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INTERIM:
Actuarial management of equity release mortgages

Current practices and issues in the actuarial management of ERMs in the UK

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Introduction

This is an interim paper by the Equity Release Mortgage working party. The paper is still going through the Peer Review process and additional sections are expected to be added as part of finalising the paper, but has been released in its current form to facilitate discussion at the sessional event on 11 December 2018 and to receive feedback on the current interim paper. The finalised paper is expected to be released in early Q1 2019.

Abstract

The aim of this paper is to provide an update on the current actuarial practices in the management of equity release mortgages in the UK. With the implementation of the Solvency II Directive on 1 January 2016, there have been a number of changes to the way equity release mortgages are managed so that investors can benefit from the Matching Adjustment under Solvency II. This has led to investors establishing processes to internally securitise equity release mortgages, including attributing an internal credit rating for the notes. We have also seen a number of consultation papers from the Prudential Regulation Authority in the UK in respect of the amount of Matching Adjustment investors should be recognising on their balance sheets. This is essentially a question on what is the correct way to determine the level of risk embedded within equity release mortgages and this paper looks to provide some discussion on this subject, particularly approaches to valuing the no-negative equity guarantee. We also discuss the approaches to valuing equity release mortgages under International Financial Reporting Standards and Solvency II.

Next steps for further research are:

1. Analysis of mortality, long term care and prepayment experience across equity release mortgages in the UK
2. Detailed modelling of different methods of modelling the no negative equity guarantee and an assessment of the level of Matching Adjustment implied by these different methods.

Keywords

Equity release mortgages; CP 13/18; No Negative Equity Guarantee; Note structuring; Internal credit rating

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Chapter 1: Introduction

Background and purpose of paper

The aim of this paper is to provide an update on the current actuarial practices in the management of equity release mortgages (ERMs) in the UK, the last paper published on this topic was the Hosty paper (Hosty, 2008). With the implementation of Solvency II on 1 January 2016, there have been a number of changes to the way ERMs are managed so that life company investors in ERMs can benefit from the Matching Adjustment under Solvency II. This has led to these investors establishing processes to internally securitise ERMs, including attributing an internal credit rating to the notes. We have also seen a number of consultation papers from the Prudential Regulation Authority (PRA) in the UK, most recently CP 13/18 (PRA, 2018) in respect of the amount of Matching Adjustment investors should be recognising on their balance sheets. This is essentially a question on what is the correct way to determine the level of risk embedded within ERMs and this paper looks to provide a discussion on this subject, particularly approaches to valuing the no-negative equity guarantee (NNEG). We also discuss the approaches to valuing ERMs under International Financial Reporting Standards (IFRS) and Solvency II.

The market for ERMs in the UK has grown substantially over recent years, with the number of product options increasing from 58 in 2016 to 139 in 2018. Average mortgage rates have reduced significantly in the last two years by 70bps to 5.22% in July 2018 (Equity Release Council (ERC), 2018), with the average age of customers being 69. The market has grown from annual sales of £2.1bn in 2016 to c.£3.8bn in 2018 (est) with an increasing demand for the mortgages, from a rapidly ageing population, being met by an increasing number of investors in ERMs. ERMs are an attractive long term investment producing high gross yields, as shown in Table 1, which also provide a good duration match for annuity portfolios.

Table 1. Comparison of asset classes as at 31.12.2016, (Source: (PRA CEO Letter, 2018)*)*

Asset class	**Spread above risk-free (bps)**	**Matching adjustment**
Sovereigns – UK	55	55
Corporate bonds	185	125
ERMs	350	200
Infrastructure	210	150
Social housing	210	160

The attractiveness of ERMs as an investment to annuity providers is also demonstrated by the recent purchase by Rothesay Life of £860m of equity release mortgages from UK Asset Resolution as at 30 April 2018.

Methodology

Unless otherwise mentioned, the discussion in the paper is in respect of ERMs held on the balance sheet of UK based insurance companies that are lifetime mortgages.

The Equity Release Mortgage Working Party (ERM WP) conducted a survey during November 2017 of ERM market practitioners (“the survey”). The aim of the survey was to provide an objective overview of

the current market practice for Actuarial Management of ERMs, including highlighting areas where there is a relative consensus or divergence in views.

Literature Review

The papers that we have reviewed have included:

Securitisation and Tranching Longevity and House Price Risk for Reverse Mortgage Products. Sharon S. Yang. The Geneva Papers on Risk and Insurance. Issues and Practice, Vol. 36, No. 4, SPECIAL ISSUE ON LONGEVITY (October 2011), pp. 648-674.

Real-Estate Derivatives: From Econometrics to Financial Engineering. Radu S. Tunaru. Oxford University Press 2017, Ch. 8.

What is the Optimal Home Equity Release Product. Katja Hanewald and Thomas Post and Michael Sherris. 2014, Journal of Risk and Insurance.

Pricing reverse mortgages in Spain. A Debon and F Montes and R Sala. 2013, European Actuarial Journal, 3, 23-43.

Reverse mortgage pricing and risk analysis allowing for idiosyncratic house price risk and longevity risk. Adam W. Shao and Katja Hanewald and Michael Sherris. 2015, Insurance: Mathematics and Economics, 63, 76-90.

Securitisation of Crossover Risk in Reverse Mortgages. Hong-Chih Huang, Chou-Wen Wang and Yuan-Chi Miao. 2011, The Geneva Papers, 36, 622-647.

A Semi-Markov Multiple State Model for Reverse Mortgage Terminations. Min Ji. 2011, dissertation for IFoA.

On Pricing and Hedging the No-Negative Equity Guarantee in Equity Release Mechanisms. Johnny Siu-Hang Li and Mary R. Hardy and Ken Seng Tan. 2010, Journal of Risk and Insurance, 77, 2, 499-522.

A Semi-Markov Multiple State Model for Reverse Mortgage Terminations. Min Ji and Mary Hardy and Johnny Siu-Hang Li. 2012, Annals of Actuarial Science.

On the valuation of reverse mortgage insurance. Chou-Wen Wang, Hong-Chih Huang and Yung-Tsung Lee. 2016, Scandinavian Actuarial Journal, 4.293-318.

On the valuation of reverse mortgages with regular tenure payments. Yung-Tsung Lee and Chou-Wen Wang and Hong-Chih Huang. 2012, Insurance Mathematics and Economics, 51, 430-441.

The Time Value of Housing: Historical Evidence on Discount Rates. Philippe Bracke and Edward W. Pinchbeck and James Wyatt. 2016, the Economic Journal.

A Bayesian Multivariate Risk-Neutral Method for Pricing Reverse Mortgages. Atsuyuki Kogure, Jackie Li and Shinichi Kamiya. 2014, North American Actuarial Journal, 18, 242-257.

Using Reverse Mortgages to Hedge Longevity and Financial Risks for Life Insurers: A Generalised Immunisation Approach. Jennifer L. Wang and Ming-hua Hsieh and Yu-fen Chiu. 2011, The Geneva Papers, 36, 607-717.

Developing Equity Release Markets: Risk Analysis for Reverse Mortgages and Home Reversions. Daniel H. Alai, Hua Chen, Daniel Cho, Katja Hanewald and Michael Sherris. 2014, North American Actuarial Journal, 18, 217-241.

Home Equity Release for Long-term care financing: an improved market structure and pricing approach. Doug Andrews and Jaideep Oberoi. 2014, Annals of Actuarial Science, vol. 9, 85-107.

Is the Home Equity Conversion Mortgage in the United States sustainable? Evidence from pricing mortgage insurance premiums and non-recourse provisions using the conditional Esscher transform. Hua Chen and Samuel H. Cox and Shaun S. Wang. 2010, Insurance: Mathematics and Economics.

A Pricing Framework for Real Estate Derivatives. Fabozzi, Shiller, Tunaru. 2012, European Financial Management, Blackwell.

Reverse mortgages – risks, pricing and market development. Li, Aw and Teo. 2017 Australian Journal of Actuarial Practice.

Asleep at the wheel: the Prudential Regulation Authority & the Equity Release Sector. Dowd, K. 2018, Adam Smith Institute.

We will extend the literature review to include academic papers on the valuation of vanilla and exotic options using the Black Scholes framework (for example, at banks, hedge funds and asset managers) to understand practice in the financial services sector more widely.

Chapter 2: Equity release market in UK

What is equity release?

Equity release is available in two forms in the UK: Home reversion plans and lifetime mortgages. This paper is focussed on lifetime mortgages, and we use ERM to refer to lifetime mortgages in this paper. Home reversion plans are currently a negligible part of new lending in the UK, although they have been a significant part of the market in the past.

ERMs enable borrowers to release equity from their property, usually on a fixed interest rate for life, with no requirement to make interest or capital repayments, unlike mainstream mortgages. The mortgages are repaid on death or entry into residential care of the last surviving borrower. They can be repaid early, but there are usually early repayment charges. Most ERM providers are members of the industry body, the Equity Release Council (ERC), selling ERC compliant products. The ERC requires members to follow certain product standards if their product is to be labelled ERC compliant, the main product standard of relevance to this paper is an ERM must have a No-Negative Equity Guarantee (NNEG). This guarantee means that when the property is sold and selling costs have been deducted ('sales proceeds'), the borrower or their estate is only liable to pay back the lower of the accrued loan or the sales proceeds.

Figure 1 shows the typical profile for an ERM loan balance. Since interest is not being serviced the loan increases rapidly over time with the compounding of interest with the original loan balance of £90k increasing to over £305k after 25 years. In this example, where the property is assumed to not change in value over a 25 year period the NNEG would bite in year 25 and beyond. The example in Figure 1 has a loan-to-value ratio of 30%, rolling up at 5.22% pa and assumes property sales costs are 2% of the property value. This is a simplistic example to illustrate how the NNEG works. However, it is unlikely for a loan to still be in-force after 25 years, based on a borrower being age 69 at origination, and most economic forecasts of the UK house prices indicate positive growth rates over the medium to long term. Medium term annual grow rates are in the range 2.1% to 3.1% in the period 2018 to 2022 (Treasury, 2018). Long term growth rates are likely to be linked to growth in the economy.

Figure 1: Typical loan balance profile for loan rolling up at 5.22% pa

Products

ERMs in the UK can be split into two main product categories. Those that enable the borrower to release a Lump sum (35% of new lending (Equity Release Council (ERC), 2018)) or Drawdown (65% of new lending (Equity Release Council (ERC), 2018)) which offer a facility from which a borrower can release funds over time. Under both product types the interest rate on the funds released is normally a fixed rate throughout life set at the time the funds are released, but not for future releases.

Common product features include:

- Early redemption charge free partial repayments – under this feature borrowers can typically repay up to 10% of the initial loan a year free of any early redemption charge.

- Inheritance guarantee – under this option if a borrower chooses to borrow less than the maximum offered by the lender for their age a proportion of their equity in the property is protected and is deducted from any future sales proceeds before they become available to repay the accrued loan.

- Fixed early redemption charge – the early repayment charges are a fixed percentage of the initial loan reducing with time.

- Interest rate linked redemption charge - the early repayment charges vary according to how a current benchmark interest rate compares to the equivalent benchmark rate at the time the loan was originated.

The maximum amount that can be released increases with age and for products that are medically underwritten, it can increase with worsening health and lifestyle scores. The average loan-to-value (LTV) on new lending in H1 2018 was 22.6% (Equity Release Council (ERC), 2018), this is lower than the maximum LTV available as most borrowers do not borrower the maximum amount available at outset of the loan, keeping some funds available in reserve. For a typical borrower, age 69, the maximum LTV available ranges from 21% to 41%, excluding any impact of medical underwriting. The ERM market is split into a spectrum of products with low interest/low LTV products at one end and high interest/high LTV at the other end.

Customers

The minimum age for ERMs in the UK is currently 55. The average age of ERM customers in the UK is 69, based on lending in H1 2018 (Equity Release Council (ERC), 2018). The average property size for ERM borrowers is £339k (Equity Release Council (ERC), 2018), compared to the UK average of £233k (ONS, 2018). The average initial amount borrowed was £75k in H1 2018 (Equity Release Council (ERC), 2018).

Sources of funding

Product providers either receive funding directly from life companies (from within the same group of subsidiary companies) or from external third parties which are typically life companies, but also include reinsurers, fund managers and pension funds. The funders will typically pay an acquisition fee to the product providers that covers the distribution costs, other acquisition costs (property valuation, legal, cashback) and a profit margin for the product provider.

Distribution

ERMs are sold in the UK via independent financial advisors. Approximately 50% of ERMs are distributed via two specialist firms – Age Partnership and Key Retirement. Advisors typically receive

commission of c.3%, while the firms they work for may also receive contributions to marketing costs from the product providers. In addition, to receiving independent financial advice, borrowers also need to receive independent legal advice under ERC standards before they can release funds from an ERM.

Regulatory regime

Advisors and providers of ERMs are regulated by the Financial Conduct Authority under the Mortgage Conduct of Business Sourcebook Chapter 8 (MCOB 8 (FCA, 2018)). The ERC also places additional requirements on its members in terms of the sales process such as requiring members to advise potential borrowers to speak to their family and beneficiaries before taking out an ERM, as well as requiring independent legal advice for borrowers. Investors in ERMs in the UK are mostly life insurance and reinsurance companies, which are regulated by the Prudential Regulation Authority.

Chapter 3: The No Negative Equity Guarantee

3.1 Background

The UK market customarily offers a no negative equity guarantee (NNEG) on ERM products. The presence of this guarantee needs to be taken into account in pricing, accounts and insurance regulatory returns under the EU Solvency II.

The interest rates charged on ERMs include an amount to cover the cost of the NNEG and other factors such as the long-term, illiquid nature of ERMs and lack of marketability of the asset. Providers limit the NNEG risk by imposing maximum loan-to-values (LTVs) at commencement which vary by age. However, the majority of customers borrow significantly less than the maximum LTVs allowed, even after allowing for further drawdowns, which reduces any potential liability. In addition, early redemptions can be significant due to the changing circumstances of customers e.g. customers may wish to downsize as they become older or move in with relatives.

It could be argued that early redemptions reduce the NNEG risk since the exposure is reduced. However, where customers in negative equity are dissuaded from redeeming early (e.g. due to difficulty raising funds to repay a loan that exceeds the value of the property) early redemption could lead to anti-selection effects.

It can be argued that, the product design gives rise to some cross-subsidies in relation to the NNEG risk e.g. between low and high LTV cases, and leavers (early termination exits) vs stayers (mortality and morbidity exits). Firms sometimes reduce the cross-subsidies by applying higher interest rates on higher LTV (maximum lump sum) cases or providing an "inheritance protection" option where if the maximum LTV is not taken then part of the property value is protected on redemption.

Alternatively, an argument can be made that the product design limits the possibility of cross-subsidies. Where two (single-life) borrowers die, and so the NNEG needs to be tested on their respective homes, there is limited possibility of cross-subsidy. The upside risk on the one property (above the rolled-up value of the loan) is fully retained by the first borrower's estate and so cannot be used to offset the downside risk on the other property (to which the ERM provider is exposed).

In the UK, life insurance companies customarily use restructured ERMs as part of the matching asset portfolios backing their annuity liabilities. In accounts and regulatory returns, the starting point is to use a best estimate assessment valuation. Under Solvency II, insurance companies must then add a risk margin to their liabilities based on a cost of capital approach. The overall Solvency Capital Requirement (SCR) is a Value at Risk (VaR) measure based on a confidence interval of 99.5% over one year. Firms must also carry out an Own Risk and Solvency Assessment (ORSA).

The Solvency II regime allows firms to take into account a Matching Adjustment (MA) subject to regulatory approval and meeting the eligibility criteria. The MA is based on the spread on the matching assets adjusted to allow for the fundamental spread (FS) published by EIOPA for the credit rating of the assets in the MA portfolio. The MA allows firms to use a higher than risk-free rate in valuing annuity liabilities. The FS adjusts the spread to allow for both the risk of defaults and downgrades.

3.2 Current approaches for assessing the NNEG risk

Background

The NNEG means the borrower only needs to pay back the lower of the sales proceeds and the accumulated loan on entry to long term care, death and in some cases voluntary repayment. This is economically equivalent to an individual house price put option. A detailed analysis of the potential ways to model the NNEG is being covered in detail as part of the academic research currently being undertaken by the IFoA and the ABI so we have not covered it here.

Closed form solutions

The majority of market participants in the UK currently use closed form solutions based on the Black Scholes derivative model, for accounting, reserving and pricing with the no negative equity guarantee valued as a series of put options with a ladder structure of maturities. Of the nine firms who described their NNEG valuation methodology in our survey, seven (78%) stated that they used a closed form solution. The other two respondents used a stochastic simulation model.

Economic parameters can either be produced on a "risk-neutral" or "real world" basis.

- Banks typically use "risk-neutral" assumptions to value options on the balance sheet and to price options in transactions. Banks typically use "real world" assumptions to stress the value of options when assessing risk for risk management purposes. This is true both for vanilla options such as 3-month call options, as well as exotic over-the-counter options, for which there is no deep and liquid market.

- Whilst ERM providers typically use the same approach as banks when stressing the value of the NNEG when assessing risk for risk management, there are a range of approaches used to value the NNEG on the balance sheet and to price ERMs as follows.

The majority of Equity Release providers surveyed by the working party set economic parameters on a "real world" basis when valuing the NNEG on the balance sheet and pricing ERMs rather than a "risk-neutral" basis. Arguments in favour of this approach include:

- There is no deep and liquid market in put options on property. However, note that banks do not consider the absence of a deep and liquid market in exotic over-the-counter options as a barrier to the use of "risk-neutral" assumptions to value exotic options on the balance sheet and to price exotic options in transactions.

- The cost of the NNEG is a component of asset cash flows.

- ERM providers do not typically hedge the NNEG. However, note that when banks value options held for speculative purposes (i.e. unhedged options) they do not see the lack of hedging as a barrier to the use of "risk-neutral" assumptions to value speculative options on the balance sheet and to price speculative options in transactions.

A minority of Equity Release providers surveyed by the working party set economic parameters on a "risk-neutral" basis when valuing the NNEG on the balance sheet and pricing ERMs, consistent with the practice in the banking sector. The "risk-neutral" basis uses risk free interest rates and so does not require making assumptions around future property price growth.

Under the "real world" basis, Black 76 is the closed form solution usually used by ERM providers together with a house price inflation rate which is often based on UK Consumer Prices Index (CPI) or the Retail Prices Index (RPI) plus a margin for house price growth in excess of CPI or RPI. The assumed house price rate may be reduced to allow for expected dilapidation and costs associated with sale.

Banks typically use implied volatility to value options on the balance sheet and to price options in transactions. Most of the Equity Release providers surveyed by the working party use historical volatility to value the NNEG on the balance sheet and to price ERMs.

Historical volatility is usually based on the Halifax or Nationwide House price indices, adjusted for seasonality on a regional basis.

To allow for autocorrelation, the observed volatility rate is increased using statistical techniques to remove the "smoothing" effect. In addition, further adjustments are usually made to the assumed house price growth and/or volatility to allow for idiosyncratic risk.

Banks typically use dividend yields to value options (on equities) on the balance sheet and to price options in transactions. Dividend yields represent the economic benefit (to the holder of the underlying asset) of receiving dividend payments during the term of the option. Compared with a direct investment in equity, the holder of a call option on equity forfeits the dividends, and hence pays a lower price.

Most of the Equity Release providers surveyed by the working party do not allow for rental yields in their calculations for closed form or stochastic solutions.

None of the respondents to the survey used closed form solutions other than standard Black Scholes variants.

Simulation based stochastic solutions

A minority of market participants use simulation based stochastic techniques for accounting, reserving and pricing. In addition, at least one of the firms surveyed has used simulations from stochastic models beyond Black Scholes on an ad-hoc basis as a check on their published numbers.

The use of more advanced stochastic models allows for a more sophisticated approach to be adopted with, for example, correlations between interest rates and property prices, and interest rates, early terminations and, potentially, sale delays. In addition, mortality and long-term care decrements could also be modelled on a stochastic rather than deterministic basis, although this may not have any significant impact on the results and few market participants currently follow this approach. Only one of the companies surveyed modelled mortality and morbidity stochastically.

Market participants using stochastic simulation techniques as their mainstream approach often use an economic scenario generator (ESG) provided by an external provider to give an independent outlook.

Our conversations with market participants using stochastic models showed a broad understanding of the factors modelled stochastically or deterministically and the correlations assumed. There is a wide choice of statistical models which can allow directly for the features of residential house prices that are commonly observed such as autoregression, mean reversion and stochastic volatility.

3.3 Parameter setting

The calibration of parameters is a major issue with few firms having any significant experience data and an absence of industry surveys. In addition, some risks such as early terminations may vary according to the product design and economic conditions, so historic rates may not apply in the future. In particular, they may be influenced by difficult to quantify factors such as the presence of early repayment charges, and general consumer sentiment towards the equity release market.

There are a number of issues with using past data to inform the distribution of future house price growth. There are a number of macro factors affecting house prices such as changes in: government policy, laws, demographic trends, population growth, planning rules, migration, availability of mortgage financing, GDP and earnings. Overseas data can be used to supplement data on UK house prices, particularly where the experience was different due to different macro factors, for example the prolonged fall in house prices in Japan following a peak in 1990. There is also a strong argument that house prices are affected by shorter term trends such as investor sentiment and momentum. ERM providers may use economic forecasts when setting their assumptions and may prefer through-the-cycle calibrations to avoid undue volatility in their long term assumption.

House price volatility is equally difficult to forecast, with historical house price data showing extended periods of relatively low volatility (e.g. the 1950s, 1960s, and 2010s) alongside short periods of extreme

volatility (e.g. the 1970s energy crisis and 2007-2009 global financial crisis). There is a risk that firms using a Black Scholes type closed form solution, which assumes constant volatility, do not properly allow for these types of features. In practice, firms may take a prudent view on volatility to avoid under-reserving.

Parameter estimation procedures, model validation and back-testing of results must be robust. The parameter estimation process needs to be revalidated on a regular basis. For stochastic models which aim to capture more characteristics of financial time series involved with NNEG, one clear challenge is the calibration of correlation parameters between interest rates and house price growth rates.

Decrements

There are no ERM specific tables for mortality, LTC or prepayments that have been published in the UK. However, the Hosty paper (Hosty, 2008) set out typical assumptions that a firm entering the UK ERM market could adopt and although the market has moved on since that time the broad principles remain the same. In terms of the decrement assumptions, the following broad principles should be taken into account.

Mortality rates: These should reflect the expected mortality for the product's target market. Most firms use standard pensioner or population mortality with appropriate adjustments. Underwriting is used for some ERM's where a higher maximum LTV is offered for impaired lives.

Mortality improvements: Most firms are basing their improvements assumptions on the CMI projection model.

Morbidity: People moving into long-term care (LTC) customarily have a very short life expectancy and most providers allow for morbidity by way of a percentage increase to the mortality rates dependent upon age and sex. The Hosty paper (Hosty, 2008) suggested that the increases should be significantly higher for female than male lives, but this may well be a joint life issue.

Joint life issues: There is significant statistical evidence that there is a lack of independence in the mortality rates for joint life cases with significantly higher mortality being experienced by the surviving partner on the death of their spouse. The joint life effect also flows through to long term care mortality rates where an ill partner may be looked after in the home rather than moving into LTC.

Early prepayments: These are usually significant and often reflect changes in outlook e.g. a decision to downsize or move into retirement accommodation with increasing age. There is also the potential for re-broking or switching of ERMs dependent upon the level of charges made on early prepayments and the rates available on new ERMs. Switching has not been a significant issue in the market to date but could become more important with increasing customer awareness and interest rate movements.

Real world vs risk-neutral

The debate about "real world" vs "risk-neutral" continues with most ERM providers surveyed by the working party currently using "real world" approaches. In contrast most banks, hedge funds and asset managers use "risk-neutral" assumptions to value options and guarantees on the balance sheet, and to price them in transactions.

There are arguments for and against the two methods, and, for cash flow projections, real world is the natural approach.

The arguments in favour of "risk-neutral" are as follows:

- It is the approach used by derivatives traders at banks and hedge funds, and derivatives traders are the predominant users of the Black Scholes framework.

- It is the approach used by market makers in options, and market makers have to provide both a bid and an offer price (with a narrow spread) for an option and so any inaccuracies in their pricing or valuation techniques would be quickly exploited by other market participants, although we saw during the Global Financial Crisis that banks have been known to price derivatives incorrectly and the market took a long time to exploit inaccuracies in their pricing.

- Two of the original proponents of the use of the "risk-neutral" approach, Scholes and Merton, were awarded the 1997 Nobel Prize in Economics for the "risk-neutral" approach. As explained in the Royal Swedish Academy of Sciences press release "Black, Merton and Scholes made a vital contribution by showing that it is in fact not necessary to use any risk premium when valuing an option. This does not mean that the risk premium disappears; instead it is already included in the stock price."

The arguments against the "risk-neutral" approach are as follows:

- There is no deep and liquid market. It could be argued that this means that the "risk-neutral" approach requires firms to make assumptions which cannot be validated or benchmarked. Alternatively, it could be argued that the "risk-neutral" approach uses risk free interest rates which are market observable (and published by EIOPA) and so requires less validation and benchmarking than the "real world" approach which uses estimates of house price inflation which require a subjective assessment.

- At the present time low risk-free rates which when adjusted for a deferment rate naturally give rise to a low or negative drift. This makes the NNEG put option more in the money than not. Alternatively, it could be argued that whilst the "risk-neutral" and "real world" approaches give different assessments of the degree of moneyness of the NNEG put option, there is no independent reason to believe that the approach that produces the lower cost of NNEG is more correct, and there is a risk that firms using this as a selection criteria could be cherry-picking the more favourable approach.

- Insurers are looking to calculate the best estimate impact of NNEG on cash flows, not the market value of the NNEG.

The above points illustrate the breadth of practice being used across the financial industry and is a key reason why independent academic research is being undertaken by Kent Business School on behalf of the Institute and Faculty of Actuaries and the ABI, due to be published in Q1 2019.

3.4 Shortcomings of current approaches and general comments

Black Scholes and closed form solutions in general

The use of solutions based on Black Scholes is subject to the general criticism that the underlying assumption of a geometric Brownian motion (GBM) is not appropriate for house prices where autocorrelation is observed. In addition, there is also an underlying assumption that volatility remains constant which does not reflect actual market experience where conditional heteroskedasticity is observed. The market also exhibits other features including mean reversion and is non-homogeneous with regional variations and variations by property type.

The use of a dividend yield in Black Scholes requires a decision as to how it should be assessed, and how it should be calibrated.

In general, closed form solutions do not allow for all the features of ERMs. The use of such solutions almost always requires parameter adjustments – in the case of Black Scholes there is a fundamental need to adjust the volatility assumption to allow for autocorrelation which firms routinely make using standard techniques.

If Black Scholes and GBM modelling were replaced by stochastic models including closed form solutions (if available) which fitted the observed data better, it is possible that those arguing against risk-neutral would disappear or at least be mitigated. It is possible to find alternative risk-neutral solutions that would not require any assumption about a rental yield or deferment rate (see later) and these would clearly make calibration easier and avoid any debate about how the assumption should be assessed. In addition, there may, of course, be *halfway house* solutions between the real world and risk-neutral approaches.

Simulation based stochastic models

Simulation based modelling allows for greater complexity, but the choice of statistical model matters and there is a danger that the statistical model used is inappropriate and could potentially give a false sense of security.

3.5 Alternative approaches

Closed form solutions

The use of Black Scholes and its underlying assumption of a geometric Brownian motion (GBM) along with adjustments to the parameters to allow for autocorrelation and idiosyncratic risk, naturally gives rise to questions about whether there are more appropriate closed form solutions.

There are certainly other closed form solutions used in the investment market which allow for autoregression and stochastic volatility. For example, closed form solutions are available such as the Heston Model and its variants. These might be more suitable because they allow for stochastic volatility.

Simulation based stochastic solutions

There is wide choice of potential stochastic models. It is not known how many providers, or for that matter external providers of ESG's, use GARCH models which cater for stochastic volatility rather than more standard ARMA or ARIMA models where volatility is fixed. However, these models may well be appropriate. There is also the possibility to use a mix of models e.g. ARIMA-GARCH.

3.6 PRA concerns about understating the NNEG risk

In the UK, the Prudential Regulation Authority (PRA) issued a supervisory statement SS3/17 in 2017. SS3/17 has now been followed-up by a recent consultation paper (CP13/18) with further guidance and proposed enhancements to the methodology.

The PRA have *four overriding principles* in assessing the NNEG risk and the overall valuation of the ERM:

(i) securitisations where firms hold all tranches do not result in a reduction of risk to the firm;

(ii) the economic value of ERM cash flows cannot be greater than either the value of an equivalent loan without an NNEG or the present value of deferred possession of the property providing collateral;

(iii) the present value of deferred possession of property should be less than the value of immediate possession; and

(iv) the compensation for the risks retained by a firm as a result of the NNEG must comprise more than the best estimate cost of the NNEG.

There is an ongoing debate about the principles and it is not clear that all market participants would agree with them. Our understanding of the rationale behind the principles is covered in the following paragraphs.

The first principle is common sense. If a firm retains all tranches then there is clearly no reduction in risk. However, in a restructuring the junior tranches often reside outside the MA portfolio. The PRA is concerned to ensure that firms properly allow for all the risks relating to the ERMs whether they reside inside and outside the MA portfolio, including the NNEG risk. This leads onto the next three principles and the 'Effective Value' construction.

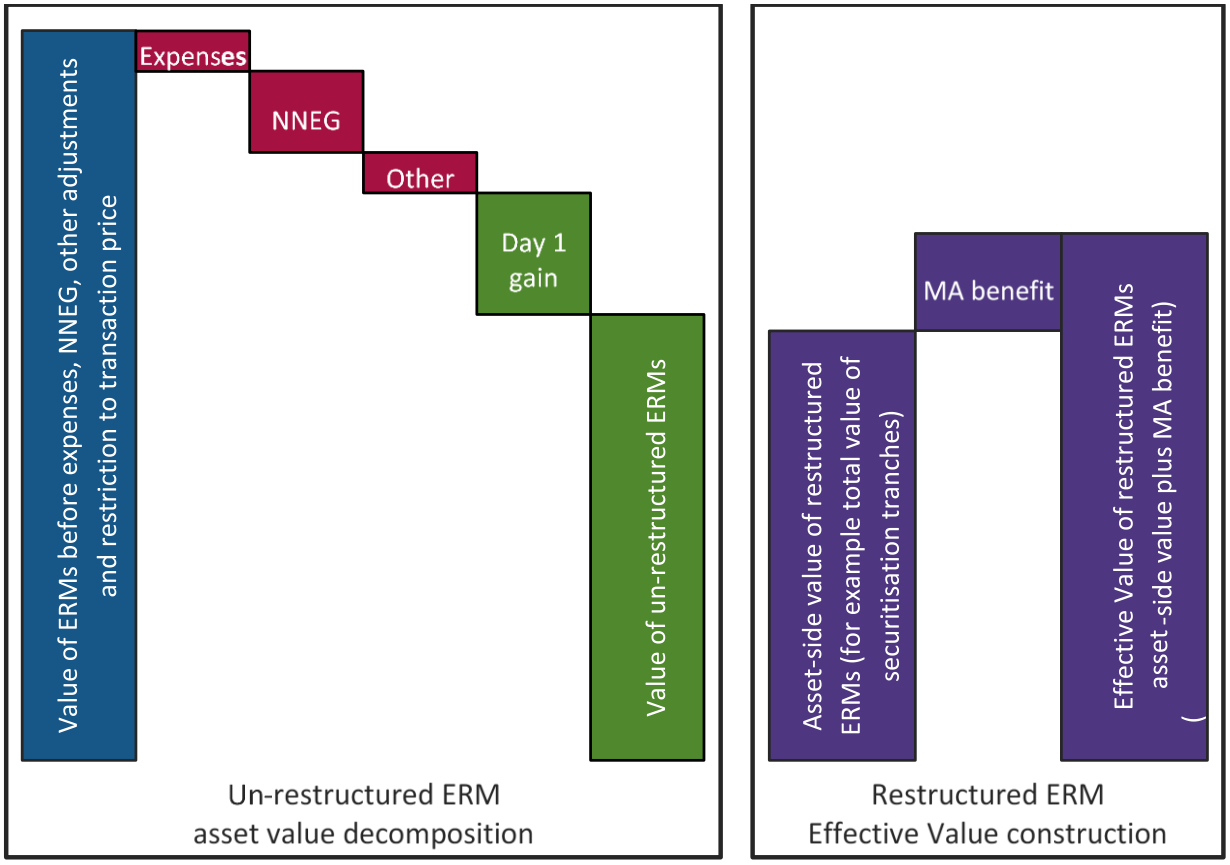
The 'Effective Value' of restructured ERMs is the total value of all tranches of the restructured ERMs on the asset side of the balance sheet, plus the MA benefit arising from the restructured ERMs on the liability side of the balance sheet. The right-hand side of Figure 2 below illustrates the construction of Effective Value, alongside an illustration of one way in which the value of un-restructured ERMs could be made up. The total value of the securitisation tranches is illustrated as being somewhat lower than the value of the un-restructured ERMs, to reflect the frictional costs of restructuring, on the assumption that an equation of value holds.

On the left-hand side of the chart, the value of un-restructured ERMs has been illustratively decomposed into:

- the value of expected ERM cash flows prior to deductions (i.e. as a risk-free loan on expected decrements) (in blue)
- expenses (in red)
- NNEG (in red)
- any other adjustments (for example to allow for pre-payment risk) (in red).

For the purposes of SS3/17, the remainder (in green) is referred to as the economic value of ERM cash flows. The PRA expects the Effective Value to be less than this amount. Calculation of the economic value should use methods and calibrations that are consistent with principles (ii), (iii) and (iv). The assessment will be carried out on a firm-by-firm basis to provide assurance that all of the risks to which the firm is exposed have been appropriately reflected, either in the value of the securitised assets or in the FS assigned to those assets in the MA portfolio.

Figure 2: PRA Effective Value Construction chart



Source: PRA

The Deferred Possession Test

Principles (ii) and (ii) give rise to the deferred possession test. The approach places a maximum value on equity release mortgage (ERM) cash flows of the equivalent loan without a NNEG or the present value of the deferred possession of the property. The value of the deferred possession of a property must be less than that on immediate possession.

In essence, the requirement that the present value of the deferred possession of the property must be taken into account requires firms to place a maximum value on the property (and the ERM plus MA) based on the value of a property reversion. The PRA has looked at the assessment of the discount rate on three methods – net rental yields, leasehold-freehold relativity and the Sportelli formula which is used in Land Tribunal cases for leasehold extensions which many consider favours the freeholder. The PRA has clear reservations on the use of the Sportelli formula.

The impact of the PRA's requirements is that although providers have universally ignored rental yields in the calculation of the NNEG, as explained above in Section 3.2, the PRA is requiring providers to consider them or something broadly equivalent. The underlying logic of the PRA's requirement is that with residents in situ the market value of the property is diminished and that there is an economic value to the use of the property. However, in assessing cash flows of matching assets market participants have no real interest in market rental yields or the present-day value placed on reversions – they are only interested in the ability of the property sale value to repay the ERM on redemption. There is a concern that the cap could give rise to over-reserving and it could be particularly onerous in scenarios where there has been a significant, potentially short-term, market adjustment. This is being investigated as part of the academic research and further analysis by the ERM working party.

The fourth principle

Principle (iv) states that the compensation for the risks retained by the firm as a result of the NNEG must be more than the best estimate cost of the NNEG. This is effectively a statement that a third-party underwriter of a NNEG put option would require to be paid more than the expected cost of claims and so, on the asset side, the value of the ERMs should be reduced by more than the best estimate cost of the NNEG.

PRA assumptions

CP13/18 also provides the PRA's view on the choice of assumptions at the present time both generally and in relation to the cap. They hold the view that the cap should be calculated on a risk-neutral method and that a minimum (net rental yield or leasehold-freehold relativity) deferment (discount) rate of 1% per annum should apply, with the PRA's central estimate being 2% per annum.

The PRA's stance is that since firms are fully exposed to the risk of house price growth, it is inappropriate to allow for house price growth in excess of the risk-free rate, which under a risk-neutral forward pricing measure amounts to a negative deferment rate.

The PRA also opine on volatility assumptions allowing for autocorrelation and idiosyncratic risk, proffering a range of 11-18% and a central estimate of 13% per annum. They have based these figures on indices (Halifax, Nationwide and ONS). No allowance is made for regional variations or information on individual property transactions (e.g. from HM Land Registry), to the extent that this has not been allowed for under idiosyncratic risk.

The Effective Value Test

There is a general presumption that the PRA's requirements can be met on a risk-neutral basis using Black Scholes methodology. This leads to an inconsistent treatment of ERMs relative to other assets such as corporate bonds, where the Matching Adjustment is calculated based on the expected impact of credit risk on future cash flows, rather than based on the cost to hedge credit risk. An Effective Value Test (EVT) is proposed using the PRA's central volatility assumption and a 1% deferment rate, although the PRA believe that 2% per annum is the best estimate.

The PRA states that firms can demonstrate that the Effective Value is less than the economic value of ERM cash flows using the following EVT approach for calculating NNEG risk. Firms should calculate the allowance for NNEG risk for the portfolio of loans as the sum of a series of allowances for each ERM for each annual period during which ERM cash flows could mature, each allowance being multiplied by an exit probability appropriate to the annual period determined using best estimate assumptions for mortality, morbidity and pre-payment. Firms should calculate the allowance for each loan and period using the Black Scholes option pricing formula shown below with the specified assumptions:

$$e-[KN(-d_2) - Se^{(r-q)T}N(-d_1)]$$

$$d_1 = \frac{1}{\sigma\sqrt{T}}\left[\ln\left(\frac{S}{K}\right)+\left(r-q+\frac{1}{2}\sigma^2\right)T\right]$$

$$d_2=d_1-\sigma\sqrt{T}$$

where:

N() is the standard Normal cumulative distribution function

S = Current reasonable estimate at the balance sheet date of the value of the property providing collateral against the ERM

T = term to maturity as described above

K = loan principal and expected accrued interest at time T

r = published Solvency II basic risk-free interest rate for maturity T, adjusted for use on a continuously-compounded basis

σ = 13%,

q = 1%.

3.7 General comments and concerns

In general, market practitioners prefer closed form solutions on practical grounds and provided they are properly tested against simulation based stochastic models, we do not think that this is unreasonable. The use of closed form solutions also assists regulators by making comparisons between firms easier. However, there is a danger that portfolio-specific risks are missed and we generally favour simulation based stochastic approaches to ensure that the closed form solutions are fit for purpose.

We have a general concern that given the growth and increasing importance of the ERM market that methods and assumption setting have not moved forward over the past 10-15 years. The PRA has rightly wanted to explore other approaches as set out in SS3/17 and CP13/18, but we feel that a more fundamental review is required. We have concerns about piecemeal adjustments rather than addressing the overall methods and bases used.

Our opinion is that any fundamental review should consider stochastic models which allow for autocorrelation of house prices, mean reversion and conditional heteroskedasticity. In addition, consideration should be given on whether mortality and long-term care decrements could be modelled on a stochastic rather than deterministic basis, although this may not have any significant impact on the results and few market participants currently follow this approach. Prepayments and sale delays may well be dependent upon economic conditions and could be appropriately modelled.

3.8 Literature review

We have carried out an initial review of academic and professional papers published in recent years covering the equity release mortgage and reverse mortgage market. The papers cover a wide range of issues relating to house prices and ERMs, although not necessarily always covering the valuation of the NNEG.

The aim of the review was to identify papers which would potentially offer “off-the-shelf” solutions to the valuation of the NNEG covering both simulation-based approaches and closed form solutions. We did not carry out a wider review of papers addressing alternatives to Black Scholes and Geometric Brownian Motion simulation techniques that are used in the investment market, such as Heston Models, given that the aim of our literature review was not to develop new approaches to valuing the NNEG ourselves.

We would add that there is no current market in the UK for residential property derivatives which would offer the opportunity to benchmark pricing of the NNEG. Those banks that were willing to provide funding for ERMs and/or consider pricing over-the-counter derivatives withdrew from the market after the 2007-8 financial crisis and have not returned. The recent return of banks and building societies as providers of ERMs does not mean that they are funding the products on balance sheet. Indeed, we believe that the only funding in the UK market currently comes from life companies, reinsurance companies and pension funds. Of course, this may change in the future given the growth of the market.

There is also no significant market in other equity release products in the UK that might also offer benchmarking opportunities. Sales of home reversions in the UK have been in rapid decline in recent years with only 23 sales in 2017 (source ERC).

Our general view is that, although there are some very interesting ideas, we have not found any definitive solutions for NNEG valuations. In addition, many of the papers continue to use GBM methods which are open to criticism.

The papers usually focus on stochastic methods rather than the closed form or analytical solutions which market practitioners and, indeed, regulators might prefer. A more comprehensive literature review comparison needs to be carried out as part of a research exercise aimed at comparing results based on various approaches used in the market.

The main points that we have noted are as follows:

- House prices exhibit autocorrelation (serial correlation), mean reversion, conditional heteroscedasticity, momentum effects, and jumps.
- The housing market is typically not homogeneous e.g. regional variations in the UK.
- Evidence that regional UK house prices exhibit GARCH effects. The papers mainly use simulation and do not always provide closed form solutions.
- AR(I)MA-(E)GARCH models predominate where GBM not used due to concerns about autocorrelation. Other approaches include VAR and MCMC.
- Jump diffusion processes used in some models to cater for large house price changes (shocks).
- Mix between real world and risk-neutral approaches.
- The risk-neutral models are usually found using risk-neutralisation techniques such as Esscher Transforms, Wang Transforms or maximum entropy approaches. The techniques are a mathematical way of going from a predictive "real world" probability distribution to a "no arbitrage" risk-neutral one. The resultant distribution does not necessarily include a deferment rate or rental yield.
- Stochastic discount factors sometimes used.
- Dependent joint life mortality mentioned in a couple of papers. There is clear evidence that the mortality rates (and indeed LTC rates) after the death of a partner are often higher and that rates are often lower when both partners are alive.
- Some of the models allow for rental yields and opine that increases in rental yields change the NNEG cost which seems to be based on the assumption that the overall return remains constant i.e. that an increase in rental yield reduces the capital return.
- Bank of England (Economic Journal) paper covers long-term discount rates in UK housing markets based on (rather geographically limited and select) information on leasehold and freehold property values. Maybe relevant to SS3/18 and CP13/18.

3.9 The way forward

We consider that it is now time to move forward the debate and consider whether the existing methods used continue to be appropriate given the increasing importance of the market. Independent academic research has been commissioned by the Institute and Faculty of Actuaries and the ABI through the Actuarial Research Centre to review the methods and assumptions used by market participants in valuing the no negative equity guarantee. The detail of the scope of the research can be found at https://www.actuaries.org.uk/learn-and-develop/research-and-knowledge/actuarial-research-centre-arc/research-programmes/equity-release-mortgages-no-negative-equity-guarantee.

Chapter 4: Valuation Methodologies

This section deals with the approach taken to placing a valuation on unstructured ERM assets on insurance companies' IFRS and Solvency II balance sheets.

The scope of this paper is to focus on actuarial valuations in insurance companies, placing the valuation methods used by other market participants such as banks are out of scope.

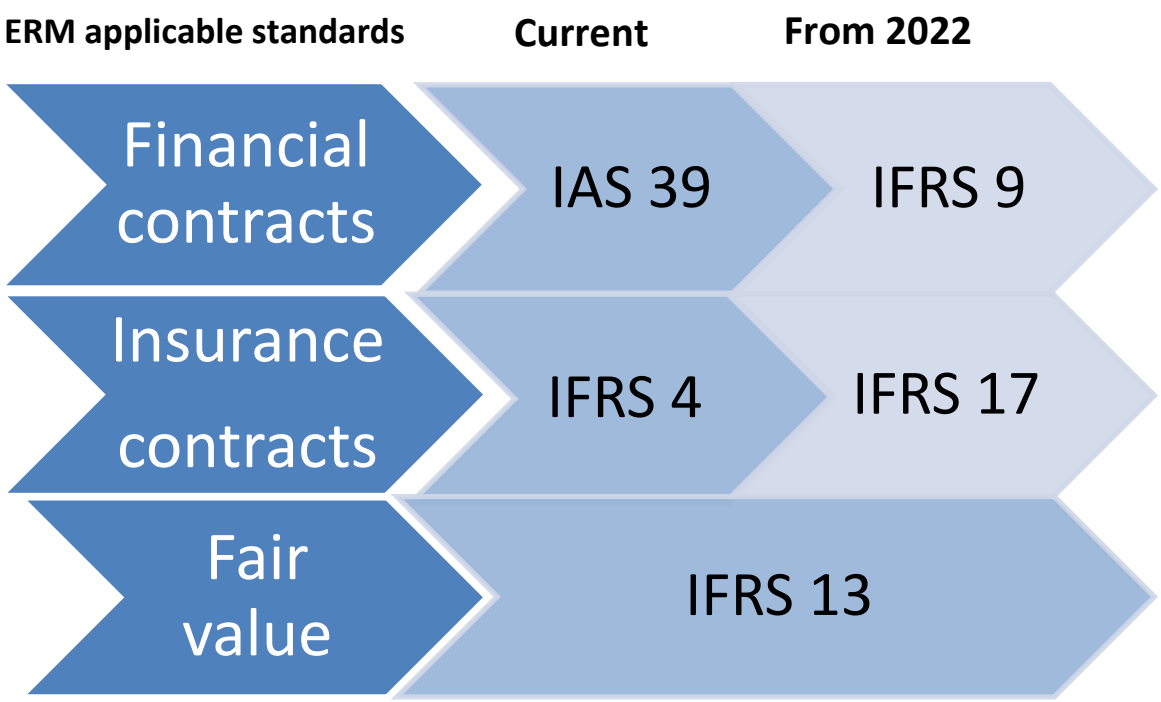
4.1 IFRS

Background

The methodology used to value ERMs for accounting purposes is driven by the relevant accounting standards; in general, IFRS is followed by UK insurers. Notwithstanding this, approaches to valuing ERMs vary since the rules are not prescriptive.

The diagram below sets out the relevant accounting standards that are/will be applicable.

Figure 3: Accounting standards for ERMs



Currently, the approach to valuing ERMs under IFRS should depend on which standard is adopted.

If the ERM is deemed to be an insurance contract, then under IFRS 4 the company could follow its previous accounting policies. So, as a starting point, that would be the methodology under 'old' UK GAAP – FRS26/27, which would typically use 'best estimate' assumptions, but would not necessarily be the same as the value which would be placed if the value were to be classed as 'fair value' under IFRS 13.

If the ERMs were deemed to be a financial instrument, then they would fall under IAS39. The company would either measure the entire contract at fair value through profit or loss (FVTPL) or would measure the host contract at amortised cost and the NNEG embedded derivative at FVTPL with fair value determined as described in IFRS13.

To date, most insurance companies have tended to classify ERMs as financial contracts with all changes in fair value going through the P&L, giving them a good match to annuities. It is worth noting that prior to IFRS17 being introduced, it made little difference whether practitioners classed ERMs as insurance or financial contracts since the treatment under IFRS 4 and IAS 39 can be similar (provided that the embedded derivative approach is not taken).

4.2 Key IFRS concepts and market practice

Elimination of day-1 gains

Going back a number of years, the approach to valuing ERMs for accounting purposes varied, with some companies reporting a profit on the origination of the asset. Alternatively companies would take account of the new business profit via the yield uplift used to value the liabilities (i.e. a lower ERM value, gives a higher yield which in turn produces lower annuity liabilities). As the assets became more common, the industry approach became more consistent – at least in the area of recognising up front profits.

The majority (70%) of the companies who answered the survey stated that they eliminated day-1 gain in the calculation of fair value. The rest showed both a carrying value and fair value in the accounts, the net effect achieving the same elimination of day 1 gains.

The majority of respondents to the question on how transaction expenses are treated made a day-1 loss on sales expenses and commission, which is consistent with IFRS13 below:

> *The price in the principal (or most advantageous) market used to measure the fair value of the asset or liability shall not be adjusted for transaction costs. Transaction costs shall be accounted for in accordance with other IFRSs. Transaction costs are not a characteristic of an asset or a liability; rather, they are specific to a transaction and will differ depending on how an entity enters into a transaction for the asset or liability.*

Assuming that the ERM is classed as a financial instrument, IFRS 9 refers to the valuation rules within **IFRS 13** which states:

> *When an asset is acquired or a liability is assumed in an exchange transaction for that asset or liability, the transaction price is the price paid to acquire the asset or received to assume the liability (an entry price).*
>
> *In contrast, the fair value of the asset or liability is the price that would be received to sell the asset or paid to transfer the liability (an exit price). Entities do not necessarily sell assets at the prices paid to acquire them. Similarly, entities do not necessarily transfer liabilities at the prices received to assume them.*
>
> *In many cases the transaction price will equal the fair value (eg that might be the case when on the transaction date the transaction to buy an asset takes place in the market in which the asset would be sold).*

IFRS 9 does not specify that a day one gain cannot occur, however it would be difficult to justify anything else:

> *The best evidence of the fair value of a financial instrument at initial recognition is normally the transaction price (ie the fair value of the consideration given or received, see also IFRS 13).*
>
> *If an entity determines that the fair value at initial recognition differs from the transaction price as mentioned in paragraph 5.1.1A, the entity shall account for that instrument at that date as follows:*

(a) at the measurement required by paragraph 5.1.1 if that fair value is evidenced by a quoted price in an active market for an identical asset or liability (ie a Level 1 input) or based on a valuation technique that uses only data from observable markets. An entity shall recognise the difference between the fair value at initial recognition and the transaction price as a gain or loss.

(b) in all other cases, at the measurement required by paragraph 5.1.1, adjusted to defer the difference between the fair value at initial recognition and the transaction price. After initial recognition, the entity shall recognise that deferred difference as a gain or loss only to the extent that it arises from a change in a factor (including time) that market participants would take into account when pricing the asset or liability.

Given the difficulty in justifying data from observable markets, it is expected that all companies will eliminate any day 1 gain at initial recognition. In the above, level 1 means for assets which have an observable market value.

Potential approaches to eliminating any day 1 gain

The survey asked how companies eliminated the day 1 gain. The following options were provided in the survey:

- Amortisation of the gain over time
- By back-solving an addition ('x') to the discount rate fixing x by **cohort** (x is expected not to change except under extreme circumstances
- By back-solving an addition ('x') to the discount rate fixing x by **policy** (x is expected not to change except under extreme circumstances)
- By back-solving an addition ('x') to the discount rate at transaction date of new sales generated and using this across new and existing business (x is the same across all business in force at any one time and is updated periodically)
- By using an addition to the discount rate across all business in force which is estimated based on market prices of ERMs to be the rate at which transactions eliminate the day-1 gain
- By using an addition to the discount rate across all business in force and which is based on implied liquidity premiums seen in the market for other assets (e.g. bonds)

Survey Results:

There was no clear consistent approach across companies, with some companies using a combination of approaches.

4.3 IFRS hot topics

A debate has been ongoing as to whether ERMs should be classified as insurance contracts as opposed to financial instruments. From 2021, ERMs will either be measured under IFRS 9 at FVTPL (i.e. similar to now) or under IFRS 17 (if classed as insurance contracts).

Arguments for ERMs being classed as insurance

A contract is generally considered to be an insurance contract unless there is no significant insurance risk, i.e. there is no scenario with commercial substance that could result in the insurer paying significant additional benefits. Even if the insured event is extremely unlikely it can still give rise to an insurance contract if it has commercial substance and can result in significant additional benefits being paid. This is described in IFRS17 paragraphs B17 and B18.

The no negative equity guarantee (NNEG) offered by ERM providers in the UK is a financial guarantee, which can have commercial substance. Since this guarantee pays out on the policyholder dying or moving into long term care, it can be argued that this guarantee is an insurance risk, implying that the ERM is an insurance contract.

Although there is no payment to the policyholder in respect of exit, in this context the payment is considered to be the difference between the loan outstanding and the house value, which is absorbed by the ERM provider under the NNEG.

Arguments against ERMs being classed as insurance

The following sets out arguments as to why ERMs should perhaps be excluded from IFRS17, and are not arguments on how IFRS17 should be interpreted.

- An ERM is a form of collateralised loan, which is usually considered to be a financial contract
- Market practice is for providers is to hold ERMs as a financial asset on the balance sheet
- The NNEG arguably resembles a financial option

Considerations to be taken into account

As part of an analysis on whether the insurance risk is "significant", one would need to determine the expected value of the loan and the property under different scenarios, and the following factors would contribute to these results:

- LTV
- Age
- The distribution of future house prices, and associated parameters
- The insurance premium embedded in the interest rate (that is, the spread over a similar loan without an NNEG)
- Restructuring arrangements

Implications of treating ERMs under IFRS 17

In practice, the standard under which insurance companies have treated ERMs has had little practical impact on the valuation of ERMs as the majority of companies have tended to measure ERMs using a fair value approach, however they are classified. However, with the approach of IFRS 17, the question as to whether ERMs are insurance contracts or not becomes more important.

If ERMs are classed as insurance contracts then they would be valued under IFRS 17, with the following implications:

- ERMs would no longer be valued at 'fair value'.
- A CSM would be required, which may change the profile of profit recognition relative to IFRS 9.
- ERM values may then differ between Solvency II and IFRS (as Solvency II balance sheet would require a fair value).
- On day 1 IFRS 9 and IFRS 17 (through the CSM value) would both give the same valuation equal to the transaction price. It is also conceivable (although unlikely) that under IFRS 17 situations could arise whereby ERMs could be classified as onerous contracts, in which case an upfront loss would be recognised.
- How any changes in assumptions and historic house prices feed through to P&L or CSM needs to be thought through in detail.

In our view, it can be argued that the insurance risk of the NNEG is "significant" for some ERMs, particularly for older policyholders who are close to being in negative equity. This would lead them to being classified as insurance contracts, even though the NNEG arguably resembles a financial option more than an insurance contract.

One alternative would be to 'unbundle' the NNEG from the ERM for IFRS 17 valuation purposes, however this is unlikely to be permitted due to interdependence between the two (IASB, 2018). Although the mortgage loan could be valued without NNEG, it is not possible to value the NNEG without the loan.

Recent debate has centred on if a change needs to be made to the current version of IFRS 17. The IASB staff has indicated that it is aware that some loans with small amounts of insurance fall within the scope of IFRS 17 and that it may consider proposing an amendment to IFRS 17 to remove such contracts from scope, allowing them to be valued under IFRS 9 (IASB, 2018). Adopting IFRS 9 would have the advantage of consistency with current market practice.

We expect the industry to continue to engage with the IASB on this issue.

4.4 Solvency II

Article 75 of the Solvency II delegated acts (European Commission, 2009) states that assets 'shall be valued at the amount for which they could be exchanged between knowledgeable willing parties in an arm's length transaction'.

Article 9 (European Commission, 2009) states that insurance and reinsurance undertakings shall value assets in accordance with international accounting standards adopted provided that those standards include valuation methods that are consistent with the valuation approach set out in Article 75 (European Commission, 2009). Where the valuation methods included in international accounting standards are not consistent with the valuation approach set out in Article 75, insurance and reinsurance undertakings shall use other valuation methods that are deemed to be consistent with Article 75.

The delegated acts also state that in order to ensure that valuation standards for supervisory purposes are compatible with international accounting developments, insurance and reinsurance undertakings should use market consistent valuation methods prescribed in international accounting standards adopted by the Commission in accordance with Regulation (EC) No 1606/2002, unless the undertaking is required to use a specific valuation method in relation to an asset or liability or is permitted to use methods based on the valuation method it uses for preparing its financial statements. (Note that a valuation hierarchy exists, with quoted market prices in active markets for the same assets being the default valuation method).

There is however no clear definition of 'market consistent' within any accounting standards, and as such this rule within the delegated acts is of little help to practitioners.

Our survey and interviews with market practitioners indicate that the IFRS 'fair value' of ERMs is typically equivalent to the asset value held on the Solvency II balance sheet. However, as discussed above, the approach taken by practitioners to the elimination of the day-1 gain varies.

Implications of recent regulatory guidance

Over the last two to three years, insurers have been working on ways to restructure illiquid assets such as equity release mortgages (ERM) into matching adjustment eligible assets.

This has given rise to various concerns from the PRA related to the valuation of the assets, including ensuring that risks are properly allowed for, that unrated assets are treated appropriately and that there is appropriate mapping to fundamental spread categories.

On 31 March 2016, the PRA released Discussion Paper 1/16 'Equity release mortgages' which covered certain specific points on the valuation of ERM and their treatment following restructure. In December 2016, the PRA released Consultation Paper 48/16 which provides a summary of the feedback and some additional thoughts on the content discussed within the Discussion Paper.

The supervisory statement and policy statement follow on from this consultation, SS3/17 being published in July 2017. It was followed by CP21/17, which contains some paragraphs discussing the

MA eligibility of ERMs. On 2 July 2018, the PRA published CP 13/18, titled “Solvency II: Equity release mortgages”, which sets out further detail on SS3/17.

Further details on CP13/18 and SS3/17 have been covered in Chapter 3, Valuation of NNEG. At time of publication CP13/18 has now closed, and the results are expected to be published by the end of 2018. The implementation of the new regulations has been deferred to December 2019.

4.5 Implementing SS3-17/CP13-18

Calculating economic value

The economic value of the ERM is the discounted value of the best estimate cash-flows (using a risk free rate to discount), less expenses, less NNEG, less other risks (e.g. allowance for prepayments). The PRA has set out a SS3/17 compliant method of calculating the economic value of NNEG in CP13/18 para 3.20, referred to as the Economic Value Test (EVT).

If the EVT fails, then the PRA has clarified in CP13/18 that it expects firms to adjust their ERM structure, valuation or internal ratings accordingly, reducing the MA benefit of the restructured ERMs to below the level of the cap.

Worked example

The following numerical examples use the approach set out by the PRA in CP13/18 to calculate economic value of ERMs, using a range of different deferment rates. This “risk-neutral” valuation for NNEG is compared to using a “real world” valuation. In keeping with Hosty et al (Hosty, 2008), we have assumed that the underlying property follows a lognormal distribution. The NNEG has been valued as a series of put options on the underlying residential property, using the Black ’76 option pricing formula (Black, 1976). The key difference between “risk-neutral” and “real world” in this context is how the forward price of the property in the Black ’76 formula is estimated.

There is no liquid market for forward contracts on residential properties, meaning that there is no “market consistent” forward price readily available.

In the “risk-neutral” formulation, the forward price of the house F_t, at time t is equal to the current price, accumulated for t years at the risk-free interest rate r, less a deferment rate q. It can be shown that this method is consistent with an assumption of “no arbitrage”, in a market where the Black ’76 assumptions are met (for example, where it is possible to borrow unlimited quantities of money at the risk-free rate, and short sell the underlying property).

1. $F_t = e^{t(r-q)}F_0$

In the “real world” formulation, the forward price of the house at time t is equal to the current house price, accumulated at an expected HPI (house price inflation) rate i. This method assumes that when agreeing a notional forward contract to take possession of the property at time t, the settlement price would be based purely on expected HPI over the period. This would require the purchaser and the seller of the contract to agree on a view of HPI, with the purchaser being fully exposed to the risk of the house price falling, and the seller fully exposed to the upside risk.

2. $F_t = e^{ti}F_0$

By substitution, we can see that the two approaches are equivalent if $i = r - q$. If $i > r - q$, then the forward house price is higher, placing a lower value on the NNEG option. In our modelling, we have assumed a “real world” HPI of 3.5%, representing a spread over market expectations of the retail prices index (RPI). This value is presented for illustration purposes only.

The risk free rate r is assumed to be 1.5%, based on long term GBP swap rates at the time of calculation. For these parameters, any positive value of q will result in the "real world" method placing a lower value on the NNEG. It is outside of the scope of these examples to comment on the appropriateness of each method.

The modelling has made assumptions for policy exits (deaths, transitions to long term care and early repayments), and using these a probability has been assigned to the loan being redeemed in each future time period. At each redemption, a cash flow has been calculated as the accumulated loan value, less the value of the corresponding NNEG option. The economic value is calculated as the present value of future cash flows.

Example 1: 70 year old customer, 30% LTV

Assume an ERM of £30,000 on a property of value £100,000. The customer interest rate is a fixed 4% p.a., and LTV is 30%. The policyholder is 70 years old.

House price volatility is assumed to be 13% p.a. The risk-free term structure of interest rates is taken from the EIOPA published technical information. For simplicity, we have disregarded frictional costs of restructuring.

Assume that the MA benefit on the restructured ERM is £6,000 (20%), after deducting a fundamental spread (FS) of £1,500. The effective value of the loan (pre economic value cap) is £30,000 + £6,000 = £36,000.[1]

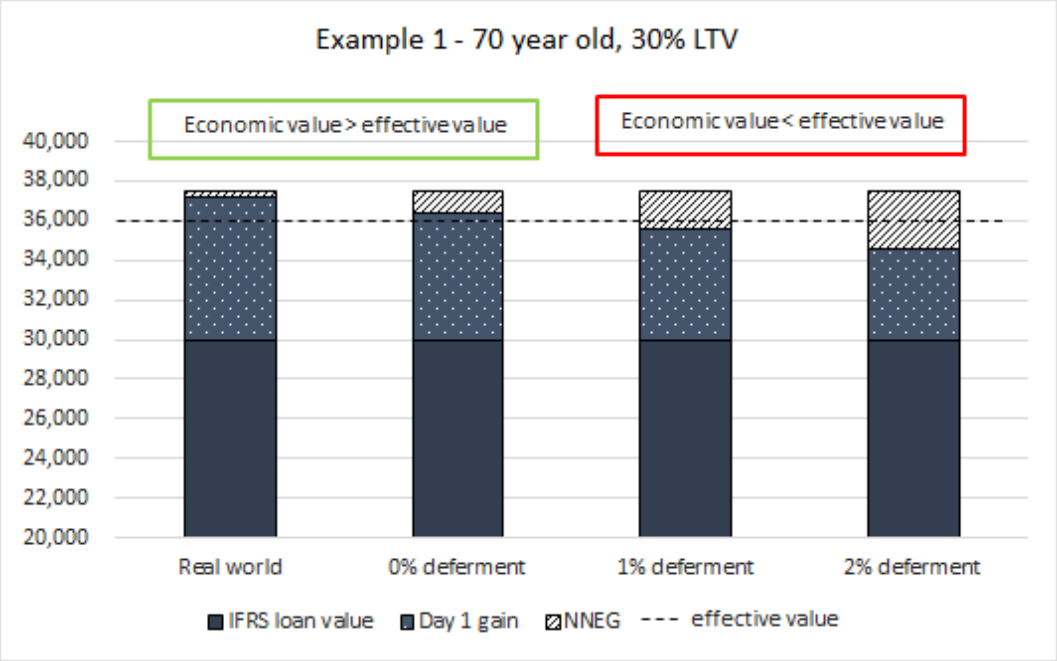
The economic value is calculated as the PV of redemption cash flows less NNEG and expenses. This can be expressed as asset value, plus day 1 gain (gross of NNEG), less NNEG and expenses. We assume as a simplification that the day 1 gain gross of NNEG is £7,500, equal to the MA gross of NNEG. This gives an economic value gross of NNEG of £37,500.

Table 2. EVT examples based on 70 year old, 30% LTV

Scenario	Assumed HPI	Effective value	PV NNEG	Economic value cap	EVT
Real world	3.5%	36,000	269	37,231	Pass
Risk-neutral, 0% deferment rate	Risk free	36,000	1,061	36,439	Pass
Risk-neutral, 1% deferment rate	Risk free - 1%	36,000	1,822	35,678	Fail
Risk-neutral, 2% deferment rate	Risk free - 2%	36,000	2,866	34,634	Fail

[1] MA calculation is out of scope of these examples.

Figure 5. EVT example 1



In the 1-2% deferment rate scenarios, the economic value cap bites, meaning that the MA benefit on the restructured ERM breaches the cap.

The implication under SS3/17 is that the gross yield on the restructured ERM is overstated, or the risk deduction (fundamental spread) is understated, relative to the underlying economic value of the loan.

Example 2: 70 year old customer, 40% LTV

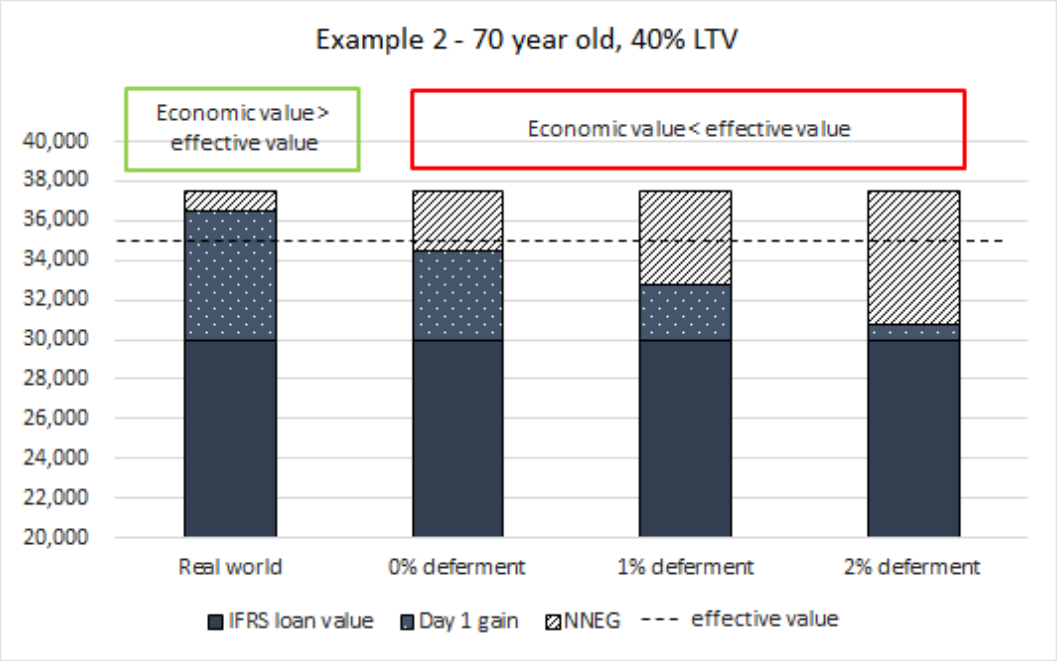
In this example, we look at a loan similar to example 1, with a higher LTV. To allow for the higher NNEG risk, we assume that the fundamental spread has increased to £2,500, reducing the effective value to 35,000.

Compared to Example 1, the 10% increase in LTV has caused a significant increase in NNEG risk, meaning that the EVT no longer passes under a 0% deferment rate.

Table 3 EVT examples based on 70 year old, 40% LTV

Scenario	Effective value	PV NNEG	Economic value cap	EVT
Real world	35,000	974	36,526	Pass
Risk-neutral, 0% deferment rate	35,000	3,006	34,494	Fail
Risk-neutral, 1% deferment rate	35,000	4,648	32,852	Fail
Risk-neutral, 2% deferment rate	35,000	6,663	30,837	Fail

Figure 6. EVT example 2



Example 3: 80 year old customer, 40% LTV

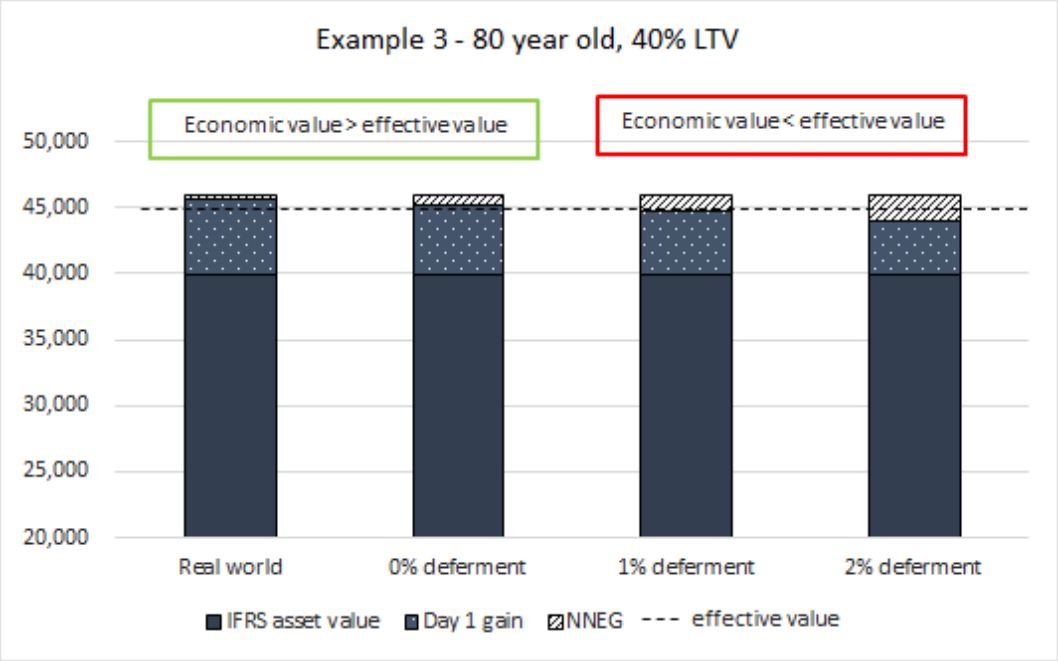
The asset value of the loan is assumed to be £40,000.

The gross of FS MA benefit is taken to be £6,000 (15%), with fundamental spread deduction of £1,200, yielding a net MA benefit of £4,800. As a simplification, we again assume the day 1 gain is equal to the gross of NNEG MA.

Table 4 EVT examples based on 80 year old, 40% LTV

Scenario	Effective value	PV NNEG	Economic value cap	EVT
Real world	44,800	247	45,753	Pass
Risk-neutral, 0% deferment rate	44,800	788	45,212	Pass
Risk-neutral, 1% deferment rate	44,800	1,256	44,744	Fail
Risk-neutral, 2% deferment rate	44,800	1,881	44,119	Fail

Figure 7. EVT examples based on in-force business

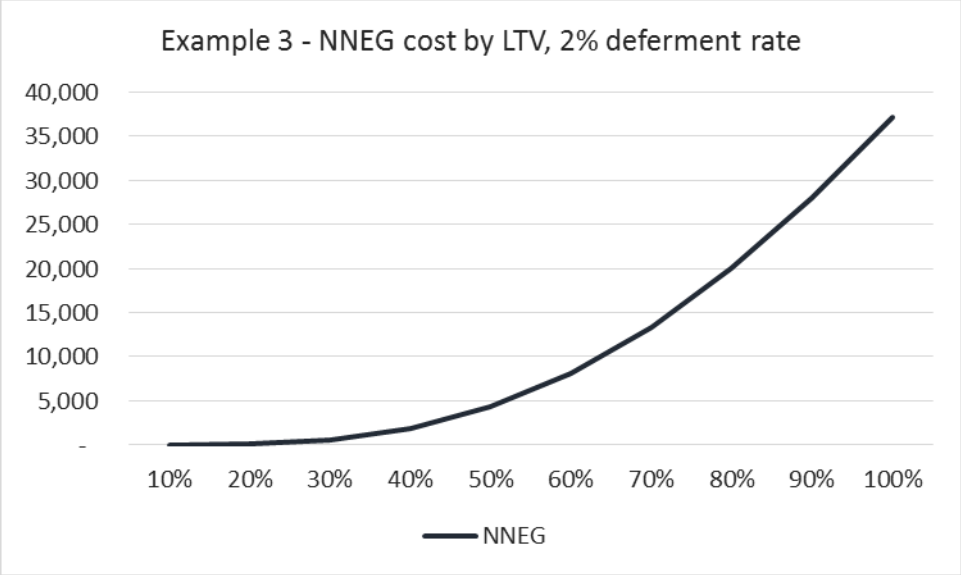


In this example, the economic value cap bites for the 1% and 2% deferment rate scenarios. On 1% deferment it is very close to effective value, implying that only a small amount of MA would be capped.

Compared to Example 1, the higher LTV increases the value of the NNEG, while the duration of the policy has shortened, which works to reduce the NNEG. Overall despite narrowly failing the EVT at 1% deferment rate, the NNEG value is low as a percentage of loan balance, meaning that the EVT is less sensitive to choice of deferment rate.

Figure 8 below shows how LTV affects the value of NNEG using a 2% deferment rate. The NNEG cost increases rapidly once LTV is higher than 30%, due to the expectation that the loan (4% interest rate) will grow much more rapidly than house prices (analogous to risk free, less 2%). For LTVs greater than 50%, the entire day 1 gain is cancelled out by NNEG, effectively meaning that the loan does not provide a material MA benefit.

Figure 8. Sensitivity of EVT NNEG to LTV



Conclusions

The following conclusions can be drawn:

- The EVT is highly sensitive to the choice of deferment rate. A higher deferment rate makes the cap on MA significantly more onerous.
- Higher LTV loans and loans to younger lives are more likely to be affected by the EVT.
- The NNEG cost using a “risk-neutral” approach can be multiple times higher than the NNEG calculated using a “real world” approach, both calculated using the Black 76 formula. This raises the question of model risk for practitioners who are using the “real world” approach.

4.6 Survey Results

General valuation principles

Many firms eliminated day 1 gain as part of their valuation methodology. The general consensus for calculating a discount rate was to use a risk-free term structure, plus illiquidity premium. There were a wide range of different methods for calculating illiquidity premiums, based on different ways to eliminate day 1 gain, and allow for NNEG and interest rate movements between valuations. The implication of this is that while most practitioners will agree on the initial valuation of ERMs, there is potential for ongoing valuations to diverge over time.

The lack of consensus in valuation methodology demonstrates the complexity of ERMs. This paper does not take a view on the appropriateness of these methodologies.

NNEG valuation

Similarly to the worked examples above, almost all firms surveyed used cash flow projection models, with a Black Scholes or Black 76 formula to calculate NNEG.

The majority of firms surveyed used the “real world” approach for valuing NNEG. The implication of this is that some practitioners may not pass the EVT in its current form, and would be required to reduce the MA benefit that they are claiming from ERMs. There is also potential for inconsistency between the Solvency II and IFRS valuations, if the IFRS valuation of NNEG continues to be on a “real world” basis.

Chapter 5: Securitisation in the Equity Release Market

The previous sections cover the whole loan ERM portfolios, their assumptions and the methods that are used to value them within insurance companies. Several insurers in the UK market have put in place transformations, through the use of securitisations using special purpose vehicles (SPVs), which aggregate the individual ERM loans within their portfolios.

This section sets out:

- The need for and features of these securitisations
- How the notes issued by them are valued
- The treatment of these securitisations under Solvency II in calculation of both the technical provisions and Solvency Capital Requirement

This section is supplemented through a combination of market survey information and some sample scenarios and analysis that has been performed using a test portfolio and securitisation structure.

5. The need for and features of these securitisations

5.1. Why structure a portfolio of ERMs?

The UK ERM market has been in existence for over 25 years, with a designated industry trade body, the Equity Release Council, formed in 1991.

In a number of insurance firms, ERM assets have been used to back long term business, in particular annuities. The long tail of the cash flows on these ERM portfolios has traditionally been viewed as a good match for the long-dated liability cash flows, and it is at these long durations that the supply of suitable alternative assets is low. Under the Solvency I regulatory regime, when holding ERM assets in their raw form, firms have been permitted to make an appropriate allowance for the risk adjusted return on their ERM portfolios in calculating the value of the liabilities that the assets are held to match, both in base and stressed conditions.

Insurers have not been the only issuers of ERM assets though, with Banks and Building Societies both having had either an historic, or in some cases current, presence in the origination market. As for the insurance companies, there has historically been limited desire to structure their ERM portfolios in the same manner as other mortgages, which is more a reflection of the size of the relative lending markets than anything else.

However, a number of reasons have led firms to consider structuring their ERM portfolios:

- **Economic Risk Transfer** – Pre credit crisis, it was commonplace in the UK for portfolios of residential or commercial mortgages to be pooled and notes, termed either residential or commercial mortgage backed securities, to be issued from these pools into capital markets. This would both transfer the economic risk of the pools into capital markets as well as provide liquidity to purchase more mortgages, gaining leverage on existing lending. This same mechanism was used by Aviva in particular, through the Equity Release Funding (ERF) securitisations. In addition, within the US market, there have also been a small number of reverse mortgage[2] securitisations, such as the Structured Asset Securities Corporation (SASCO) series. However, the use of securitisations for this purpose was and remains less common amongst insurers, particularly given that these portfolios were used to back annuity business and annuity premiums were a natural source of liquidity to facilitate lending for a number of business models.

- **Liquidity management –** The credit crisis led to Banks seeking additional liquidity on the balance sheet. For ERM, historically this led to a number of banks that were active in the UK

[2] This is the US term for Equity Release Mortgages

market, as either funders or originators, withdrawing funding from the market. Use of a transformation allows the portfolio to be converted into a more marketable, liquid form that may subsequently be sold into capital markets if needed. This is also not widely used.

- **Stabilising long dated cash flow variability to improve matching –** The cash flows arising from ERM assets can provide a good match for insurance liabilities. However, there is a relatively large amount of uncertainty in the timing and size of the longest dated cash flows, resulting from 'lumpy' redemptions as the ERM portfolios decrease in size and lose critical mass as well as the increased risk of the NNEG biting. Structuring portfolios to separate the 'safer' cash flows that are most appropriate to match the associated long dated liabilities can help to reduce the risks arising from this variability, and increase the ability to match these liabilities more accurately.

- **Solvency II and the Matching Adjustment (MA) –** As noted above, under Solvency I, insurers were able to achieve attractive capital treatment of the ERM assets, both under Pillar 1 through their inclusion within the risk adjusted liability discount rate and under Pillar 2 (the Individual Capital Assessment, or ICA) through an illiquidity premium on the discount rate in base and stressed conditions.

  The implementation of Solvency II and the advent of the MA saw a change in the standards that asset holdings needed to meet in order to qualify for this treatment, specifically around the need for the cash flows of the assets to be absolutely "fixed" in the absence of a credit event, not just reasonably predictable (as is the case with mortality/morbidity and early redemption driven timings of ERM cash flows).

The PRA set out in its October 2014 (PRA, 2014) letter that "ERMs would be unlikely to qualify for inclusion in a matching adjustment portfolio" and this position has been re-affirmed in the PRA's recent statements.[3] In order to achieve a capital treatment that is more aligned with that under Solvency I, firms are required to restructure the portfolios of ERM assets, with securitisation proposed (but not limited to) being one of the viable solutions.

This left insurers with a range of options:

- **Take no action -** Where ERM portfolios are small or the impact on the MA portfolio[4] / own funds would be immaterial, it may be preferable to accept the exclusion of ERMs from the MA portfolio. Indeed, even where the effect is more material, the Transitional Measures in Solvency II allows any adverse impact for business written before 01.01.2016 to be phased in over an extended period, where the ERM assets were used to back technical provisions under Solvency I.

- **Dispose of assets -** Removal of ERM assets and replacement with MA portfolio-friendly assets is also an option. However, the disposal of a portfolio of ERM assets is not a simple transaction and given the low volume of trades and illiquidity within the market, efficient disposal or transfer of the risk into capital markets is likely to require some form of transformation into a capital market friendly instrument. Any adverse impact from this course of action would be booked immediately.

- **Securitise using an SPV -** Use a securitisation structure to convert the ERMs to a series of notes so that a large part of the cash flows meet the MA eligibility requirements (e.g. through issuance of a large senior note with fixed cash flows). In the simplest form of securitisation, a portfolio of ERMs can be securitised and two notes issued, namely a senior tranche, with fixed cash flows, and a junior tranche that takes the residual cash flows arising from the portfolio. The fixed cash flows within the senior note are designed such that they are MA compliant, and are placed within the MA portfolio.

[3] In Supervisory Statement 7/18, July 2018

[4] This is the pool of assets and liabilities that is separately identified, managed and has been approved by the PRA to include an MA in the discount rate.

Given the nature of the resulting securitisation and the interaction with the Solvency II Standard Formula for spread risk, this also led firms to needing to obtain approval for (Partial) Internal Model to achieve the desired capital result.

All in all, the structuring and obtaining these necessary approvals are time, cost and resource intensive. However, given the size of firms' holdings and the potential for unfavourable capital treatment, a number of insurance ERM writers within the market have securitised some or a large part of their ERM portfolio.

We had five firms respond to our survey saying that they had performed a securitisation of their ERM assets whilst one provider had chosen not to. The reason for this provider choosing not to securitise is likely to be because they are currently using standard formula, under which the capital requirement for securitised ERMs is prohibitive.

5.2. Are there any alternative options available?

The PRA's suggested solution to the issues arising within the Matching Adjustment focused on securitisations. However, within its recent supervisory statement (SS7/18) the PRA reiterated that it "does not have a preference for the way in which firms choose to restructure, pair or group their ERM assets for the purposes of satisfying the MA eligibility criteria."

This suggests that alternative methods to achieving MA compliance may be possible. Some examples of possible solutions include:

- Bespoke derivative solutions, hedging out the cash flow timing uncertainty risk that arises within the portfolios.
- Use of some form of external guarantee to fill in the ERM cash flow gaps / smooth the income into the MA portfolio.
- Using reinsurance to transform the portfolio of ERM assets into an MA eligible form.
- Use of a structured asset such as a total return swap, with the ERM assets as underlying collateral.
- In addition, we are aware through discussions that investment banks have considered a range of solutions for the insurance market to achieve the desired capital treatment by using external vehicles to change the nature of the insurance investment in full.

Our survey of UK market participants indicates that none of these solutions have obtained approval for ERM assets to date or come to market in earnest. However, as the size of the ERM market increases and remains attractive to new entrants, we may see some of these approaches being explored further. As the prevalent solution is the securitisation approach, the rest of this paper therefore focuses on securitisation.

5.3. Features of the securitisations

The use of structuring is a well-established approach for managing a book of mortgage cash flows. Securitisations have been widely used within capital markets within the banking industry to transfer risks to capital markets and turn a portfolio of illiquid individual assets into a more palatable, liquid form for external investors.

However, as securitisations have been significantly less widely used within the insurance sector, we have set out some of the features that those securitising ERM assets have considered within the MA structures.[5] In principle, a securitisation allows the issuance of a series of notes from a portfolio of

[5] This is not intended to be a "lesson in securitising" assets more generally. At this point in time, the structures in place have been developed to obtain MA compliance, so are really for the purposes of meeting specific regulatory requirements.

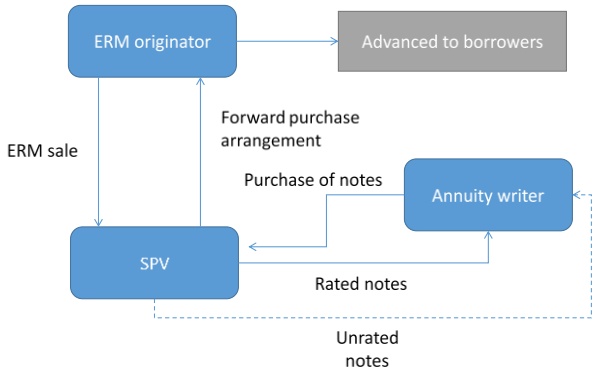
assets, each of which makes up a waterfall payment structure where each layer that is subordinated to another carries an increased level of risk.

Within such a structure for ERMs:

- The ERMs assets are transferred to a SPV from the ERM originator
- The SPV issues a series of debt notes (and equity) secured on the cash flows of the ERM
- The debt notes are purchased as an asset by the fund writing annuity business (or an external third party).

This is outlined within Figure 9 below:

Figure 9. ERM securitisation structure



Ownership of the SPV and notes

The SPV could be owned either within or outside of the insurance group. Our survey indicated that the common re-structuring approach involves the SPV being a wholly owned subsidiary of the entity which contains the MA portfolio.

The notes issued by the SPV are then bought by a combination of the MA portfolio and another investor. In February 2015, the PRA issued a clarification that considers a structure where all the tranches held by the same entity which contains the MA portfolio could be classified as an 'intra-entity' transaction. This allows the MA benefit secured to be preserved on the Solvency II balance sheet for group consolidation purposes, rather than be eliminated as may be the case for 'intra-group' transactions under Solvency II otherwise. Our survey showed five firms who held all tranches in the same entity which contained the MA portfolio thus being classified as an 'intra-entity' transaction.

However, this does not preclude firms seeking to transfer some of the risks outside of the Insurance Group. For example, one would still achieve the desired consolidation treatment under Solvency II if

Insurance providers looking to sell tranches into capital markets will have a number of additional considerations (and requirements) to help make the assets complaint and attractive to external investors. We do not cover these items in this paper.

any of the tranches were sold to a counterparty outside of the group. This is demonstrated by one firm in our survey having sold their junior note to an external third party in the market.

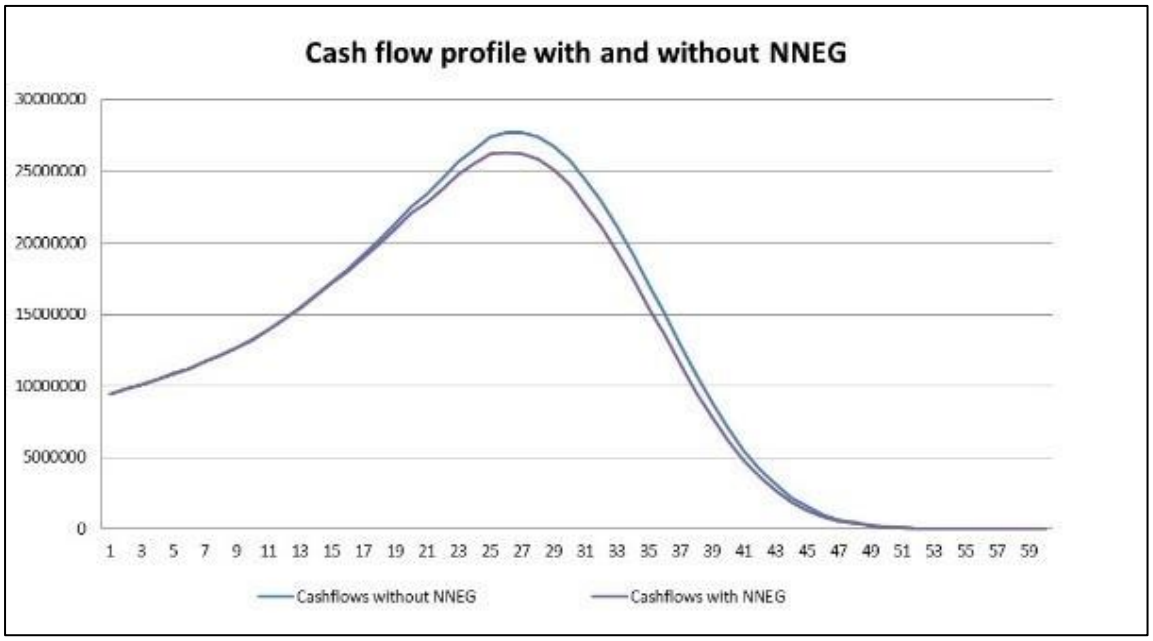
Specific design features

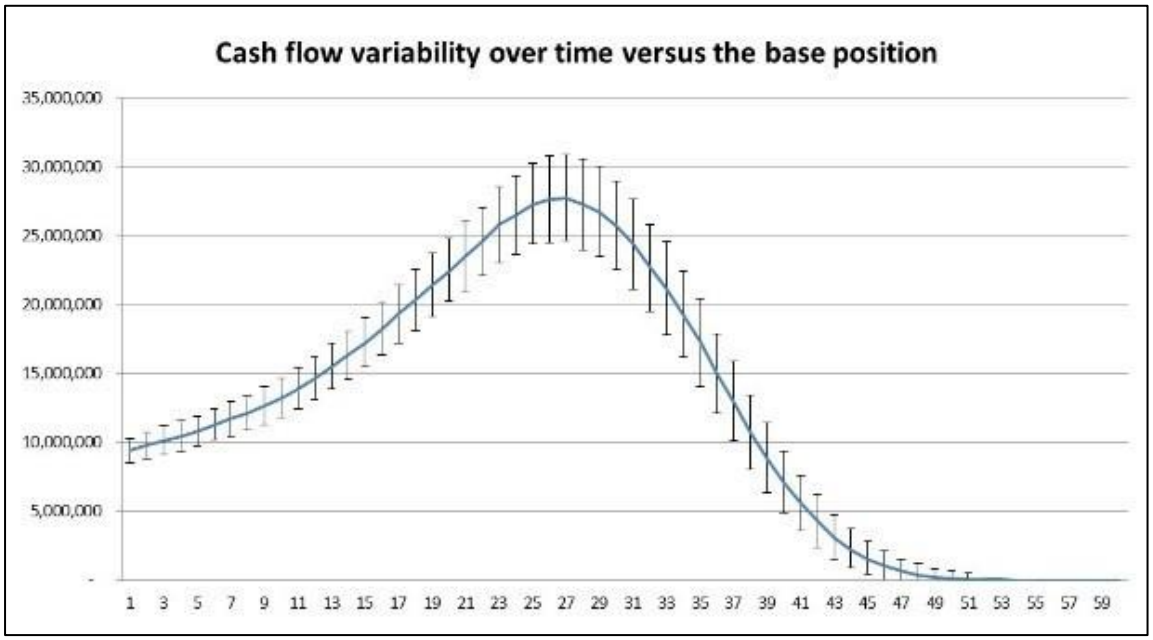
There are a number of decisions to be made within setting up a structure. Some examples of variations are set out in this section, but we note that the balance between scale, optimisation, operational complexity and other costs means that there is not a simple "one size fits all" approach for all firms.

Before introducing these variants, it is helpful to understand the risks that one faces by issuing a fully fixed series of note payments from a portfolio of ERMs.

Figure 10 below sets out the best estimate cash flows from an ERM portfolio as well as the level of variability around those cash flows that are produced using a stochastic model.

Figure 10. Variability of ERM cash flows





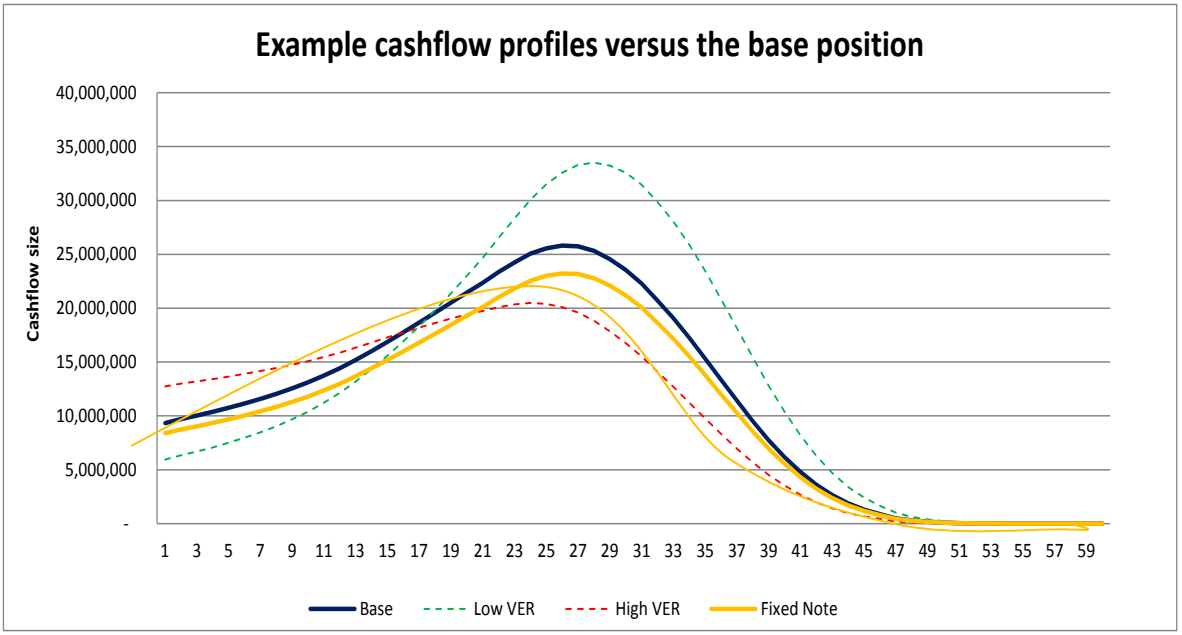
ERMs are not typical credit assets like bonds or mortgages – firstly, 'default events' are actually the operation of the NNEG as intended so not really default events at all, and secondly their timing is very back-ended – as the diagram above indicates, the typical ERM product structure of low issuance LTVs and accumulating interest means that any such event is typically not expected until a long way into the future.

In an unstructured world, prepayment experience and longevity events predominantly vary the timing, rather than the value of cash flows, with any impact on the balance sheet simply attributable to the difference between the earned customer rate (less NNEG and costs) and the reinvestment rate (i.e. the rate that can be earned on funds redeemed).

However, securitisation adds an element of fixity to the cash flow profile, which makes the timing of the cash flow receipts from the ERM portfolio all the more important. The impact of this can be illustrated in Figure 11 below.

If the orange line was the level at which the cash flows were fixed, there are scenarios (as illustrated by the green dotted line, which is based upon a reduced VER scenario) where the SPV would need additional liquidity to meet shortfalls in early years, with excess cash flows arising from the ERM portfolio in later years. Conversely, in a higher VER scenario, illustrated by the path of the red dotted line, the ERM portfolio would be providing excess cash into the SPV that would need to be re-invested in the early years in order to meet shortfalls in later years.

Figure 11. Variability of timing of cash flows



In assessing how resilient the structure is to events which change the shape of cash flows, hence the ability of the SPV to make payments on the senior notes as they fall due, firms therefore consider items such as:

- Higher than expected mortality rates (or rate of transfer into long-term care) leading to higher early cash flows but lower later cash flows in the portfolio; or lower than expected mortality rate (or rate of transfer into long-term care) leading to the opposite effect.

- Higher than expected VERs, leading to higher early cash flows but lower later cash flows in the portfolio; or lower than expected VER leading to the opposite effect.

- Sales proceeds on properties being lower than the accrued loan balances, and consequently the NNEG biting leading to reduced cash flows.

The approaches used to assess the resilience of the structure, hence the credit rating it may receive, are covered further in Chapter 6.

Number of notes

The simplest re-structuring design involves issuing two tranches, a senior note and a junior note. The senior note, paying fixed cash flows, is held by the MA fund whilst the junior note, picking up the residual cash flows from the underlying mortgages, is held outside the MA portfolio.

A more complicated structure involves the SPV issuing multiple senior notes, with increasing levels of subordination and varying credit quality, which would all be eligible for holding in the MA fund, alongside a junior note, which is held outside the MA fund. The advantage of such an approach is the potential to allow for a greater proportion of cash flows to be fixed using subordination to protect the ratings of the more senior ranking notes, and a greater proportion of cash flows to be of higher rating through the differentiation of tranches. However, this comes with an added dose of complexity in terms of SPV mechanics, valuation and capital assessment, particularly as the note tranches interact and may pay down at the same time.

Our survey shows a mix of approaches, with some providers using a simple two note structure, whilst others opting for two or three senior notes alongside the junior note. We found that those opting for a greater number of senior notes typically had a larger portfolio of ERMs (>£1bn) and that the lowest rated tranche included in the MAP was of investment grade quality (equivalent to BBB or better). Those opting for a single rated note achieved an investment grade rating, although the rating of the single note does vary between the providers choosing this route.

Managing liquidity risk

An important aspect of the structure design is how to manage the liquidity risk arising from the uncertainty in early repayments and variability in underlying mortality and morbidity rates. Liquidity support can be provided through one or more of the following:

- **A reduction in (or zero) senior note payments for a given period -** One way of providing liquidity is to reduce the proportion of fixed cash flows at the start of the repayment schedule or to have no cash flows at all for the first few years. This will lead to a build-up of a cash buffer which can then be used to provide liquidity for the remainder of the term. The use of such a buffer will feed into the credit rating process, improving the credit ratings achieved. A reinvestment strategy is required for the excess cash and should consider the risk appetite in meeting the fixed payments. This leads to a reinvestment risk as the cash will be re-invested at a lower rate than the underlying mortgage assets. The trade-off is that a lower proportion of expected redemptions in the early years are included in the fixed note schedule and the overall proportion of cash flows eligible for the MA is reduced.

- **An initial cash injection -** This works in the same way as a reduction in senior note payments by providing an initial cash buffer which can then be used to provide liquidity for the remainder of the term. This approach avoids the requirement to reduce the senior note payments thus preserving a greater proportion of cash flows as matching adjustment eligible.

- **A liquidity facility -** An alternative source of liquidity is to use a liquidity facility which can lend to the SPV at times when there is a shortfall in cash to meet the bond coupon payments. This facility can be provided internally by another company entity or an external provider. This liquidity facility would come at a cost as there would be a fee to set this facility up and an interest charge (typically LIBOR + an agreed margin) would be charged on the cash lent to the SPV. The loan would be expected to be repaid out of future redemptions exceeding payments on the senior note but importantly would rank below the senior note.

Most firms surveyed used either a reduction in senior note payments to build up a cash buffer in the structure to provide future liquidity or had an initial cash buffer at the start of the securitisation; one firm

had both. Several firms had liquidity facilities in place, though not all; one was provided internally whilst another had arranged for an external facility in case it was needed.

Managing cash being trapped

In the event of a combination of greater than anticipated early redemptions, deaths or movement into long-term care then the proceeds from the ERMs will exceed the payments on the senior note in the early years.

This can give rise to a large amount of cash being trapped in the SPV, which can be managed through one or more of the following:

- **Excess cash can be extracted via the junior note -** This is typically a mechanical process, whilst also ensuring that the ratings of the senior notes are maintained. For example, junior note payments may be made equal to the excess of cash above the amount required to meet the fixed senior note liability (i.e. when the cash balance covers the discounted value of future senior note payments at the risk-free rate). Or, the junior note payments can be limited to the best estimate profile of the junior note, but this would still lead to excess cash being trapped in the event of high redemptions. Some structures may also allow for distributions to the junior note holder to be made via a special coupon. These require a clear policy defined in advance.

- **Excess cash can be replaced with new mortgages to back existing notes -** If new mortgages are being written outside of the securitisation, then it is possible to replace the excess cash with new mortgages to back the existing notes. This process needs to be defined in advance and would be subject to the rating on the existing bonds being maintained. This is more efficient than leaving cash in the structure earning a low rate of return and can also improve the resilience of the notes, but is reliant on a flow of new loans being available.

- **Excess cash can be rebalanced through replacement and issuance of new notes -** The excess cash in the structure can also be rebalanced through adding sufficient mortgages to back the existing notes alongside issuing new notes, or positive increments to existing notes. It would be expected that the existing ratings of the bonds be maintained. The treatment of new business is considered further in the next section.

We found firms had a mix of approaches to extracting cash via the junior note. Whilst for some this a mechanical approach, as described above, for others there is flexibility in the structure to extract cash so long as the rating is maintained. Some firms commented that their structure allows them to inject more or less mortgages to use up excess cash and through the issuance of new notes, and ultimately firms said that they retained the right to wind up the SPV as a last resort.

Allowing for new business

So far, we have looked at the securitisation of an existing portfolio of equity release mortgages. The growing ERM market plus the ability to drawdown on certain products means that obtaining the MA on new business is also important. There are several considerations for firms who are looking to do this.

To perform a new securitisation, a firm would typically need to build up a sufficient size of ERM assets to make securitising viable. This leads to a requirement to fund and warehouse the mortgages during this time until they can be securitised and for some firms has meant that this is an annual process.

To the extent that annuity business is written into the MA portfolio, it also means that alternative assets need to be sourced to back these liabilities as they are written. The latter can be avoided if the annuities are held outside the MAP until the same time as the mortgages are securitised but this also requires sufficient capital to cover the strain of the annuities whilst they do not benefit from being discounted at the MA.

In securitising new business, there are several approaches that firms have used:

- **A completely new structure can be created -** This is the simplest approach as the previous securitisations of ERMs are unaffected. The same approach is followed as for the new mortgages, with a new SPV being created, and the same structure of senior and junior note can be issued. This process only requires the new notes to be rated as the existing structures are unchanged.

- **The existing structure can be used, and new notes created -** Alternatively the existing structure can be used. The new mortgages are transferred into the existing structure and can be used to issue a new senior and junior note. The simplest approach involves ring-fencing the new assets from those of previous tranches. Another approach is to not ring-fence assets but issue a new senior note and change the terms of the first junior note to provide a combined junior note capturing the residual cash flows. The new senior note can either have a lower priority of repayment to existing senior notes or all senior notes can rank equally. The latter leads to greater complication in the ratings process as ERM repayments can support different tranches and this affects the security of existing notes.

- **The existing structure can be used, and increments to existing notes can be issued -**The new mortgages are added to an 'open' pool and an updated schedule of payments for the fixed note is issued. All previous issues are fixed and increments can only be positive. All existing and new mortgages in the structure are used to support the new schedule of payments. This is the most complicated approach but allows a more frequent securitisation process so that the MA can be obtained more quickly on new mortgages. It also requires a process for re-rating the existing notes with each new increment.

Through our survey, we found firms using a mix of all of these different approaches.

5.4. What targets are companies looking to achieve / meet in developing the securitisation?

As noted in the section above, companies that are implementing these structures need to balance a range of factors within the optimal design of the structure.

The parameters firms were originally working around include the following list. This position has been changed somewhat by the issuance of SS3/17 and CP13/18 by the PRA, which restricts the amount of MA that can be recognised on an ERM securitisation and so removes the benefits of optimising beyond a certain point. The nature and consequences of SS3/17 and CP13/18 are covered in further detail in Chapter 4.

- **Optimal financials –** Achieving the optimal MA benefit in base and stressed conditions. This is no mean feat, as one needs to consider:

  - The size of each of the notes
  - The current credit rating and sustainability
  - Providing a viable match for the MA liabilities
  - The management of "cliff edge" risk within the ratings. I.e. that a small change in experience leads to a large impact downgrade of the rated notes.

- **Liquidity** – Firms will also look to ensure that the structure that has been put in place optimises their use (or the cost of using) liquidity within the entity or group. Having such liquidity "on tap" can quickly become very expensive.

- **Operational outcome –** The SPV will require firms to enhance their rating infrastructure, valuation and capital infrastructure as well as put in place new processes for cash and liquidity management.

From our survey, most firms said that in their structuring approach they targeted a specific rating whilst optimising to maximise the proportion of MA eligible cash flows and taking into consideration liquidity and capital constraints. Each of these must be carefully traded off against one another, and this is clearly evident through the variations in the structures that exist today.

5.5 Valuation of the SPV notes

As set out within Chapter 4, there are a range of valuation approaches in place within the UK market for both IFRS and Solvency II valuation purposes. Within this section, we implicitly assume that the underlying mortgages are valued using fair value principles and that they are held on this basis on the insurance firm's balance sheet.

We recognise that within the wider financial sector, firms may hold these at book value (subject to the valuation option selected under IAS39 / IFRS9 and local GAAP rules). However, this is not compatible with the fair value approach required within the insurance market, so we do not cover it any further here.

The compromise of structuring to achieve MA compliance has given rise to a range of additional valuation considerations for these businesses, covering both technical and operational items within the business. Coupled with there being limited experience within insurance firms of building asset securitisations (noting the Aviva ERF structures being the only ERM securitisations available within the UK market), this has presented a challenge to the industry, with different approaches taken.

This section sets out some of those key questions and some of the options available to firms.

5.6 Does the value of the ERM portfolio change pre / post structuring? Should there be some form of equation of value?

In principle, the splitting of a portfolio of ERM assets into two notes that are effectively "low risk" (rated note) and "high risk" (junior note) would not be expected to change the total value of the pool of assets. Doing so would effectively mean the creation or destroying of value through the segregation of the cash flow profiles, which would not seem aligned with the fair value principles that underpin both the financial statements and regulatory returns for insurance companies.

However, additional features within the securitisation that do not exist with the underlying portfolio, such as the additional servicing costs to establish and run the SPV and additional costs of providing support such as the provision of liquidity facilities, may give rise to differences between the total value of the underlying whole loan portfolio and the SPV notes.

In addition, the SPV will incur its own expenses, through recurring items such as director's payment and audit fees. These cannot be ignored in determining the valuation methodology.

Taking this into account, we have the following equation of value at inception, assuming that the only assets that are deposited in the SPV is the portfolio of whole loans, of:

Total value of whole loans *less* frictional costs of the SPV = Total value of notes issue by the SPV.

Over time, there will be instances where the SPV contains more than the portfolio of ERMs due to cash being trapped within the structure. For example:

- Where there have been large redemption payments from the whole loan portfolio that are in excess of any note payments.

- Where there are timing differences between the redemptions being received and the most junior note being paid any cash flows.

This leads to a refined equation of value of:

Total value of whole loans *plus* cash holdings *less* frictional costs of the SPV = Total value of notes issued by the SPV

5.7 How do I go about placing a value on the notes in base conditions?

Valuation of the underlying ERMs is typically mark to model. There are relatively few structures with observable market prices and the volume of trading in the notes of structures that there are in the market is minimal. This means that, whilst the notes issued by the SPV should in principle be more liquid than the underlying loan portfolio, mark to market based pricing remains unviable.

However, to support the valuation of the notes, the following principles do hold:

- The assumptions that are used to value the underlying portfolio (See Section 3.3) remain valid for the valuation of the structure.
- Based on these assumptions and a defined SPV waterfall payment structure, in any given scenario, the expected cash flows for the portfolio are known.
- The rating of each note is known in advance of seeking to value it.

The residual assumption to be determined is therefore the discount rate for each of the notes, with a range of possible options available for firms to utilise.

Table 5. Description of approaches to valuing notes

Approach	Description
1) Direct valuation of senior note(s) with equity balancing item (or the "cost of debt" approach)	Under this approach, one uses reference market prices for debt securities with similar characteristics to the securitised notes. This may include factors such as the note term, credit quality/rating and overall level of liquidity. However, there is a lack of openly available market information to calibrate this cost of debt precisely for ERM assets. One may expect to require some form of adjustment, which would ultimately be based upon judgement, to adjust the yields on the reference assets to reflect ERM. This also leaves a large amount of judgement in the most material assumption for the insurance company.
2) Direct valuation of the junior note with senior note(s) as balancing item (or "cost of equity approach)	Under this approach, one may use market observable pricing for the most junior (or equity) layers in similar, market based securitisation structures to set the discount rate for the junior note. Alternative methods to assess the change in discount rate for the junior note may also be considered, based upon an analytical evaluation of the additional risk that the junior note bears The value of the senior note(s) is then calculated simply as a balancing item if one uses the equation of value approach. Whilst there is also limited available information to support this assumption, this is a less material judgement within the valuation process as typically the junior note payments are long into the future and low in volume as a large amount of the cash flows are typically the junior note payments are long in the future, relatively low in volume as a large amount of the cash flows are typically aimed to be paid to the senior tranches, and cash flows are highly discounted.

3) Direct valuation of notes with scaling	Under this approach, both senior and junior notes would be valued directly, but the results would then be scaled so that the overall equation of value is maintained.

Of the firms surveyed there is an even split between approaches one and two above, and the choice of approach does not seem to be driven by the number of senior notes in the structure. One firm followed approach three, using a direct valuation of the rated notes and scaling this to true-up for inconsistencies between the direct calculation and the value of the underlying assets. The range in approaches taken by firms highlights the infancy of these techniques in the insurance sector.

Ultimately, whatever the approach one choses, the lack of reference pricing means that firms would expect to need to use one of the alternative approaches as a validation tool.

5.8 How do I value the notes under stress?

In principle, the valuation of the senior and junior notes under stress may be expected to use the same approach as the valuation of the notes in base conditions.

Each of these stresses will be based in the risks that underpin the notes, and to help determine the risks to be considered:

- As outlined in Chapter 6, the risks related to the underlying ERM portfolio are typically well understood and have been modelled in company ICA's for a number of years. The scope of the stresses that would be applied for the underlying ERM portfolio would therefore typically form the basis of the stresses for the SPV.

- However, depending on the structure of the SPV itself, there may also be additional risks arising from the structure of the SPV itself that cannot be ignored. For example, use of any liquidity facility generates a counterparty risk exposure, cash (or other assets) building up in the SPV creates other forms or counterparty or credit exposures, and the return on these assets also generates risk around the security of payment to the senior note. These additional risks need to be allowed for within the stressed valuation.

This gives rise to a large number of factors that affect the value of the notes, and linking each of them directly through to the note valuation would likely become spurious very quickly. Helpfully, as under the base valuation, the principle of retention of value should also hold. This therefore maintains the bridge between the value of the underlying ERMs and the total value of the note within the SPV under stress.

The residual question is effectively therefore "how do I apportion the total value of the underlying ERMs in stress between each of the notes". Typically, depending on the approach taken within the base valuation of the notes, this will take one of two forms:

- Cost of debt approach – the senior note yields are stressed in line with the way in which debt markets would perceive the underlying default and liquidity events change. This may be through the use of stresses, based upon alternative reference assets or other illiquid asset methodologies with adjustment to reflect ERMs.

- Cost of equity approach – the junior note yields are again stressed in line with the way that the price of junior/equity tranches of wider market securitisations move in stress, or through some other, more analytical means, to help calculate the return would expect for the change in risk profile on the junior note.

Either way, as for the base valuation, this is not an exact science and use of both approaches can be very helpful for firms.

5.9 Capital treatment on technical provisions and SCR

There is limited judgement required when calculating impact on the SPV notes on the MA in the Solvency II BEL. The MA calculation methodology is prescribed by EIOPA so once the notes are valued and a credit rating and mapping to the relevant EIOPA parameters has been assigned, the MA can be calculated in the same manner as for any other fixed income security.

There is more complexity within the SCR calculation. In principle, the treatment of securitised ERM in the capital calculation is as straightforward as:

- The assets (the notes issued by the securitisation) need to be valued post-stress. This is covered in the previous section.
- The MA needs to be recalculated post-stress, reflecting the revised value and rating of assets in the MAP

For valuation of the assets, the same approach can be used in stress conditions as is used in the base calculation, as set out above and for assets held outside of the MA portfolio, which is typically the 'junior' notes, this change in valuation is all that is needed as part of the capital requirement calculation.

For assets held in the MA portfolio, it is necessary also to consider the impact on the MA. In principle, this means following the PRA's 5 step approach to calculating the MA in the SCR[6], determining the value and rating of the assets and the revised Fundamental Spread (FS) deduction obtained, to put into the revised MA calculation along with the stressed asset value, whilst meeting the wider MA ALM requirements.

For the purposes of this section, we only cover the elements of the PRA's 5 steps that are specific to the ERM assets, namely the credit rating and FS elements of the calculation.

Credit rating modelling

The discrete nature of credit ratings creates a step function for the impact of each stress:

- For a moderate increase in risk there will be no reduction in rating, and hence no change in the Fundamental Spread deduction, so the MA will increase to offset falls in the value of allocated assets.
- For a marginal further increase in risk, the rating will drop to the next notch and the Fundamental Spread deduction will increase, leading to a corresponding reduction in MA.

This behaviour is complex to model as there are several risk drivers affecting ERM assets – stresses on two risk factors together might lead to a downgrade where neither stress in isolation has that effect – hence the effect would need to be covered through an interaction term, with two-dimensional 'step' characteristics. Taking the same point further, stresses on three risk factors together might lead to a downgrade, but none of the pairs lead to that outcome – hence requiring a three-way interaction term with 'three-dimensional 'step' characteristics.

Direct modelling of rating under stress will also lead to conditionality – the stress will depend on the starting conditions in base (specifically how far from a downgrade the allocated notes are assessed to be).

A possible simplification is to assess stresses economically on a continuum. This will give an intuitively sensible outcome for any stress or combination of stresses, and will make the internal model more usable as an aid for decision making, but it will not give a precise view of the actual impact for allocated

[6] Chapter 3 of the PRA's Supervisory Statement 8/18, July 2018

notes (either under or over-stating the impact, depending on where the steps lie for that particular combination of stresses and those particular starting conditions). Of course, if it were anticipated that the securitisation would be restructured following a stress, then this will likely give a more accurate view of the net effect.

Fundamental spread calibration

The PRA is clear that under stress, firms cannot simply mechanically apply the same approach as used within the calculation of technical provisions. In addition, SS8/18 sets out that for illiquid assets, firms should look to model the Fundamental Spread for these asset classes, unless it can be justified that it is not materially different to another, existing asset class.

There are a number of approaches for ERMs available, including:

- Subsequent re-application of the EIOPA FS parameters under stress, given the revised credit rating of the asset. It is likely that this would be considered a "mechanistic" approach, hence in isolation own may not be appropriate as the revised FS deduction in stress. However, this is a very important baseline measure within the MA, as in principle, this allows firms to understand their Solvency II balance sheet dynamics for a day to day movement in conditions underlying the ERM assets in the absence of a re-calibration of the FS parameters by EIOPA. We consider that it also serves as an important benchmark measure in advance of any re-assessment of the FS calibration itself.

- Re-calibration of the FS based on the default risk characteristics of the ERM assets. This in itself may not yield large FS deductions, as for ERM assets, the only true credit loss event is through the NNEG biting. However, the notes may default as a result of items such as timing risks too, such as:

    - reinvestment risk (i.e. the rate that can be secured on excess cash held within the SPV) arising from cash sums expected being exacerbated by any upward stress on VER rates. This leads to further cash being generated, which would need to be invested to generate at least part of the return that would have been earned had the ERM continued to be in force.

    - liquidity risk, arising primarily from a lower than expected rate of VER, and potentially leading to there being insufficient cash for the SPV to meets its obligations (even though value of assets in the SPV may as a result of the low VERs may be above expectation)

This example shines a light on a potentially important issue – how to model and derive ratings for assets which have ample collateral but suffer technical default due to insufficiency of cash flows. As a result, the use of stochastic methods to model the decrements of the underlying cash flows may become more important when looking to quantify the FS in stressed events.

What future actions should be allowed for in stress?

Within the documentation of the SPV will be detailed instructions for how cash flows and payments to note holders are to be managed. For example, coupon payments on more junior notes may be deferred in certain circumstances to preserve the credit quality of future coupons and the redemption payment on more senior notes. All of these rules should be allowed for when valuing and assigning an internal rating to the notes.

Where, as is generally the case with recent ERM securitisations, one entity owns all parts of a securitisation structure, there is the possibility of a future restructure. Indeed in CP13/18, PRA proposes just such a restructuring of cash flows as one of the means by which a firm might rectify a breach of the Effective Value test.

The general principle with future discretionary actions is to take account of them only if they form part of a regular process, or are a pre-defined response to a trigger, which the firm has put through its governance processes.

We would suggest that this principle could be applied to future discretionary restructures of ERM securitisations.

Chapter 6: Internal rating of notes

The previous sections set out that a number of insurers in the UK market have put in place transformations, through the use of securitisations, that aggregate the individual ERM loans within their portfolios. This section sets out:

- Why firms need to develop an approach for an internal credit rating of the senior notes of the securitisation
- An overview of the internal rating process
- The types of stresses and scenarios considered in rating analysis

This section has been supplemented using a combination of research of published rating criteria by (Fitch Ratings, 2018) and (Moody's, 2015) and interviews with rating agencies (Fitch and Moody's) to gain a more in depth understanding of the practical application of these published criteria.

6.1 The need for an internal rating approach

Insurers with material exposure to equity release mortgages may choose to obtain ratings for senior notes from an External Credit Assessment Institution (ECAI). However, irrespective of whether an Insurer invests in an equity release securitisation with an external rating from an ECAI, an internal rating is also required. This requirement arises from Solvency II delegated regulation which requires an internal rating for larger and more complex exposures. This means that insurers have a requirement to develop the methodology and tools necessary to assess the rating of the senior notes on a regular basis. This process may also be used as part of a demonstration of understanding the risks of the investment and compliance with the Prudent Person Principles. The ultimate rating output will also be used in calculation of the firm's Matching Adjustment.

6.2 Internal rating process overview

PRA supervisory statement SS 3/17 (PRA_SS3/17, 2017) provides guidance on the way in which internal credit ratings should be calibrated. In particular:

- the Credit Quality Step (CQS) to which an internal credit assessment maps should lie within the plausible range of CQSs that could have resulted from an issue rating given by an ECAI; and
- once a CQS and asset class has been assigned, firms are required by Article 77e(3) of the Solvency II Directive to use the corresponding FS set out in the technical information published by the EIOPA, and not alter the CQS because of a disagreement over the technical information (e.g. because of different expected recovery rates).

We interpret the PRA supervisory statement to mean that the internal rating framework should be specified as far as possible to be consistent with the approach and methodology an ECAI would adopt for a similar asset, so that the internal rating is consistent with an ECAI issue rating. The CQS mapping will then be demonstrably consistent with that which would have resulted from an ECAI issue rating if the same mapping criteria are applied.

No two ECAI's use the same rating methodology and assumptions for any asset class, including ERM. Therefore, in order to demonstrate consistency of their internal rating process, insurers may choose to implement processes consistent with generic ECAI approach and processes described below. These processes cover assumption choices, modelled scenarios, expert judgement, internal governance requirements, rating committees and demonstration of independence between individuals/teams in the rating review process.

6.3 ECAI rating process

In setting out our understanding of ECAI rating approaches for the rating of notes issued by equity release mortgage securitisations, we have researched published rating methodology for structures similar to those used by UK insurers and conducted interviews with the rating agencies involved (Fitch and Moody's). Below we document the general features of the rating process. More detail on the stresses and scenarios considered by rating agencies is provided in Section 3.

From our research of published documents and interviews, the following activities are common features of the rating process:

- An assessment of the risks that could impact on the cash flows received from the assets (the equity release mortgages) in the structure
- An assessment of the legal basis of the various elements of the structure (e.g. due diligence on the mortgage contracts, examining contracts for parties to the securitisations such as the cash manager or liquidity facility provider)
- A quantitative assessment of the impact of a range of stresses and scenarios on the cash flows from the assets
    - Stresses are calibrated using both data[7] and expert judgement, and are generally expected to apply throughout the economic cycle[8]
    - Stresses are rating level dependent (e.g. AAA stresses are calibrated to extreme / never before seen stress levels, whilst B stresses could be only marginally worse than best estimate)
    - Stresses are combined into multivariate stresses (i.e. all the AA rating level stresses are combined to give a AA level scenario). Cash flows would also be expected to survive univariate stresses as well as combined scenarios. Expert judgement is an important element of the choice of stresses and scenarios as described below.
    - Stresses are applied uniformly across the portfolio of mortgages (i.e. no assumptions are dependent on LTV ratios)
- A quantitative assessment of the ability to pay the senior notes cash flows as they fall due under the stresses above
    - A number of scenarios will be modelled (e.g. both early and late redemptions) to test which type of scenario is most onerous for the structure.
    - The contractual features of the senior note will be taken into account (e.g. whether scheduled principal repayments can be deferred[9] without default)
    - The contractual features of the securitisation will be modelled (e.g. liquidity facility will be taken into account as well as any reserve accounts)
- Interpretation of the results of the modelled output involves expert judgement and/or consideration by a committee. This would consider the qualitative and quantitative input from the steps above to inform the rating decision. The rating sensitivity to changes in the underlying stressed assumptions will also be considered. More detail on the expert judgement process is included in section 2.3.
- Documentation of the stresses used and the rating outcome
    - Note that the process of assigning a rating is more complex than one might infer from the published documents. In particular, the published documents suggest a limited number of scenarios, whereas from discussion with agencies we understand that a wide range of scenarios are considered in order to establish which causes the most credit negative scenario. For example, the published methodology may only consider low prepayment rates, whereas at the committee stage ECAIs would consider both high and low prepayments.

[7] Broadly speaking, data could be considered credible if it covers one full economic cycle.

[8] As noted in section 3.1, Fitch currently includes an adjustment for overvaluation in the UK property market, and would be expected to vary the property value stress in different economic environments.

[9] Although note that at the AAA and AA levels, timely payment of scheduled cash flows is required so no deferral would be allowed at these rating categories.

6.4 ECAI rating review process

The process above is followed at the time of assigning a rating to the senior notes of a structure. The published criteria and ratings are typically reviewed on an annual basis, although may be reviewed off-cycle if assumptions are deemed to have become inappropriate. The review of ratings follows the same process of modelling and expert judgement as described above. Key triggers that could potentially instigate a review between annual assessments are structural triggers, outlying performance and changes in counterparty risk assessments. These include monitoring for spikes in prepayment, house price falls and low interest rate experience.

6.5 Application of expert judgement

Expert judgement is a fundamental part of a ECAIs rating process for all assets including ERM. As described above, although certain elements of methodology are specified in published documents, ECAIs frequently make use of expert judgement, and consider a range of scenarios when determining a rating to give to particular issue and/or issuer. These judgements are expected to differ based on the specific consideration of risks relating to a particular issue and/or issuer.

From an internal rating perspective, we expect that insurers will need to carefully consider and document expert judgements made. This should include but not limited to the rationale for the judgement; the source, quality and accuracy of data, expert opinion received, the relevant experience of those making the judgement; and how these judgements are consistent with ECAI approaches. Areas where expert judgement is typically applied:

- From our discussions with ECAI's, the rating stresses are not necessarily designed (especially at the AAA level) to simulate circumstances that have been seen before or could realistically be imagined in combination. Whilst one of the combinations of stresses that is considered by ECAIs is the undiversified combination of all stresses at a particular rating category, expert judgement will be applied to consider plausibility in determining the weight to given to these scenarios. This expert judgement can consider amongst other things quantitative data, the feasibility of the stress or combination and materiality of the risk drivers to the ability of the issuer to meet its debt obligations. For example, in a scenario of a large fall in house prices and a significant increase in prepayments, the rating decision would take into consideration the likelihood of such a scenario taking into account the borrower rationale and ability to prepay or refinance their loan given significant increase in loan to value.

- When deciding the rating, expert judgement is used to determine how much weight is given to each modelled scenario results. This judgement would consider the significance of the risk driver and the materiality of the results relative to other scenarios. If a particular scenario result were to be materially different (worse) than all other scenarios modelled, that scenario is unlikely to be disregarded when assigning a rating. However, where the scenario result is not material then expert judgement would be applied in the weight given to the scenario result in determining the final rating. For example, in a rating review, if a senior note marginally fails one scenario and passes all others then this would not automatically lead to a downgrade. The rating decision would depend on judgement as regards the materiality of the fail relative to the other scenario results and the significance of the risk driver. There may be differences in approach at different ECAI and there is limited guidance or documentation on the selection of stresses or on the relative impact of each result on the rating outcome.

Therefore, insurers should clearly articulate the rationale for any judgements made here and the approach taken.

In Section 3 we comment on the extent to which we would expect an expert to allow characteristics of individual portfolios to influence the choice of assumptions (e.g. for base early repayment assumptions reflecting actual past experience of early repayments in the portfolio). Where there are different books of business within a single portfolio, with different characteristics, we would expect agencies to model the pools using separate assumptions where material.

6.6 Differences in ECAI approaches

We have surveyed the published rating criteria of Fitch and Moody's, and conducted conversations with their analysts.

Whilst there are considerable similarities in their approaches, there are also differences.

Both agencies will assess whether the contractual payments of the senior notes are paid on a timely basis for AAA and AA ratings. For lower rating categories (A and below), a similar approach may be followed. An alternative approach for lower ratings is to employ a more statistical method where modelled losses under stress may be compared against their idealised loss tables for different rating categories.

6.7 Probability distribution for stresses

There may be a desire for Insurers to attempt to translate rating stresses into a probability distribution in order to more closely align a credit rating with capital and/or ORSA stresses. From our discussions with rating agencies, this is not an approach that they are familiar with, and from observation of individual stresses, it is also clear that not all variables are stressed to the same extent. We therefore consider that it is easier to demonstrate ECAI consistency in internal ratings by comparing and justifying assumptions and judgements used against ECAI published criteria, rather than setting a probability level.

6.8 Stresses and scenarios to be considered

In this section we set out some of the specific stresses as found in ECAI current published criteria.

We understand that the scope of the published criteria can differ depending on the particular ECAI. For example, Moody's criteria is agnostic to the securitisation structure applicable while the Fitch criteria has been designed based on their own experience of rating particular structures and pools of underlying mortgages. These stresses may be considered by insurers when determining the internal rating to apply to notes. However, as described above, we would expect each insurer to carefully consider the risks within their underlying mortgages and their structure, before simply applying this or any other ECAI published approach.

6.8.1 House prices and future house price inflation

Both ECAIs published rating documents provide detail on the stresses applied to property prices and future price growth. These are based on well-established rating criteria for other products (e.g. RMBS), adapted for the equity release market. This adaptation results in less severe stresses for the equity release market than RMBS because the decrement timing for

equity release is less correlated with house prices. This reduction in stress is taken into account in the tables below.

The published criteria specify an immediate house price decline and a future growth rate as set out in the table below (as at September 2018).

Table 6. ECAI house price stresses

Stress	Fitch	Moody's
Immediate house price decline - AA stress - BBB stress	Regional stresses, within the range given below - 25.9% to 45.8% - 16.0% to 38.6% A further haircut is applied if the property is within the top 5% (10% haircut) or top 1% (15% haircut) of property prices in each region.	 - 25% - 15%
Future house price inflation - AA stress - BBB stress	A flat assumption for all rating categories of 2% pa	 - 1.5% - 2.5%

Note that it is our understanding that the assumptions documented by Fitch include an allowance for current over-valuation of property prices in the UK. It is anticipated that the publicised house price decline assumptions could change in a downturn period of the economic cycle as the gap between peak prices and current prices grows.

We expect that there is limited flexibility from the agencies in applying their criteria for house prices because these are based on well-established criteria for other products. We therefore expect that insurers will apply similar stresses in their internal rating approaches.

6.8.2 Mortality

Both published rating methodology documents comment on stresses that result in lower rates of mortality. In addition, in Fitch's criteria published in September they comment on stresses for higher rates of mortality for notes with scheduled principal repayments. From our discussions with the agencies, we understand that scenarios with a greater rate of mortality will be considered.

Both agencies commented that mortality rates and stresses are amongst the most likely to be adapted to the circumstances and experience data of a portfolio. If credible experience data is available, then we would therefore expect this to be taken into account. As previously suggested by the PRA (PS14/17 paragraph 2.11), insurers would need to share that data with an ECAI in order for it to be taken into account in an ECAI rating. We expect that rating agencies would take this into account in determining the best estimate assumption, rather than the size of the stress to apply to that best estimate at each rating level.

The table below combines the published criteria with our understanding of agency approaches based on our interviews.

Table 7. ECAI mortality stresses

Stress	Fitch	Moody's
Lower rates of mortality	Base table Equity Release 2005 published by IFoA	Base table consistent with published tables for the life

- AA stress - BBB stress	multiplied by a rating dependent factor: - (1 - 25%) - (1 - 15%) No allowance for future improvements	insurance industry. Rating dependent improvements: - 6.5% pa to age 70 and 4.0% pa thereafter - 4.5% pa to age 70 and 2.0% pa thereafter
Higher rates of mortality - AA stress - BBB stress	Equity Release 2005 base table. No allowance for future improvements. Unexpected increase in mortality rates of up to 7.5% at the AAA level – no other rating level information provided.	Would be considered by expert judgement.

6.8.3 Morbidity

There is considerably less documentation on rating agency approaches for setting Morbidity assumptions. Experience data from the portfolio of equity release mortgages may be used if it is considered credible. It is likely though that a number of scenarios and sensitivities will be considered and ultimately judgement will be used. Table 7 below is based on the published criteria and our interviews with rating agencies.

Table 8. ECAI morbidity stresses

Stress	**Fitch**	**Moody's**
Lower rates of morbidity - AA stress - BBB stress	35% of the corresponding mortality rate	Derived based on portfolio characteristics and market data. Set to zero in high rating scenarios and in cases where there in insufficient reliable data.
Higher rates of morbidity - AA stress - BBB stress	35% of the corresponding mortality rate	Would be considered by expert judgement and historical data.

6.8.4 Voluntary early redemption (VER)

Of all the assumptions considered, the VER assumption is most likely to be set by rating agencies to reflect the characteristics of the pool of mortgages. Provided sufficient historical data is available, the assumption should take account of contractual features (and in particular the size and term of any early redemption fees charged to the customer) that may influence borrower behaviour.

In order for portfolio data to be taken into consideration, we expect that data covering one full economic cycle must be made available to rating agencies. Short term spikes in historical data could be used to set stresses at the A and BBB level. Simple and prudent extrapolation could then be used to set stresses at the AA and AAA level.

Table 9. ECAI VER stresses

Stress	Fitch	Moody's
Lower rates of VER - AA stress - BBB stress	2.5% pa for all rating categories (note that this is in line with the historical average for the portfolio)	Derived based on portfolio characteristics and market data. Set to zero in high rating scenarios and in cases where there in insufficient reliable data.
Higher rates of VER - AA stress - BBB stress	- 14% pa - 10% pa	Would be considered by expert judgement.

6.8.5 Interest rates

Interest rate stresses are of interest for equity release securitisations primarily because of the rate of interest earned on any other assets (e.g. cash) within the vehicle. If assets earn a contractual (guaranteed) fixed rate of interest then this will be taken into account (along with any potential allowance for exposure to the counterparty). If assets earn a rate of return linked to market indicators (e.g. LIBOR), then we would expect rating agencies to apply their standard stresses for those indicators. In the current environment, this is likely to lead to an assumption of zero or negative short term interest rates, and close to zero long term interest rates under stress.

6.8.6 Other assumptions

Published documents from the rating agencies have differing levels of detail in respect of additional stresses / assumptions that are considered. Nevertheless we would expect insurers to consider the following factors:

- Additional house price decline for LTV above 100% - whilst lower than their standard RMBS criteria, Fitch still reduces house values by 8.5% in cases where the LTV is greater than 100%.
- The risk of properties becoming dilapidated relative to the index used to project their values – Fitch assumes a 100% loss on the 10 largest loans to allow for this risk (this number would be scaled based on the size and characteristics of the portfolio in question)
- Foreclosure costs – in order to allow for the additional costs (from solicitor/estate agent fees and potential repairs) of selling a property that is above 100% LTV, Fitch assumes a variable cost of 2.5% of the property value and a fixed cost of £3,000.
- Fees – we expect agencies to take into account the fees paid to parties to the securitisation (e.g. cash manager, liquidity facility provider). To the extent that fees could increase on replacement of one of the parties (e.g. if liquidity is provided from within the insurance group at lower than market rates) this would be taken into account.
- Counterparties - all structured finance transactions involve an element of counterparty risk. One of the principles of the design of the structures is to achieve structural "isolation" of a transaction's performance from the credit or operational exposure of the counterparties involved. The intended result is that a structured finance transaction performance reflects primarily that of the underlying collateral and is isolated from the specific risks that impact corporate counterparties. In terms of a rating opinion for structured finance transactions, if sufficient isolation is not achieved from material counterparties, the rating of the notes may not be capable of exceeding that of the lowest – rated counterparty. Rating agencies typically publish separate criteria for assessment of counterparty risk.

Chapter 10: References

Equity Release Council (ERC), 2018. *Equity Release Council.* [Online]
Available at: https://www.equityreleasecouncil.com/document-library/equity-release-market-report-autumn-2018/

European Commission, 2009. Solvency II Directive (2009/138/EC, recast). *Official Journal of the European Commission,* pp. 1-309.

FCA, 2018. *FCA.* [Online]
Available at: https://www.handbook.fca.org.uk/handbook/MCOB/8.pdf

Fitch Ratings, 2018. *Fitch_Ratings.* [Online]
Available at: https://www.fitchratings.com/site/re/10026881

Hosty, G. G. S. M. C. a. S. M., 2008. Pricing and Risk Capital on the Equity Release. *British Actuarial Journal,* 14(01), pp. 41-91.

IASB, 2018. *IFRS 17 Insurance Contracts, Concerns and implementation challenges.* [Online]
Available at: https://www.ifrs.org/-/media/feature/meetings/2018/october/iasb/ap02d-ifrs17.pdf
[Accessed 9 11 2018].

Moody's, 2015. *Moody's investors service.* [Online]
Available at: https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBS_SF407275

ONS, 2018. *ONS.* [Online]
Available at:
https://www.ons.gov.uk/economy/inflationandpriceindices/bulletins/housepriceindex/august2018

PRA CEO Letter, 2018. *CEO Letter.* [Online]
Available at: https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2018/solvency-ii-equity-release-mortgages.pdf

PRA_SS3/17, 2017. *SS3/17.* [Online]
Available at: http://www.bankofengland.co.uk/pra/Pages/publications/ss/2017/ss317.aspx

PRA, 2014. *PRA.* [Online]
Available at: https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2014/solvency-ii-matching-adjustment-15-october-2014.pdf?la=en&hash=04DD55510BD3B0B236FE16F514642B68DD38E015

PRA, 2015. *PRA Paul Fisher.* [Online]
Available at: https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2015/letter-from-paul-fisher-on-solvency-2-equity-release-mortgages

PRA, 2018. *Bank of England - Solvency II: Equity Release Mortgages.* [Online]
Available at: https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/consultation-paper/2018/cp1318.pdf

Treasury, H., 2018. *HMT.* [Online]
Available at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/733826/PU797_Forecast_for_the_UK_Economy_August_2018_covers.pdf

Appendix 1: Survey Methodology

A1.1 Market Survey

The working party carried out a survey of ERM market participants over autumn 2017. The survey covered over 150 questions, with a mix of structured and free form questions, and had a total of 15 responses, predominantly comprising of insurance companies. The survey was issued by the IFoA, on behalf of the working party, and the results were anonymised before being shared with the working party.

The survey covered a range of topics including:

- **Valuation of unstructured ERMs** – IFRS and Solvency II
- **Valuation of NNEG** – *use of closed form solutions (such as Black Scholes, Black-76), use of stochastic models, management of NNEG*.
- **Assumptions** – *real-world versus risk-neutral, property assumptions, demographic assumptions and economic assumptions.*
- **Valuation of securitised ERMs** – *securitisation structure, notes rating, matching adjustment and liquidity management.*
- **Credit rating methodologies** – *rating mechanisms*

A1.2 Individual Discussions

Following the market survey the working party also held individual discussions with seven ERM market participants to ask follow-up questions to material covered in the survey. These took place in spring 2018, using a standardised set of questions, and were carried out by independent members of the working party (ie consultants, academics). The results were anonymised before being shared with the wider working party.

The individual discussions focussed on three specific areas:

- **Modelling methods** – *type of actuarial model, purpose to which model used (valuation, validation, internal model, pricing etc.), use of closed form solutions (such as Black Scholes, Black-76) and use of stochastic models.*
- **Assumptions** – *real-world versus risk-neutral, property assumptions, demographic assumptions and economic assumptions.*
- **Valuation of securitised ERMs** – *securitisation structure, notes rating, treatment of new business, liquidity management and other management actions.*

Appendix 2: Historic house price growth and volatility in UK

Figure A1: Annual house price inflation 1975-2017

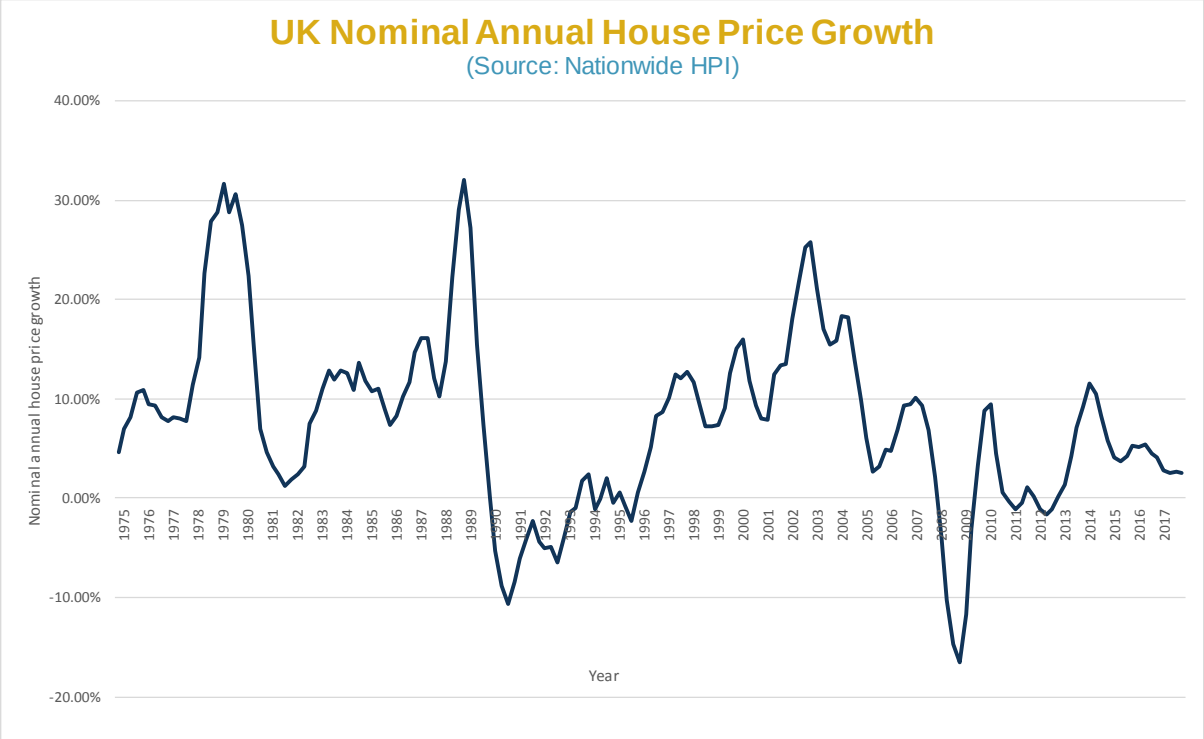


Figure A2: Volatility of house price growth over period of 10 years

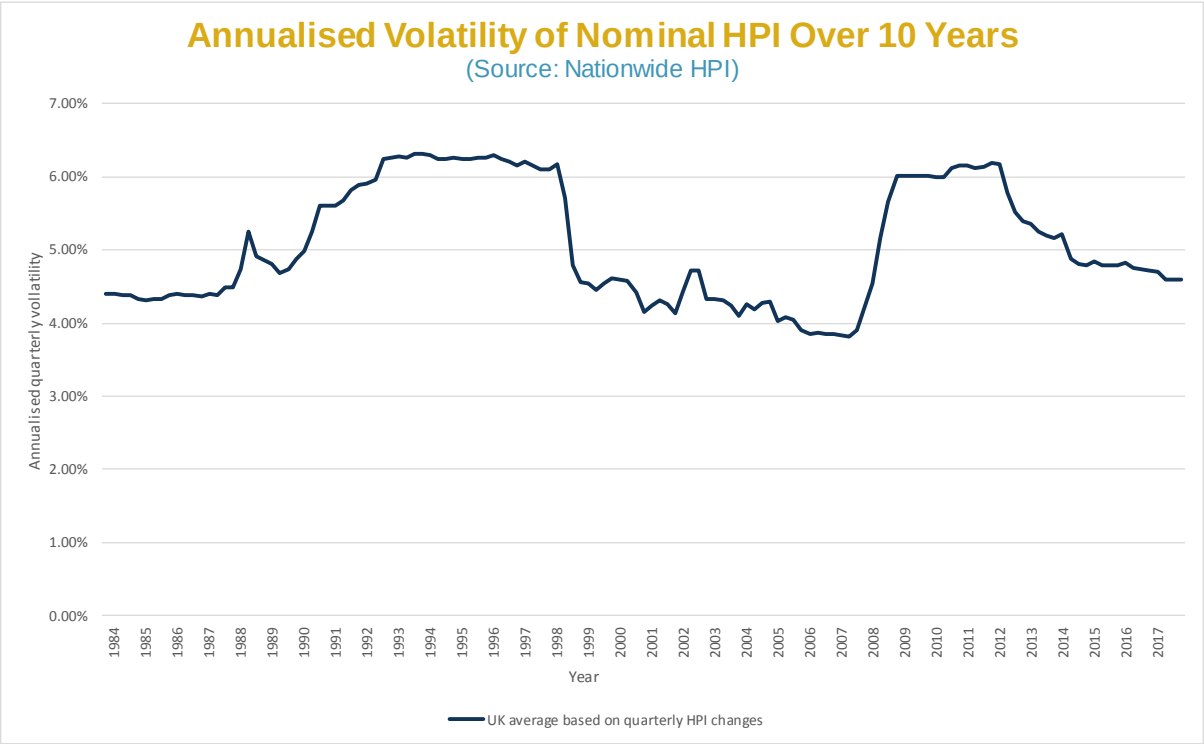


Figure A3: House price growth by region: 30 year moving average

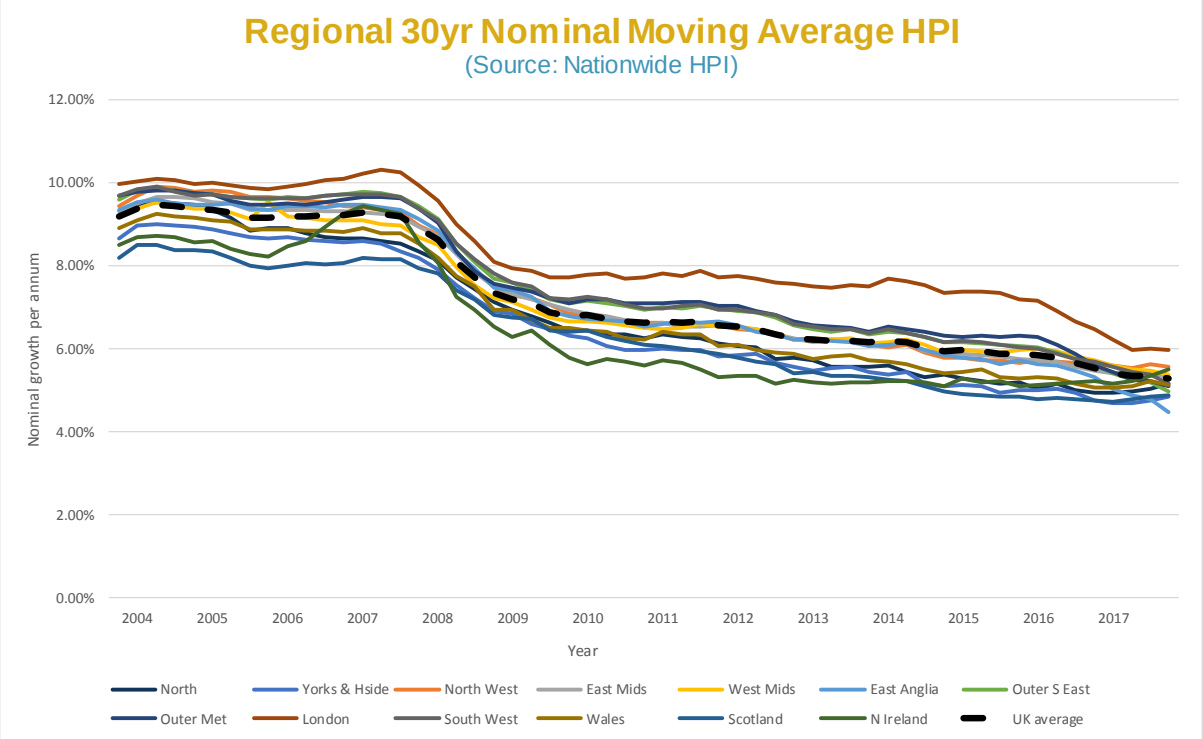


Figure A4: Regional variations of house price volatility over 30 years to 2017

Annual or quarterly price movements: 30 years to 2017				
Region	Annualised volatility		Autocorrelation	
	Quarterly	Annual	Quarterly	Annual
North	7.4%	10.4%	25.2%	41.1%
Yorks & Hside	7.5%	11.4%	47.8%	29.2%
North West	6.1%	9.5%	56.5%	55.6%
East Mids	6.6%	10.7%	57.2%	44.9%
West Mids	6.2%	9.8%	55.2%	45.4%
East Anglia	7.3%	10.6%	42.5%	25.6%
Outer S East	6.5%	10.2%	57.9%	32.9%
Outer Met	5.9%	9.5%	61.5%	28.0%
London	6.5%	9.5%	45.1%	38.4%
South West	6.7%	10.3%	51.6%	29.4%
Wales	7.3%	10.3%	35.8%	47.5%
Scotland	5.8%	7.0%	19.6%	30.9%
N Ireland	8.9%	12.9%	32.9%	29.3%
UK	**5.4%**	**8.6%**	**64.2%**	**40.2%**

Figure A5: Regional variations of house price volatility over 10 years to 2017

Annual or quarterly price movements: 10 years to 2017				
Region	Annualised volatility		Autocorrelation	
	Quarterly	Annual	Quarterly	Annual
North	4.3%	4.3%	13.3%	59.1%
Yorks & Hside	4.8%	5.9%	26.6%	-32.8%
North West	4.4%	6.0%	38.6%	-4.6%
East Mids	4.3%	6.3%	58.4%	22.1%
West Mids	4.3%	6.2%	50.4%	19.5%
East Anglia	5.5%	8.0%	41.2%	-7.8%
Outer S East	5.3%	7.5%	50.3%	9.4%
Outer Met	5.5%	8.2%	54.7%	11.8%
London	6.5%	9.2%	42.1%	20.2%
South West	4.9%	6.6%	42.4%	11.1%
Wales	6.0%	5.1%	-1.5%	5.4%
Scotland	4.4%	3.9%	-2.0%	-8.1%
N Ireland	9.2%	14.7%	36.9%	56.2%
UK	**4.6%**	**6.7%**	**53.6%**	**12.6%**

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