ASLEEP AT THE WHEEL

The Prudential Regulation Authority & the Equity Release Sector

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EXECUTIVE SUMMARY

- There is a scandal brewing in the Equity Release Mortgage sector. This scandal is similar in nature to the Equitable Life scandal of nearly two decades ago – it involves the under-estimation of opaque long-term guarantees – but on a larger scale.

- The guarantees at the heart of this problem are the No-Negative Equity Guarantees issued by lenders in the Equity Release market. These guarantee that the maximum repayment on Equity Release loans can be no greater than the property price at the time of repayment.

- This under-valuation problem is a ticking time bomb that could do serious damage to the financial health of the Equity Release sector.

- The regulator, the Prudential Regulation Authority, has made half-hearted efforts to address this under-valuation problem, but has for years failed to rein in firms that used inadequate valuation methods for their No Negative Equity Guarantees.

- A recent Treasury Committee investigation into the UK life industry missed these problems and unwisely set up the Equity Release sector as a poster child to be promoted.

- This Equity Release guarantee scandal raises far-reaching questions not just about the Equity Release sector, but also about the PRA's supervision of it.

INTRODUCTION

...we have seen how dangerous a single, inconspicuous type of an embedded option can be if insurers do not handle it with care.

Nils Rüfenacht, 2012

Once upon a time there was a company called Equitable Life. Founded in 1762, Equitable was the oldest mutual assurance office in the world. A pioneer in the life assurance business, it enjoyed a stellar reputation for a long time.

One of its most notable innovations was the launching of retirement policies in the late 1950s with a guaranteed annuity rate (GAR) option that allowed policyholders to opt for minimum pension payouts on retirement. However, as interest rates fell in the 1980s, Equitable had increasing difficulty funding these commitments. It had neither hedged these commitments nor properly priced them, and it stopped selling them in 1988.

In the 1990s, under mounting financial pressure, Equitable then sought to cut payments to holders with GAR policies, but its right to do so and continue to operate as normal was eventually rejected by the House of Lords in 2000. Unable to find a buyer, Equitable had no choice but to close to new business later that year. Losses to hundreds of thousands of GAR investors were somewhere in the range between £2 billion and £3 billion and the government eventually paid out £1.5 billion in compensation. Subsequent reports were highly critical of the main parties involved: the management, actuaries, auditors and regulators.[1]

To quote to a report issued on behalf of the then-UK regulator, the Financial Services Authority (FSA):

> It is apparent that at all material times from the 1980s onwards, Equitable Life was aware of the GAR risk (though it is not clear when the full possible impact of that risk was appreciated). It is also apparent that at no time did Equitable Life ever hedge or reinsure adequately against the GAR risk to counteract it. (FSA, 2001, p. 4)

All true, but the timing of the FSA report is also significant: the FSA wised up to the problem at the same time as everyone else. Prior to that it had been asleep at the wheel in the venerable tradition of repeated UK financial regulatory failures such as Barings (1995), Bank of Credit and Commerce International (1991), Johnson Matthey (1984), Norton Warburg (1981) and many times before. It was to be so again when the Global Financial Crisis (GFC) hit. In all these cases, the would-be guardian of the system had failed to spot any impending problem until it was too late.

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1 For more on the Equitable case, see, e.g., Penrose (2004) or HM Treasury (2009).

The Equitable disaster was more than anything a failure of the regulatory system.

Nearly two decades and one Global Financial Crisis (GFC) later, it seems like history is repeating itself again.

This time the action is in the rapidly growing Equity Release market. The ingredients are much the same as in the Equitable case: incompetent management, opaque undervalued long-term guarantees, and regulators not up to their job.

The guarantees that are the focus of the action in the Equity Release case are the No Negative Equity Guarantees (or NNEGs) – by which lenders guarantee borrowers that the value of their loan cannot exceed the value of their house at the time that the loan is repaid.

Like the Guaranteed Annuity Options that brought down Equitable, NNEGs are seemingly innocuous instruments that, if misused, have the potential to undermine the financial health of the firms that issue them.

It is often said that the Equitable fiasco triggered a major step change in the nature of life insurance regulation. To give a typical quote:

> *"After Equitable a far-reaching change in the way of thinking of local [country-specific] insurance supervision took place all over the world. It was realised that current and mostly rule-based supervision could no longer guarantee an accurate protection of policyholder's interests. The change towards a more transparent, risk-based and dynamic supervision … had begun."*

> *(Rüfenacht, 2012, p. 4)*

Dr. Rüfenacht's statement nicely summarises points often made in the over-abundant regulatory literature. However, the reality is that there was no step change away from rules-based supervision towards more transparent, risk-based and dynamic supervision. Instead, supervision became even more opaque, the "risk-based" regulations were based on gameable and worse-than-useless risk models, and "dynamic" supervision existed only in theory. The actual supervision on the ground became more leaden-footed than ever. In essence, there was mainly a move towards even more rules – and inconsistently applied rules too.

Lessons had indeed been learned, but only on paper.

Asleep at the Wheel is organised as follows:

Chapter One introduces the NNEG problem and the regulatory response to it.

Chapter Two explains the basic economics and finance of Equity Release and NNEGs: it explains why firms issue NNEGs and the issues involved in valuing them.

Chapter Three discusses a recent report issued by the UK Parliamentary Treasury Committee: "The Solvency II Directive and its impact on the UK insurance industry" in October 2017. This report is a testament to the power of sustained lobbying with no regard to the long-term consequences. The industry snowballed the Committee's inquiry, and the report reflected the industry line that the root problem holding back the industry is excessive gold-plating by the PRA. Whilst it is self-evidently true that regulators always like to gold-plate regulations, this narrative is misleading because it misses the main concern: the way in which the industry undermined efforts (admittedly, half-hearted efforts) by regulators to impose

higher standards on the industry.

In the process, the TREASCOM report unwisely bought into the industry line that Equity Release was a poster child to be promoted.

That misjudgment is one they will likely soon regret.

Finally, Chapter Four sets out a few questions for the PRA.

EQUITY RELEASE STARTING TO LOOK LIKE EQUITABLE LIFE

Consider this passage from a recent communique by Deloitte:

"For an asset class that represents just 1.4% of insurers' asset holdings, equity release mortgages (ERMs) have consumed a remarkable amount of firm and supervisory time. A decade or so ago, the regulatory challenge of this asset class lay on the conduct side. More recently, however, and not without some irony, the main mitigant of these conduct risks, the no negative equity guarantee (NNEG), has switched the focus primarily onto the inherent prudential risks of equity release, namely its

illiquidity and, owing to the NNEG, the long term exposure it brings to the fortunes of the housing market without further recourse to the borrower."

(Bulley et al., 2017)

The Deloitte partner behind this report (Andrew Bulley) has worked extensively in the area and was previously Head of Insurance Supervision at the Prudential Regulation Authority (PRA).

So what is going on?

Consider first that the UK ERM market had nearly trebled in size over the previous 5 years and was projected to grow by a further 40% by 2020. This growth has been driven by investors' search for yield in a low-rate environment, which is itself a source of concern: we don't want insurers crowding into excessively risky investments. In a recent speech to the ABI in July 2017, the PRA's David Rule warned that the results of a PRA stress test indicated that a 30% house price fall could lead to losses of £2 billion to £3 billion, or 8% to 12% of the ERM sector's assets, with the exposures skewed towards firms with larger house price or ERM exposure. More recently (April 2018), Mr. Rule went further, saying that ERM books "could face difficulties in scenarios of flat, as well as falling, nominal house prices".[2]

The riskiness of ERMs arises not just from their exposure to property prices, which are themselves risky, but also because they involve risky NNEG guarantees as well.

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2 D. Rule, "An Annuity is a Very Serious Business." Speech to the "Bulk Annuities – The Expanding Market" Conference, Westminster 26 April 2018, p. 5. Available on the web at https://www.bankofengland.co.uk/-/media/boe/files/speech/2018/an-annuity-is-a-very-serious-business-speech-by-david-rule.pdf?la=en&hash=A2AA2FCD12D5C39CFAB94068EB2183CFF1FC3E29

These statements come in a context in which the PRA has issued a number of letters going back to October 2014 and resulting consultation papers, discussion papers and supervisory statements (see, e.g., CP 48/16, CP 23/17, CP 24/17, DP 1/16 and SS 3/17) that had set out a number of concerns about ERM firms' exposures and modelling practices. The number, scale and intensity of these documents suggest that regulators are worried. As CP 48/16 drily noted (pp. 6, 19), there is:

> "*a wide variety of practice regarding valuation of the embedded guarantee, with suggestions that sometimes diverged from conventional approaches to the valuation of guarantees in incomplete markets.*" […]

> "*[But there] was consensus that property assumptions (growth and volatility) were most significant [in the valuation of the NNEG].*"

In plain English, firms were all over the place on NNEG valuation, which is a source of concern in itself, but there was a consensus on the relevance of property growth and volatility assumptions. This consensus is an even bigger concern, because (expected) property price growth is irrelevant to option pricing. Property growth or expected property growth do not appear in any standard option pricing equations.

Let's suppose that the insurance company expects to wait for T years before getting possession of the house. The current value of the house to the insurance company is then given by what the PRA calls the deferment price, namely "the price that would be agreed and settled today to take ownership of the asset at [T years] in the future". Both deferment and forward prices are estimable or known now, i.e., are not dependent on uncertain future prices. Note that the forward price is also less than the current price, assuming rental yields are higher than interest rates, as seems likely in the current environment.

The PRA gives a good explanation of this point on pp. 17-18 of CP 48/16:

> (III) The value of future possession of a property should be less than the value of immediate possession

> 3.14 This statement is equivalent to the assertion that the deferment rate for a property is positive. The rationale can be seen by comparing the value of two contracts, one giving immediate possession of the property, the other giving possession ('deferred possession') whenever the exit occurs. The only difference between these contracts is the value of foregone rights (eg to income or use of the property) during the deferment period. This value should be positive for the residential properties used as collateral for ERMs.

> 3.15 It is important to note that views on future property growth play no role in preferring one contract over the other. Investors in both contracts will receive the benefit of future property growth (or suffer any property depreciation) because they will own the property at the end of the deferment period. Hence *expectations of future property growth are irrelevant* for this statement. [My italics]

Now the guarantee is costly to the insurance company and the question is how to value it. To quote SS 3/17:

> 3.7 When determining the fair value of an asset for the purpose of deriving its [credit] spread, it is important that any embedded guarantees are valued consistently with the rest of the asset (ie, on fair value principles). Otherwise, the component of the asset's spread that is assumed to represent compensation for the risks arising from the guarantee may be underestimated.

In theory, if we make certain simplifying assumptions, we can model the cost of the guarantee as a form of house price put option, and the natural choice is a version of the Black-Scholes option price model known as the Black '76 model (Black, 1976). This model differs from Black-Scholes in using the forward price of the house instead of its current price as the underlying random variable to be used in the option price equation.

We should appreciate that these products put a lot of strain on insurance companies' liquidity because companies (typically) have to wait a long time before getting any payoff from their investment. They are also highly risky which makes them capital intensive. They are risky for a number of reasons:

- Their guarantees are short option positions which are notoriously risky.

- The fair values/costs of these options can rise substantially when current house prices fall. Option fair values can also be very nonlinear and can rise in proportionate terms by much more than house prices might fall, i.e., these options can be highly leveraged.

- The Black model is itself inadequate, in part because it treats risks as Gaussian (or "bell curve" distributed) which implies "thin tails" when financial risks are actually heavy-tailed, i.e., large losses are likely to be larger and more likely than the Gaussian distribution predicts. We can then be confident that any estimate of the cost of a guarantee based on a Gaussian risk model will understate the true cost of that guarantee. The model is also inadequate in so far as it does not deal with important issues

such as market illiquidity or prepayment risk.[3]

- The timing of exit/death is uncertain, in part because of what mortality actuaries cheerily call "idiosyncratic" or Poisson individual death risk, i.e., that even if we could predict the average time of death of a large cohort of people of the same age, gender etc. the timing of death of any individual, i.e., our customer, is still highly uncertain. But we cannot even predict with confidence the average time of death of the cohort, because life expectancy has been rising over recent decades and is itself uncertain.[4] However, one point on which we can be confident – and I speak with some experience having worked extensively in the life expectancy/mortality modelling field – is that insurance companies selling ERM products will not have modelled these risks properly.

The punchline is that even the best current state of practice estimates of the costs of these guarantees would likely be too low, but let's put these misgivings aside for now.

Let me give some samples of firms' statements about their NNEG valuation approaches from their recent reports:

"[The value of the NNEG] is calculated using a variant of the Black Scholes option pricing model. The key assumptions used … include …. *property growth* ... "

"Stochastic modelling is used to capture the expected cost of [the NNEG], which will depend on the *expected rate … of future house*

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3 Real-estate options also give rise to various other issues, an excellent introduction to which is provided by Brown (2018).

4 See, e.g., Dowd et al., (2010).

price growth … "

"Equity release … loans … are valued using an internal model. Inputs to the model include primarily *property growth rates*, …. "

"The fair value of the (ERM) loans is determined using assumptions for … *future house price inflation* … " [My italics]

There is an error here and it's a whopper. Instead of using some proxy for forward house prices, which would have been the sensible approach, these firms instead apparently use a projection of future house price growth. Their modellers appear to have confused forward house prices, which will decline in the typical low-interest-rate case where the net rental yield (the rental rate minus the risk-free rate) is positive, and future house prices, bearing in mind that house prices have tended to rise in recent years, even though their future growth is always uncertain.

To their credit, the PRA picked up on this problem. Referring to the results of an earlier survey, CP 48/16 states (p. 25):

Many respondents mentioned a version of the Black-Scholes formula known as 'Black 76', where the underlying price is the 'forward price' of the property. This version uses the current price of a forward contract. Some respondents appeared to *conflate* this with the forecast future price of the property, but provided *no justification* for why house price inflation was relevant to the current price of a forward contract. [My italics]

A masterpiece of understatement! The key word is "conflate". The reason why these correspondents provided no justification for using projections of future house price inflation to value these guarantees is because no such justification exists.

To spell it out: some firms say that they are using *assumptions about future house price growth*, but the PRA correctly says that this is *obviously wrong*. From which it follows (1) that some firms are using a method wholly at odds with the one endorsed by the PRA and (2) that the PRA would not be bothering to state this at all, particularly through a protracted consultation period (March 2016 to the final statement SS 3/17 in July 2017) if it had not experienced substantial pushback from firms. We can then infer (3) that firms with equity release exposure have been undervaluing their no negative equity guarantees. We can infer this because the PRA would not be publishing on the subject or seeking industry consultation if they thought that these guarantees were correctly valued. Consequently, some firms are presumably undervaluing them. Also (4) by a similar logic, if firms are dedicating substantial resources to pushing back, they must think that the valuation of guarantees is a material issue.

I am not aware of a *single firm* that has *demonstrated* that it is valuing its NNEGs using a defensible valuation methodology.

EQUITY RELEASE EXPLAINED

This chapter explains the basics of ERMs and the nature and valuation of their No Negative Equity Guarantees (NNEGs).

THE BASICS OF EQUITY RELEASE

An ERM is a type of loan collateralised by a property ('house'), and the particular class of ERM we are interested in goes as follows. The loan is taken out by a customer late in life who owns the property they live in. The customer uses the loan to take a cruise, help their children get on the property ladder, or whatever. Unlike a normal loan, this loan has no fixed end date and involves no regular interest payments.[5] Instead, the loan ends when the customer exits the house,

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5   In some case, the loan can also end by early repayment, but I do not consider early repayment here.

either upon death or by going into a nursing home, and the value of the loan accumulates over time. At the time of exit, the lender takes possession of the property and sells it to repay the accumulated value of the loan. If there are any proceeds, these are then returned to the customer or to their estate.

The ERM loans we are interested in also include a NNEG, by which the lender can only claim back the minimum of the accumulated loan value and the house price.

The ERM loan will be taken out as some fairly low proportion of the property value – 40% is typical for a borrower aged 70 and loan-to-value ratios tend to rise with age – and the lender is protected against any risk of loss for as long as the loan value is below the value of the house.

The loan rate will typically be in the region of 5% to 6% so the loan value will accumulate at that rate over time.

The value of the collateral, the house, will vary with the house's market price. Typically, house prices have risen in recent years and we might expect them to continue to rise, but we would not usually expect the house price to rise at a rate exceeding the loan rate. In any case, house prices are uncertain and sometimes fall, so expectations of future house prices are unlikely to be realised.
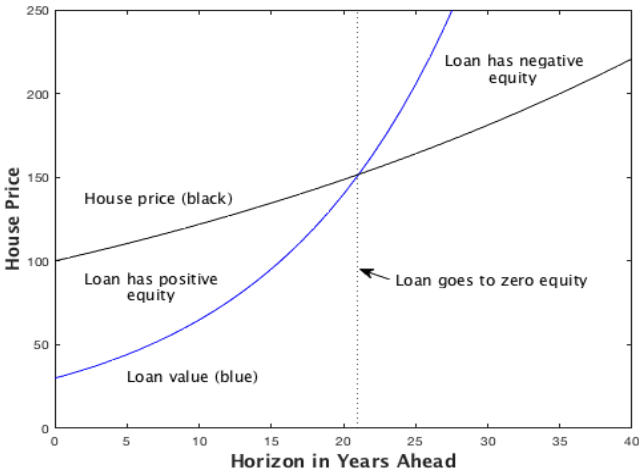
A typical case is shown in Figure 1.

Figure 1: Loan Equity in a typical Equity Release Mortgage

In this case, the initial house price is £100 and the initial value of the loan is £30, so the Loan-to-Value (LTV) is 30%. Over time we expect both the Loan Value (shown in blue) and the House Price (in black) to rise, but the Loan Value will rise at a faster rate and eventually, if the customer lives long enough, the blue Loan Value line will cross over the black House Price line. Thereafter Loan Value will exceed the value of the house, i.e., the loan will go into negative equity.

If the customer exits the house before the loan goes into negative equity (e.g., at 21 years or earlier in Figure 1), then the lender would be repaid in full.

If the customer exits after that point, the loan would expire in negative equity, i.e., the value of the property collateral would not be enough to cover the accumulated value of the loan. In the absence of a NNEG, the lender could sue the borrower or their estate, but they

might have few assets left–especially if the borrower was moving into a retirement home and any remaining assets were being used to finance their care. But most real-world ERMs incorporate a NNEG, in which case the negative equity becomes a loss borne by the lender.

The lender's potential loss with the NNEG in place is illustrated in Figure 2, and let's assume henceforth that exit is due solely to death:
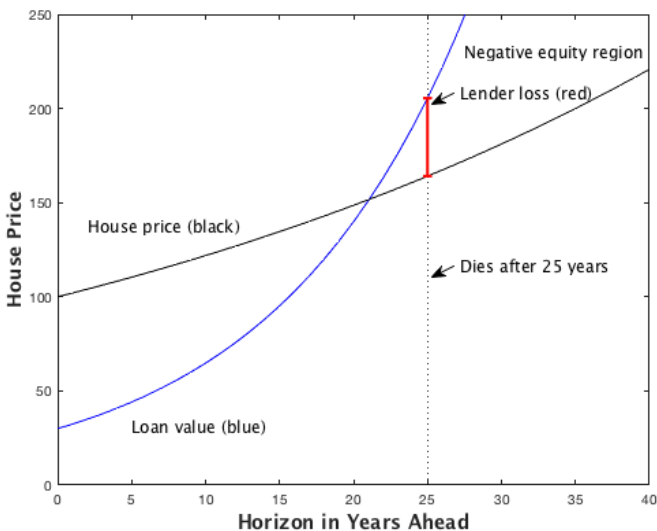
Figure 2: The problem of negative equity

In this case, the borrower dies after 25 years and the lender makes the loss given in red, the difference between the loan value and the house price after 25 years.

We should recognise that this loss (and whether any loss occurs at all) is uncertain before the event. The timing of death is uncertain and if the customer dies early then there would be no loss to the lender. But if the customer dies later the lender suffers a loss that depends upon

other factors at the time of death.

For example, if the customer dies after 27 years, then the dotted line showing time-of-death in Figure 2 would be moved 2 years to the right and the loss would be larger than in Figure 2. This case is shown in Figure 3:
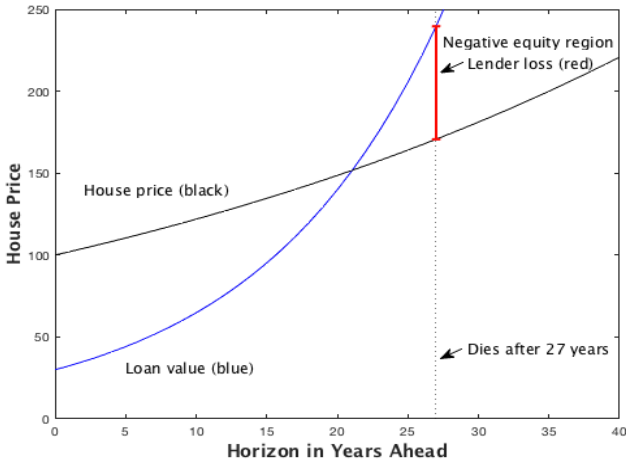

Figure 3: Lender loss and time of death

Thus, ERMs are exposed to longevity risk – the risk that the customer might live too long.

ERMs are also exposed to house price risk. This risk is illustrated in Figure 4 on the next page:
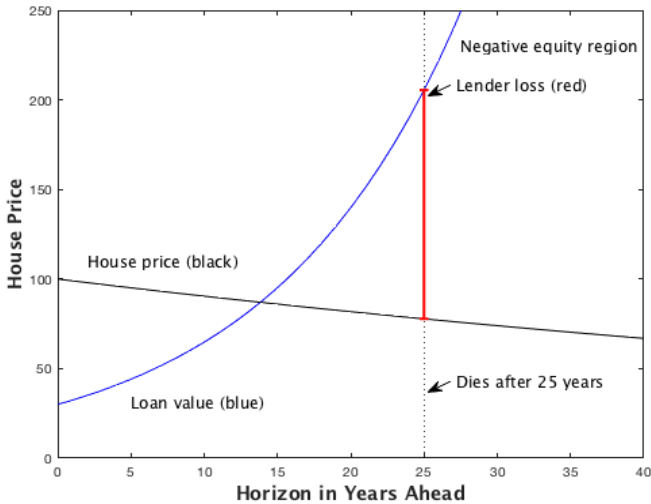
Figure 4: The impact of a fall in house prices on negative equity

The house price might be lower at the time of death than the lender expected it to be. Figure 4 shows a case where the house price declines instead of rising. If the customer dies after 25 years, then it is clear from a comparison of Figures 2 and 4 that the lender now suffers a much larger loss due to the house price fall. ERMs are therefore subject to house price as well as longevity risk.

In fact, ERMs are subject to a number of other risk factors too. These include, e.g., the risk-free interest rate and the volatility of the (forward) house price.

The present value of the Equity Release loan (ERM) can then be considered to be the present value of a perfectly collateralised loan L, one which is guaranteed to be repaid in full, minus the value of the NNEG guarantee:

(1) $$ERM = L - NNEG$$

L grows at the loan rate l from its current value until the time when the loan ends, and the NNEG is the sum of the products of the exit probabilities for each future time t and the present value of the NNEG guarantee for each future time t:

(2) $$NNEG = \Sigma_t \left[exit\ prob_t \times NNEG_t \right]$$

where $exit\ prob_t$ is the probability of exiting the house in period t, which we take to be the conditional probability of death in period t, conditional on having survived to period t; and $NNEG_t$ is the present value of the NNEG guarantee for period t.

The question is then how to value the NNEG guarantee.

VALUING THE NNEG

Recall that the NNEG gives the customer (or the person acting for the customer) the right to repay the loan by paying the lender the minimum of the loan value or the house price at the time of death.

This right to repay the minimum of two future values (one of which, the future house price, is uncertain) at some future time is a put option.

A reasonable, albeit not perfect, approach to the valuation of this put option is given by the Black '76 formula (Black, 1976).[6] The put is exercisable at some future time t. Adapted to forward house prices, the value of the put, p_t, is given by the following formula:

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6 Some of the limitations of the Black '76 approach to NNEG valuation were discussed in Chapter 1.

(3) $$p_t = e^{-rt} [K_t N(-d_2) - F_t N(-d_1)]$$

where r is the risk-free rate of interest, K_t is the strike or exercise price for period t, F_t is the forward house price for period t, the function $N(...)$ is the value of the cumulative standard normal distribution at the value specified in brackets, and d_1 and d_2 are given by:

(4) $$d_1 = [ln(F_t/K_t) + \sigma^2 t/2]/(\sigma\sqrt{t})$$

(5) $$d_2 = d_1 - \sigma\sqrt{t}$$

where ln is the natural logarithm and σ is the volatility of the forward house price.

The strike price K_t is then the accumulated loan value by period t:

(6) $$K_t = current\ loan\ value \times e^{lt}$$

and the forward price F_t, the price agreed now for possession in t, to be paid in period t, is:

(7) $$F_t = current\ house\ price \times e^{(r-q)t}$$

where q is the house net rental rate, i.e. the rental yield net of management costs, void and dilapidation. This net rental rate is different from the 'headline' or gross rental yield, e.g., the amount received by a landlord.[7]

F_t will decline as t gets longer, given that in current low interest rate

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7   The model as specified by equations (3) to (7) can also be regarded as a special case of the Margrabe option, the option to exchange one risky asset for another (see Margrabe, 1978), which is itself a generalisation of Black-Scholes.

conditions the risk free rate r is less than a plausible net rental rate .

Also, the forward house price F_t must not be confused with future prices or expected future prices:

- Forward prices for future period t are known (or can be approximated) now and we need to be able to value options using information available now.
- Options cannot be valued using future house prices because future house prices are unknown.
- Options should not be valued using expected future prices because expectations of future prices do not appear in the Black 76 option pricing formula.

We should also be careful to keep in mind that although the original Black 76 article discussed options on futures prices, these futures prices are the prices of futures contracts, a form of forward contract, *not* future prices of any sort. We must not confuse futures prices (as in prices of futures contracts) and future prices!

The key parameter is thus the q or net rental rate. As just noted, a plausible q rate might be 2% or 3% p.a., but we would always expect q to be positive, because the net rent on a property will be positive. On the other hand, if we use an expected future house price inflation rate to determine the q rate – an example is given in Appendix 2 – then we will likely get a negative q rate that can be dismissed as incredible.

Just as we were going to press, on July 2nd 2018, the PRA issued a new Consultation Paper on ERMs (CP 13/18) in which it imposed the requirement that firms use a q rate of at least zero effective immediately. It also recommended a 'best estimate' $q = 2\%$ and a minimum $q = 1\%$ to take effect after a transitional period of no more than 3 years.

NNEG VALUATION: AN EXAMPLE

We can now build a NNEG valuation model (e.g. using Excel) based on plausible input parameter values.

The baseline parameter inputs are: the customer is assumed to have just turned 70, current house price = £100, risk-free rate = 1.5%, net rental rate = 2%, loan to value ratio = 40% (implying a current loan value = £40), loan rate = 5%, volatility = 10%, with all rates in % p.a. Combined with other assumptions set out in Appendix 1, these yield a NNEG valuation of £20.8 or 52% of the current amount loaned.

A STRESS TEST

Since results are sensitive to input parameter values, it is also good practice to do a stress test in which we determine how NNEG valuation might change in the face of plausible hypothetical events.

Consider 6 different stress test scenarios:

- Stress test #1: Risk-free falls from 1.5% to 0.5%.
- Stress test #2: Net rental rate rises from 2% to 4%.
- Stress test #3: Volatility rises from 10% to 15%.
- Stress test #4: House prices fall by 30%.
- Stress test #5: House prices fall by 40%.
- Stress test #6: Expected longevity increases by 2 years.

The results of these stress tests are shown in the Table overleaf:

TABLE 1: STRESS TEST RESULTS

STRESS TEST	NNEG VALUATION	NNEG VALUATION/ AMOUNT LOANED
Base Estimate	£20.8	52%
Stress Test #1	£34.6	87%
Stress Test #2	£32.6	82%
Stress Test #3	£24.9	62%
Stress Test #4	£31.3	78%
Stress Test #5	£36.0	90%
Stress Test #6	£25.7	64%

So, for example in the base case, the NNEG valuation is £20.8, the amount loaned is £40, so the ratio of NNEG valuation to the amount loaned is 20.8/40 = 52%, and so forth.

Results are highly sensitive to the stresses considered. Note, too, that stressed NNEG valuations would increase considerably if we considered these stresses in combination rather than one at a time.

APPENDIX 1: CALIBRATION OF THE COST OF THE NNEG USING THE BLACK '76 MODEL

My estimates of the cost of the NNEG are based on an implementation of the Black '76 put option model calibrated to plausible values:

- Risk-free rate = 1.5%, which is more or less in line with the current risk-free term structure.
- Net rental yield = 2%.
- Volatility = 10%.
- Loan-to-Value (LTV) ratio = 40%.

The net rental and volatility assumptions are along the lines of a 2005 Equity Release Working Party publication "Equity release report 2005. Volume 2: Technical supplement on pricing considerations."

The assumed LTV ratio is in line with the LTVs for ERMs sold by life insurers in 2017 (see Rule, 2018, chart 5).

I have assumed house exit probabilities based on Continuous Mortality Improvement projected male death rates and I have assumed that clients have an empirically plausible distribution of ages.

I have not taken account of morbidity (ill-health) factors, the impact

of joint lives policies by which exit takes place when the second part-
ner of a couple exit the house, or the impact of early redemption
options.

Nor have I searched around to find that combination of plausible
parameter inputs that would maximise the value of the NNEG, but
one could easily get much higher plausible values if one set out to
do so. I would merely note that any or all of a lower risk-free rate, a
higher loan rate, a higher rental rate, a higher volatility, a higher LTV,
illiquidity or disposal costs and/or higher longevity could increase
(and in some cases, considerably increase) the value of the NNEG.

APPENDIX 2: HYPOTHETICAL NNEG VALUATIONS

To see how the calibration of the NNEG model might affect the size
of NNEG valuations in a hypothetical context, Figure 5 plots hypo-
thetical NNEG valuations against the amount loaned for different q
(or net rental) rates:
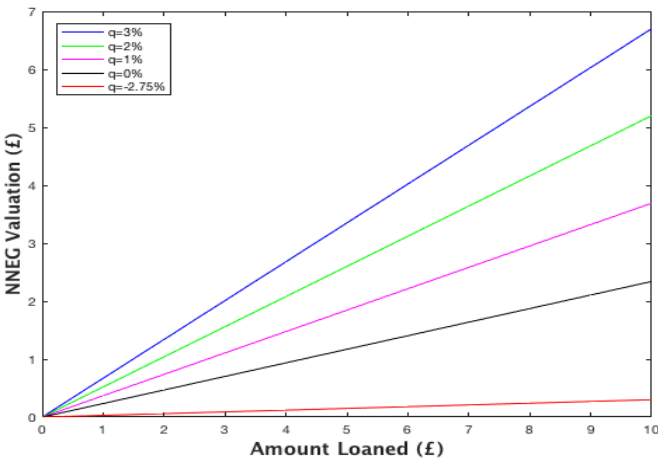
Figure 5: Hypothetical NNEG Valuations Against Amount Loaned

The q rates considered are: the plausible q rate range of 2% to 3%, and bear in mind that the new PRA 'best estimate' q rate is to be 2%; the 1% q rate that is to be the new PRA minimum; the 0% minimum q rate that the PRA has just announced is to be effective immediately; and an illustrative q = -2.75% obtained by taking the forward rate as the negative of an expected house price inflation rate.

It is interesting to note that plausible q rates can produce astonishingly high NNEG valuations.

TREASCOM BOTCHES IT ON INSURANCE REGULATION

On October 25th last year the Treasury Committee released an important report, "The Solvency II Directive and its impact on the UK insurance industry." The focus of this report was to criticise excessively restrictive regulations, especially those relating to capital requirements under Solvency II, the EU's capital/solvency regime for insurance companies.

Now TREASCOM have done some great work in recent years, but I am fairly sure that this report will not go down in history as one of

their finest. Indeed, if it goes down in history at all, it will be as a case study of the problems parliamentary committees face on highly technical subjects where they are bombarded by lobbyists determined to steer them off the straight and narrow.

To quote an FT piece by Ralph Oliver published on October 27th:

MPs have demanded that regulators reconsider their approach to the insurance industry.

In a report published on Friday on the EU's Solvency II insurance rules, the Treasury select committee said that the UK "may have erred on the side of caution" when putting the regulations into practice.

The committee was particularly critical of the Prudential Regulation Authority, a part of the Bank of England that regulates the insurance industry.

"An excessively strict interpretation of the requirements of Solvency II, and of its own obligations, has limited [the Prudential Regulation Authority's, PRA's] thinking in a way which could be detrimental to UK plc," the committee said in the report. […]

"The PRA needs to explain its thinking on the industry's suggestions in more detail than hitherto, and it needs to consider its reactions with more of a post-Brexit mentality," the MPs said, adding: "The committee is concerned by the PRA's dismissal of many of these suggestions."

The industry were cock-a-hoop:

> Clare Swirski, a consultant at Debevoise & Plimpton, the law firm, said: "[The report's] general tone is one of support for insurers. The select committee has clearly listened to what insurers have to say, and is asking the PRA to reconsider its approach."

> Huw Evans, director-general of the Association of British Insurers, said: "This is an important report which urges sensible reform so that the UK's world-leading insurance sector can operate effectively to serve customers, business and the wider economy."

My congratulations to the industry on a superb lobbying campaign.

GOOD VS. BAD RULE BENDING & THE PUZZLE OF 'ARTIFICIAL STRUCTURES'

In essence the industry message to the Committee was that the Solvency II regime, which took more than a decade to put in place, has been highly problematic. Insurers complained that the new rules have been ill-thought through, expensive, and cumbersome to implement. Not only these but insurers have increased their costs in important areas like annuities or ERMs, thereby also discouraging their investment in long-term assets.

At first sight, the industry might seem to have a good case: some regulations are unreasonable, so the firms lobbied for those rules to be relaxed and MPs agreed.

Ordinarily, I would be cheering them on from the sidelines as there is some truth to such claims and, frankly, the only argument for stringent capital regulation is as a counterweight to other failures of the

regulatory system – of which there are many.

Reverting to topic, my problem is that this narrative is misleading.

To quote the Committee:

> 105. It is unsatisfactory that significant monetary and time costs are being incurred as insurers create artificial structures to "get round" the rules—for example in restructuring (reasonable) assets so that their cashflows meet the exhaustive qualifying criteria set out in the rules.

Naturally, if the rules are clearly stupid, then there would be some justification for 'getting round' them. But the whole point and purpose of the original Solvency II was to put an end to the sort of Equitable Life style abuse caused by off-market and firm-specific valuations, i.e., the valuation methods that the industry lobbied hard to keep. That the purpose of Solvency II was to avoid another Equitable Life fiasco was clear from the start, as a European Commission memo from July 10th 2007 makes clear:

> The proposed new solvency regime addresses in particular a number of problems which have appeared in the Equitable Life situation. … It is therefore less likely that situations such as that experienced in the case of Equitable Life will reoccur in the future. (EU Commission, 2007, p. 14)

So what exactly are these 'artificial structures?' and why is the industry so keen to preserve them?

In a letter dated October 15th 2014, the PRA Executive Director for Insurance Supervision, Paul Fisher, explained that "The PRA expects that firms will need to undertake restructuring or hedging

actions to transform the cash flows of such assets into an eligible format." The idea seems to have been that the assets in question were to be securitised into junior and senior tranches. We don't know the details, but one must presume that the senior spread must be significantly high and the tranche significantly large, otherwise there would be no point. After all, there is no point firms lobbying to defend their 'artificial structures' unless they are genuinely and honestly artificial and unless firms stand to gain materially from them.

Further details emerged in a subsequent letter in February 2015 and in CP 46/16. This letter explained the qualifications under which the artificial restructuring would work. One of these is that firms hold both senior and junior tranches, although only the senior tranche could be used to qualify. It also explained how an internal 'ratings based' approach could be used. Roughly speaking you can embed a complex and potentially toxic non-linear guarantee into an asset, then securitise the asset, rate it internally (for example, AA) and keep both tranches. All this is fine because the junior tranche would absorb any losses.

If this sounds fishy, that is because it is. Apart from anything else, exactly the same risks stay on the firms' balance sheets (i.e., there is no risk transfer to outside parties, which is odd) and an awful lot is riding on the assumed loss absorbency of the small junior tranche.

What had happened is that the European Commission had ruled against ERM portfolios receiving something called 'Matching Adjustment' approval. Matching Adjustment (MA) is a strange regulatory practice by which firms are allowed to apply a higher discount rate to their liabilities. The application of this higher discount rate has the effect of reducing the value of their liabilities which thereby conjures up additional, fake, capital and bolsters firms' balance sheets. MA is of course a regulatory fiddle, but it is a valuable one for

firms.

To quote David Belsham in his 22 February 2017 TREASCOM evidence, in response to Q166:

> "The Solvency II rules are very clear that the matching adjustment is only allowed on assets with fixed cash flows. They emphasise it more by saying that the cash flows *cannot be changed*. It is absolutely clear which assets are being limited [denied eligibility], and that is because the matching adjustment is *such a big [regulatory] benefit*." (My italics)

Mr. Belsham couldn't be clearer. Firms then came up with the bright idea of 'securitising' ERM portfolios to make them eligible for MA approval and so get around the rules. Never mind that the fixity of the securitised assets cash flows was dependent on a highly suspicious piece of financial alchemy (i.e., the securitisation itself) or that firms retained all the risks involved. You see, the only purpose of the securitisation was to get around the European Commission rules.

Firms then lobbied the PRA hard to grant MA approval for their securitised ERM positions and afterwards complained to the Committee about having to go through the inconvenience of creating these artificial structures to circumvent the rules.

Some further insight was provided, albeit obscurely, by Sam Woods in his oral evidence on the same day:

> "Because we have had to go through this securitisations loop in order to enable firms to get the matching adjustment for equity release, it has made it more difficult for firms on the standard formula. Our solution to that … is to encourage or allow firms in that situation to apply for a partial internal model, so as to model that

bit. Normally, we are quite cautious about that for cherry-picking reasons, but we have allowed that. More broadly, yes, of course we would prefer to settle things in a civilised way without people threatening to go to law."

He confirms that the purpose of the securitisation is to obtain the MA for equity release, but he also expresses his concern about the dangers of cherry-picking i.e., gaming, and his evident distaste about having to make decisions on whether to grant MA approval in the face of threats to take legal action.

Mr. Woods' remarks reveal a lot about the intense lobbying pressure that the PRA is subjected to.

One might also have questions about the modelling, e.g., of default probabilities, losses given default, longevity risk, the valuation of option-like guarantees and the inadequate modelling of long-term property price risk, especially the possibility of a major house price decline, which could be catastrophic for ERM positions.

There is also a bit of a mystery about the timing. Solvency II came in on January 1st 2016 so it's safe to assume the model approval process must have been complete by then, and this conjecture is confirmed by a letter dated November 6th 2015 by Andrew Bulley and Chris Moulder from the PRA. However, this letter goes on to say that "we intend to undertake an industry-wide review during 2016 of ERM valuations and capital treatment. The outcome of that review may lead to a reassessment of the extent to which firms are complying with the Solvency II requirements in areas such as asset valuation and the prudent person principle." Yet it seems odd to have completed the model approval process but simultaneously say that a reassessment was now needed.

They also mention the "challenge" of "how to value embedded options and guarantees when assessing the appropriate value for the asset and the appropriate capital treatment." But if the valuation of embedded options was still a challenge after the approval process was completed, then why did the PRA give approval for securitising them before the second approval process had been completed?

It is all rather puzzling.

For its part, the Committee would appear (rightly) not to approve of these 'artificial structures':

> 106. In developing the future regulatory model, specific efforts should be made to avoid creating situations where artificial structures are encouraged to achieve an appropriate regulatory treatment for any class of assets or liabilities.

It should go without saying that the rules should aim to prevent bogus securitisations that are designed merely to game the rules. However, the central question revolves around 'appropriate regulatory treatment'.

To avoid any kind of gaming, the only appropriate treatment is the (one hopes, true and fair) value that a rational market agent would place upon the assets or debt, i.e., there should be no separate 'regulatory' valuations as such – and definitely no MA.

Thus, the more important issue is not Solvency II so much as solvency itself.

Let me expand on these issues in the context of the sector highlighted by the Bulley-Moulder letter: Equity Release Mortgages (ERMs).

EQUITY RELEASE MORTGAGES

An interesting feature of the TREASCOM report is the way in which the Committee failed to challenge the industry's emphasis on the still small but rapidly growing ERM market. The report states:

> 117. UK firms believe that Solvency II makes it harder for them to invest in longer-term illiquid assets, such as infrastructure *and equity release mortgages*. This is a concern as the disincentive could have negative economic consequences and act as a restraint on UK plc. (My italics)

To have made ERMs a poster child for the industry is something that both the Committee and the PRA may live to regret, however.

There are a number of issues here. From a first principles perspective, ERMs are a highly undesirable investment for a typical insurer. Companies usually practice some form of Asset-Liability Management (ALM) which advises firms to invest in assets with similar cash flows as their liabilities. This, indeed, is the main reason why they invest in long-term bonds and some forms of long-term property. However, whilst ERMs are certainly long-term, they are also risky, both because of riskiness of their NNEGs and because of their exposure to house price risk.

These guarantees are also a cause for concern because a recent PRA survey of firms involved in the ERM business found evidence of widespread malpractice in the way that firms valued these guarantees:

> Many respondents mentioned a version of the Black-Scholes formula known as 'Black 76', where the underlying price is the 'forward price' of the property. This version uses the current price of

a forward contract. Some respondents appeared to conflate this with the forecast future price of the property, but provided no justification for why house price inflation was relevant to the current price of a forward contract. (CP 48/16 2016, p. 25)

The PRA's polite language disguises the point that the use of the forecast future price of the property instead of the forward rate involves a major intellectual error that can make a material difference to the valuation.

The problem is not just that the NNEG under-valuation means that some firms might appear to be in better financial shape than they actually are. There is also the danger, e.g., that bogus valuation models could be used to inflate the values of firms' stock and thereby liberate equity from pension funds and other investors. Indeed, it cannot be entirely ruled out that the desire to protect this particular business line might be a motive for some firms to push back against PRA attempts to scrutinise their internal models.

Referring back to Para 117 quoted earlier, the question also arises as to why the Committee would want these firms – many of whose liabilities are annuities that are meant to provide for a safe retirement pension – to back those liabilities with highly risky assets such as infrastructure projects and ERMs. That might be, in part, because it is not just the industry that has been spouting this irresponsible line, but the regulators too. In a July 2017 speech entitled "Changing risks and the search for yield on Solvency II capital", Mr. David Rule, the PRA's executive director of insurance supervision, states:

> "Yields on government bonds are low and spreads on corporate bonds are narrow. Insurers are therefore searching for yield in less liquid, direct investments. These include equity release mortgages, commercial property and infrastructure financing.

> Based on supervisory information, about 25% of annuities are backed by such direct investments currently. But insurers have plans for that proportion to increase to 40% by 2020." (Rule, 2017, p. 3)

All this is true, but instead of warning that higher yield always involves higher risk, and then concluding that it might be unwise for firms to back annuities with such assets and on such a scale, he endorses the practice instead:

> "These assets can be a good match."

"Can be" doesn't cut it. ERMs are risky assets and risky assets are not a good match for annuity liabilities that are meant to be ultra safe.

Search for yield is always dangerous. That's the reason why junk bonds are called junk.

The regulator encouragement of such risky investments also goes directly contrary to the PRA's core purpose which is to encourage prudent risk-taking and promote financial stability.

THE CAPITAL REQUIREMENT FOR THE UK INSURANCE INDUSTRY IS WHAT, EXACTLY?

One final point: the Committee missed a revealing discrepancy in the evidence given by its two principal witnesses. Consider these two answers, the first by Bank Deputy Governor Sam Woods and the second by David Belsham in their 22 February 2017 evidence to TREASCOM:

> Woods (in answer to Q162): "... the whole capital requirement for the insurance industry is around £126 billion ..."

> Belsham (in answer to Q172): "… £60 billion … is about 75% of the entire capital requirement of the industry …"

Since £60 billion is 75% of the entire capital requirement of the insurance industry, Belsham is suggesting that the entire capital requirement must be £80 billion.

So how come the PRA CEO says it is £126 billion but his colleague suggests that it is only £80 billion? That is a difference of £46 billion.

So which is it and why didn't the PRA issue a correction afterwards to set the record straight?

Let's hope the good folks at the PRA managed to get their act together before they had to provide a progress report as requested by TREASCOM for the end of March 2018 – and let's hope the MPs do a better job next time.

Insurance industry 1, TREASCOM nil.

SOME QUESTIONS FOR THE PRA

So things are not looking so good in equity release land.

A few questions also arise over the PRA's handling of the sector:

- How big is their assessment of the ERM NNEG valuation problem across the ERM sector?
- How long have they known of these problems?
- Which firms are of most concern?
- Can the PRA assure us that they have done everything possible to ensure good practices in the ERM sector and, if so, why did the PRA sign off on any cases where firms' modelling practices did not meet their own standards?

- Can the PRA reassure us that all firms are in sound financial condition and that there are no systemic prudential concerns emanating from the sector?
- Can the PRA reassure us that the Equity Release NNEG problem will not turn into a repeat of the Equitable Life fiasco of two decades ago, and that all is well with the Solvency II insurance regulatory regime that was introduced to prevent another Equitable Life?

In most financial regulatory scandals the regulators are caught off-guard and never saw the problem coming. This case is somewhat different in that the regulator not only identified the problem but went to considerable lengths to get it under control. One can only applaud them on both counts.

But the mystery here is that having identified the problem of poor NNEG valuation practices, the PRA allowed them anyway. So close but no cigar.

One is then left wondering about the point of having a regulator that allowed regulated firms to flout its own minimum standards.

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