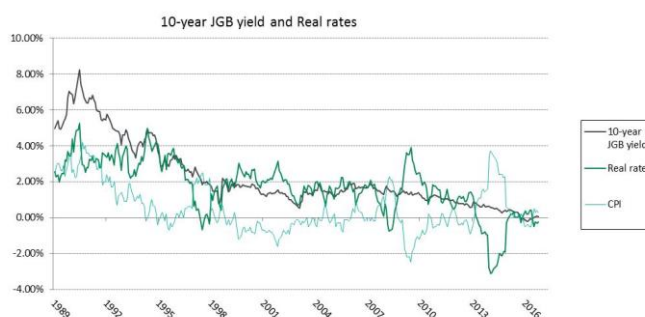
Japan Life Industry Response to Negative Interest Rates

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Low and negative rates- background

- Japan long term rates have long been on a downward trend since the bursting of the “bubble” economy which peaked in 1989.
- Various monetary policies were introduced from 1999 onwards to alleviate deflation and promote growth, with limited success.



Quantitative Easing

- Short-term nominal rates hitting a zero lower bound curtailed the effectiveness of monetary policy using short rates and prompted a shift of focus to the whole yield curve.
- QE is large bond-buying programs, forcing the actual yield curve below the natural yield curve to create accommodative financial conditions
- The European central bank went as far as to introduce negative interest rates in 2014 and Japan, in 2016.

1. The natural rate of interest is the real rate of interest at which the economy neither accelerates nor decelerates. If the actual rate of interest is above the natural rate of interest, then the gap will put downward pressure on output, and vice-versa.

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Europe has also seen very low rates

- Japan 10-year rates turned negative in early 2016, and regained positive territory in November, whereas the Swiss 10-year has been in continual negative territory since July 2015.

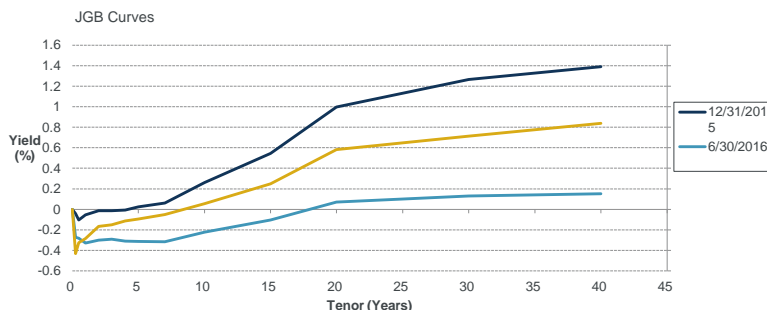


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Japan – quantitative easing and “yield curve management”

- Short end anchored at zero overnight cash rate, creating a “hockey stick” yield curve
- From September 2016, large-scale bond purchases across tenors gave way to targeting a zero 10-year rate, allowing the curve to steepen.



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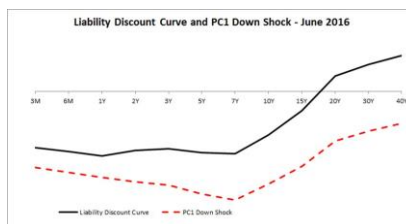
Modelling challenges – economic capital

- Principal component analysis is typically used, whereby historical rate movements are broken into key drivers to limit the number of simulations.
- Historically, methodologies have typically not allowed for part of the yield curve to be negative, not only for the shocked yield curve but also for the base discount rates, and a change of model is required to allow for part or all of the curve to be negative

Before....



After

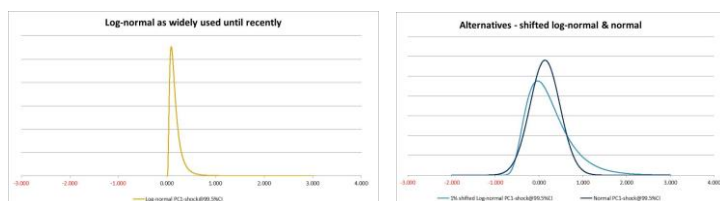


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Modelling challenges – economic capital

- The log-normal model no longer works, because it has a floor of zero
- Other possibilities are normal and shifted log-normal
- Shifted log-normal assigns asymmetry to rates (i.e. a sizeable rise more likely than a sizeable fall when rates are negative), which might be regarded as more realistic.
 - Selection of the floor is, however, subjective.



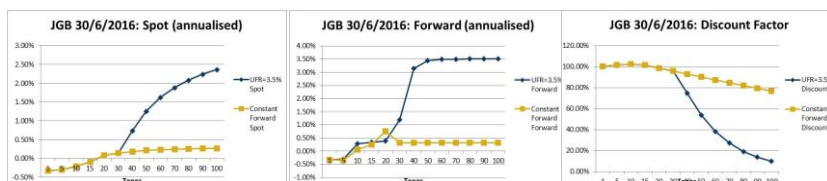
Note : Distribution as applicable to a particular tenor e.g. 30 years. Standard deviation will, in general, vary with tenor.

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Modelling challenges – economic capital

- Companies publishing economic solvency ratios typically used an Ultimate Forward Rate (UFR) the same as that used for Japan (and other developed economies) under IAIS, i.e. 3.5%¹.
- The difference in discount factors, versus using a constant forward rate is significant when rates are very low – e.g. the 1.22% at 30 years for Japan Government bonds (JGB's) at 30 June, 2016.



1. Of the 6 companies disclosing economic capital results, 4 showed Economic Solvency using a 3.5% USR, and 2 did not disclose the method. Of the 4, one also showed results using constant forward after the last liquid point (LLP). LLP assumptions were split between 30 and 40 years. For UFR, all companies disclosing method used 60 years, with Smith-Wilson interpolator between the LLP and the UFR.

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Economic capital implications

- Typically, assets are shorter than liabilities, and a reduction in long-term interest rates reduces available economic capital (AEC).
- Most products have Guaranteed (minimum) Interest Rates (GIR's) and hence liabilities are convex.
- The limited number of life companies disclosing economic solvency ratios (ESR's) showed significant falls at March 31 / June 30 2016, e.g. from the > 150% range a year prior, to 100% or less.
- March 31, 2016 Japanese FSA economic solvency field test shows an aggregate result of 104% at the 99.5% confidence level.

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Economic capital implications

- Economic Solvency represents a major departure from the existing regime¹
- Very low interest rates, such that the aggregate industry ESR is only just above 100%, together with pricing pressures, are a regulatory challenge to economic solvency implementation, resulting at least in part from government QE policies.
- An economic solvency regime will create an incentive for greater term matching of liabilities, to reduce volatility and risk to the ESR.

1. This combines a fairly static valuation of liabilities with asset valuation that is a mixture of book value (for duration matching and held-to-maturity assets) and market value (available for sale assets).

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Embedded value modelling challenges

- Japanese companies disclosing embedded value generally use a market-consistent approach.
- All companies disclosing EV at September 30, 2016 used an Ultimate Forward Rate of 3.5%, versus only 6 out of 9 a year earlier¹.
- For MCEV, negative swaptions curves make it impossible to derive volatilities assuming a log-normal rates distribution – as for EC shocks, this forces use of shifted log-normal or normal models.
- The concept of market-consistency is stretched by sustained government intervention.

Note:

1. Of 9 major life companies disclosing standalone for Japan, all used discount rates based on Japan government bond yields for discounting of Yen-denominated liabilities except for 1 using swaps, with an LLP or 30 or 40 years, a UFR at 60 years and Smith-Wilson interpolation. 2 of the 9 used MCEV while 7 did not disclose the existence of, or degree of, a liquidity premium.

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Embedded value implications

- Embedded value disclosures as at March 31 and September 30, 2016 (some companies) were at either side of the low for 30-year rates on June 30.
- All companies disclosing EV at September 30, 2016 used an Ultimate Forward Rate of 3.5%, versus only 6 out of 9 a year earlier.
- Value of inforce fell significantly for all companies:

| | March 31, 2015 | March 31, 2016 |
|-------------------------------|-------------------|-------------------|
| Adjusted Net Worth | 196 | 217 |
| Value of Inforce | 25 | (47) |
| Embedded Value | 221 | 170 |
| # Companies with negative VIF | 1 | 6 |

- It remains to be seen whether Japanese companies will persist with this reporting, particularly if Economic Solvency is implemented.

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Investment implications

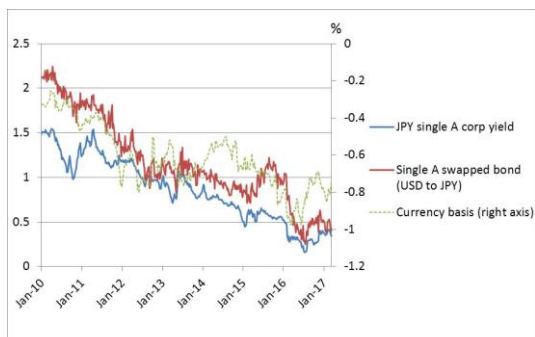
- “Hockey stick” yield curve resulted in, for example, a barbell strategy – a zero combined with a 20-year bond - yielding significantly more than a 10-year bond.
- Securities lending relatively attractive, due to negative borrowing costs paid on collateral
- Real estate supported by low interest rates
- Incentive to search for yield

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Investment implications

- Dollar-denominated bonds that are currency swapped to maturity now actually feature a negative carry on the currency swap, although the dollar corporate bond market is much larger than that in Yen.



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Product responses

- The market has seen the continuation of a trend towards more foreign currency-denominated products – largely USD and AUD.
- Reports suggest that the trend will have strengthened in Fiscal 2016 although statistics are not yet available.
- Several companies have withdrawn from the Yen single premium market in particular.

Annualised Premiums

| JPY billions | Fiscal 2014 | Fiscal 2015 | Growth |
|-----------------------------|--------------|--------------|--------|
| Regular Premiums - FX | 113 | 128 | 13% |
| Regular Premiums - Total | 2,164 | 2,398 | 11% |
| FX as share of total | 5.2% | 5.3% | |
| Single Premiums - FX | 259 | 333 | 28% |
| Single Premiums - Total | 943 | 921 | -2% |
| FX as share of total | 27.5% | 36.1% | |
| Total Premiums - FX | 372 | 460 | 24% |
| Total Premiums - Total | 3,107 | 3,319 | 7% |
| FX as share of total | 12.0% | 13.9% | |

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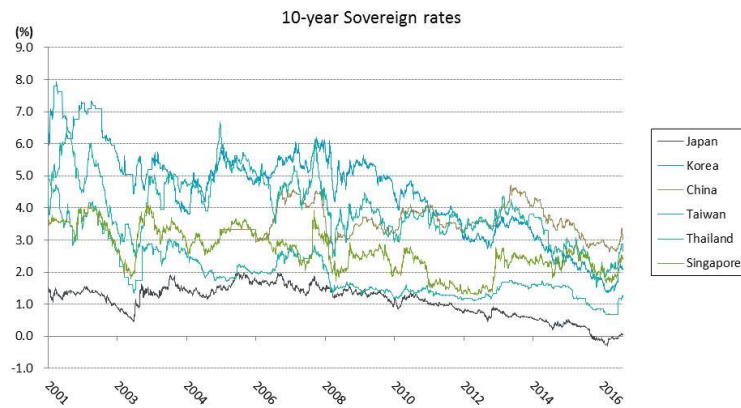
Product responses

- Low cash-value products have become quite popular in the market, introducing another source of profit to mitigate the rise in premiums needed to compensate for low interest rates.
- However, the fall of interest rates increases the value to the customer of an existing contract with GIR, leading to a decrease in lapse rates.
- Variable annuity sales have been depressed since the 2008-09 financial crisis.
- There has been some increase in popularity of single premium variable universal life riders, which feature a slice of leveraged equity investment in addition to a fixed-rate base savings contract.

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Other Asian countries have seen rates trend lower ...



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Questions

Answers

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THANK YOU

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