

# Turkish Economic Review

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## The UK prudential regulation authority's valuation principles for equity release

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**Abstract.** In recent years the UK Prudential Regulation Authority has been involved in an ongoing discussion with equity release firms over the principles to be used in the valuation of equity release mortgages. The UK regulator proposed a set of such principles in its Supervisory Statement SS 3/17. These principles mark a major step forward in equity release valuation methodology. They are based on elementary pricing economics, their validity is easily established and they are easy to apply. They can be used to provide a cross-check on any proposed set of valuations and so test the reliability of the underlying valuation model or its calibration.

**Keywords.** Actuarial science; Black '76 model; Equity release mortgage; No negative equity guarantee; Prudential regulation.

JEL. G20; G30.

### 1. Introduction

There has been considerable controversy recently in the UK regarding the valuation of equity release mortgages (ERMs) and their no-negative equity guarantees (NNEGs) (see Dowd, 2018; Dowd *et al.*, 2019; Buckner & Dowd, 2020, 2021; Jeffery & Smith, 2019; Thomas, 2018; 2019). An equity release mortgage is a loan made to an older property-owning borrower that is mortgaged against their property and repaid when the borrower permanently leaves it, e.g., on death. A NNEG implies that a borrower never owes the lender more than the value of the property pledged against the loan and constitutes a put option issued by the lender to the borrower.

Part of the background to this controversy involves protracted discussions between the UK Prudential Regulation Authority (PRA) and equity release firms over the principles to be used. The PRA proposed a set of such principles in its *Supervisory Statement SS 3/17* issued in July 2017. To quote:

1.1 This supervisory statement (SS) sets out the PRA's expectations in respect of firms investing in illiquid, unrated assets within their Solvency II matching adjustment (MA) portfolios. It is relevant to life insurance and reinsurance companies holding or intending to hold

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unrated assets (including restructured equity release mortgages (ERMs)) in an MA portfolio.<sup>2</sup>

The *Supervisory Statement* continues (para 1.6)

Chapter 3 ... sets out some principles to be applied when assessing the risks from guarantees embedded within ERMs ...

The term 'guarantees' refers to the No-Negative Equity Guarantees (NNEGs) that ERM lenders typically grant to borrowers who take out ERM loans. The issue is then how to value these NNEGs. Implicit in *SS 3/17* was the PRA's concern that firms were calibrating their NNEGs using unreasonably low deferment rates.<sup>3</sup> A number of firms at the time were using negative deferment rates and these are strange, because the deferment rate should be equal to the net rental yield and rentals, whether net or gross, are ordinarily and obviously positive. Such deferment rates lead to understated NNEG valuations and overstated ERM valuations.<sup>4</sup>

We will focus here on Principles II and III, which state:

[Principle 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;

[Principle III] The present value of deferred possession of property should be less than the value of immediate possession

These Principles can be used to establish model-free rational valuation bounds on any proposed ERM or NNEG valuations. The bounds themselves are based on elementary economic logic. By 'model-free bounds', we mean bounds that do not depend on the choice of option-pricing model.

These bounds are useful for two reasons. The first is that they enable us to check a set of proposed valuations. If someone offers us a set of valuations that breaches these bounds, the rational response would be to reject those valuations. The bounds might be useful to an analyst or regulator tasked with equity release model validation. If valuations breach the bounds, then the valuations should be rejected and the models that generate them should be called into question.

The second reason is that one can interpret the *bounds themselves* as giving model-free valuations. Suppose, for example, that one wished to value an ERM but believed that there was no reliable NNEG valuation model that one

<sup>2</sup> The phrase 'restructured equity release mortgages in a Matching Adjustment portfolio' refers to an internally held securitisation in which the firm holds all tranches of the securitisation, and the term 'Matching Adjustment' refers to the regulatory practice of allowing firms to discount liabilities at a rate higher than the risk-free rate.

<sup>3</sup> The deferment rate is the discount rate which when applied to the property price gives the deferment *price*, and the deferment price is the sum to be paid immediately to secure possession of the property at a specified future date.

<sup>4</sup> The main controversy centres around whether one should use 'market consistent' approaches such as Black (1976; B76) with the forward house price as the underlying and the deferment rate set equal to the net rental rate, or to use the industry's preferred 'discounted projection' approach, which is equivalent to using B76 but with the forward house price replaced by a projected future house price.

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could use,<sup>5</sup> then one might resort to using the Principle II and Principle III bounds as a surrogate. The NNEG lower bound would be regarded as a surrogate NNEG valuation and the ERM upper bound would be regarded as a surrogate ERM valuation.

This article sets out these Principles and provides new and simpler demonstrations of their validity.

This paper is organised as follows. Section 2 sets out and proves Principle II. Section 3 sets out and proves Principle III. Section 4 discusses the bounds that Principles II and III impose on ERM and NNEG valuations. Section 5 provides an example of how these bounds can be used to identify irrational valuations. Section 6 discusses the responses of the actuarial profession and the industry to the Principles. Section 7 concludes.

### 2. Principle II

Principle II is an instance of a more general principle that has universal validity. Suppose there are three boxes A, B and C, into each of which I have put a sum of money. I put an arbitrary amount in each of A and B, but the amount in C is equal to the lower of the amounts in A and B. For example, if I put £10 in A and £20 in B, then I put £10 in C.

Assume you are a rational person and can choose one of the three boxes. Would you choose box C? Clearly not. The amount in C cannot be more than the amount in A, and may be less, so you will prefer A to C. By similar reasoning, you will prefer B to C. Therefore you will not choose C. On the principle that 'more valuable' means what any rational person would prefer, the value of C is less than the value of A or the value of B.

Principle II is an instance of this general principle. You can choose now between A the value of a loan at a future time  $t$ , B the value of a property at the same future time, or C, the minimum of A and B. On the principle above, you would never choose C.

But C is an ERM-let, i.e. a contract that delivers the minimum of the value of a loan at future time  $t$  and the value of a property at the same future time. Principle II then follows. I.e.

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.

### 3. Principle III

Principle III states:

The present value of deferred possession of a property should be less than the value of immediate possession

i.e.,

Deferment property value < spot property value. (1)

<sup>5</sup> We have frequently encountered the view among actuaries that B76 cannot be applied to NNEG valuation for one reason or another, e.g., because B76 requires liquid markets in the underlying and this assumption is not empirically valid in the ERM context.

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where the deferment house value is the price that we would agree to pay and pay today to take possession of the property in  $t$  years' time.

Compare the value of two contracts, one giving immediate possession of the property, the other giving deferred possession when exit occurs. The only difference between these contracts is the value of foregone rights<sup>6</sup> during the deferment period. The value of these foregone rights should be positive for the residential properties used as collateral for ERMs. It then follows that the present value of deferred possession should be less than the value of immediate possession, i.e., we obtain Principle III. Principle III thus follows from elementary pricing economics: just as we would pay more to get more, we would pay less to get less.

Alternatively, consider the deferment property price

$$R_t = S \times e^{-qt} \quad (2)$$

where  $R_t$  is the deferment property price over a deferment period  $t$ ,  $S$  the current or spot property price, and  $q$  is the *deferment rate*, defined as the discount rate applied to the current house price to give the deferment price.

Note the implicit assumption that  $q$  has a flat term structure.<sup>7</sup>

Applying the Discount Dividend Model (Gordon, 1959) we obtain

$$S = d[1/(1+y) + 1/(1+y)^2 + 1/(1+y)^3 \dots] \quad (3)$$

where  $d$  is the net nominal annual rental and  $1/(1+y) > 0$  is the appropriate discount factor. We see that  $S$  has the same sign as  $d$ .

Now note that if  $d \leq 0$ , then  $S \leq 0$ , and no ERM lender would make an ERM loan mortgaged against a property with a nonpositive value. Thus, the case where  $d \leq 0$  is of no relevance to equity release. For equity release purposes, we can now proceed on the basis that  $d > 0$ .<sup>8,9</sup>

It can then be proved that

$$q = d/S. \quad (4)$$

<sup>6</sup> Economists commonly refer to these rights as 'rental values', a term which includes rental income, where the property is let out, or the 'roof over the head' benefits of living in the property, where it is not let out.

<sup>7</sup> The case where  $q$  has a term structure would be the subject of a further paper.

<sup>8</sup> In any case, counter-examples to  $d > 0$  are conceivable but strange and rare, and of no relevance to equity release.  $d \leq 0$  indicates negative or zero rental i.e. properties where the renter is paid to rent. One thinks of an apartment in Chernobyl or a house hanging over the edge of a cliff. No ERM lender would make an ERM loan mortgaged by such properties, however.

<sup>9</sup> Another mistaken counter-example is where a person might be paid to housekeep a property e.g., while the owner is away. Leaving aside that such arrangements are typically too short-term to matter in this context, the payment made should not be conflated with a negative rental. Instead, from an economic perspective, the payment made to the housekeeper should be regarded as a payment for the service of looking after the property minus a positive rental payment that the housekeeper pays for the benefits of having a roof over the ir head, the alternative being that the housekeeper camp in the garden.

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A proof of (4) is given in the Appendix to Buckner & Dowd (2021).  
Applying  $d > 0$  and  $S > 0$ , then (4) implies

$$q > 0. \tag{5}$$

It then follows from (3) and (5) that

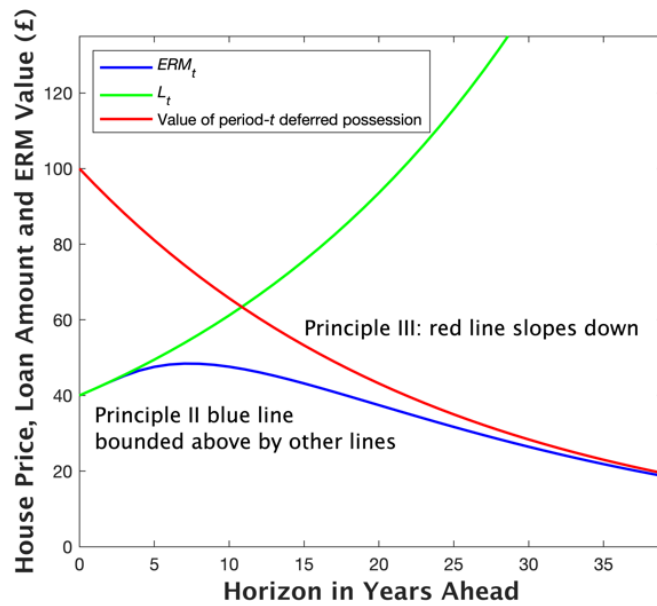
$$R_t = S \times e^{-qt} < S. \tag{6}$$

and Principle III is established.

The reader will note that the only assumptions underlying our proof of Principle III are that  $q$  has a flat term structure and that it is permissible to apply the Discount Dividend Model.

### 4. Bounds on ERM and NNEG Valuations

The impact of these two Principles is illustrated in Figure 1:



**Figure 1.** Illustration of Principles II and III

**Notes:** Based on the baseline assumptions: male aged 70, loan-to-value ratio=40%, risk-free interest rate=1%, loan rate=5.25%,  $q=4.2\%$  and volatility=20%. Justifications for these calibrations are given in Buckner and Dowd (2020). The blue line gives  $ERM_t$  valuations obtained using the B76 option price model. House exit probabilities are based on the M5-CBD mortality model, Cairns *et al.* (2009).<sup>10</sup>

Principle II implies that the blue ( $ERM_t$ ) line must be below both the green ( $L_t$ ) line and the red (deferred possession) line, and Principle III implies that the red (deferred possession) line should slope downwards.

<sup>10</sup> House exit probabilities refer to the probabilities that the borrower makes their final exit from their home in 1 year, 2 years, 3 years etc., at which time the ERM loan is repaid. Denoting these as  $p_t$ ,  $ERM$  is the sum of the  $p_t \times ERM_t$  terms over all future  $t$ .

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In this particular case, the blue  $ERM_t$  line is based on B76 and we see that these valuations do not violate the ERM bounds.

There is some interesting intuition underlying the Figure:

- For very low horizons,  $NNEG_t$  is very out of the money and the probability of exercise is very low. Hence the value of the option will be negligible and  $ERM_t$  will be indistinguishably close to the value of the loan  $L_t$ .
- For long horizons or high  $t$ , the option is well into the money and the probability of exercise is high and approaching 1. Therefore, the  $ERM_t$  line converges to the deferred house value line for period  $t$ .

These graphs reflect some elegant mathematics.  $ERM_t$  is given by

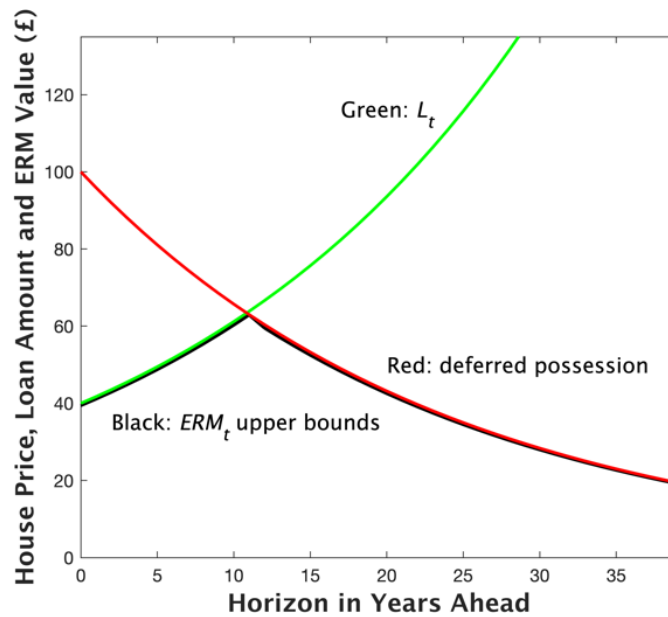
$$\begin{aligned} ERM_t &= e^{-rt}L_t - e^{-rt}[L_tN(-d_2) - F_tN(-d_1)] \\ &= e^{-rt}[1 - N(-d_2)]L_t + N(-d_1)e^{-rt}F_t \end{aligned} \quad (7)$$

where we have set the deferment price  $D_t = e^{-rt}F_t$ . From the standard equivalence  $N(-x) = 1 - N(x)$ , we then get

$$ERM_t = N(d_2)e^{-rt}L_t + N(-d_1)e^{-rt}F_t. \quad (8)$$

This expression is simpler and reflects the shapes of the curves clearly. As  $d_2$  gets positive,  $-d_1$  gets negative, so  $N(d_2)$  goes to 1,  $N(-d_1)$  goes to zero and  $ERM_t$  approaches the present value of the loan. As  $d_2$  goes negative, it's the other way round, so the term on the left disappears and the term on the right approaches the deferment price  $e^{-rt}F_t$ .

Figure 2 shows the upper bound for  $ERM_t$  made explicit and highlighted in blue.



**Figure 2. ERM Upper Bound**

Notes: As per Figure 1.

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As an aside, if we start with a figure like Figure 1 and let the volatility get small, then it is easy to show that Figure turns into Figure 2 and the ERM valuation approaches the Principle II upper bound. But if the ERM valuation approaches its upper bound, then the corresponding, e.g., Black 76' or any other valid option valuation must approach the Principle II NNEG valuation lower bound, i.e., as  $\sigma \rightarrow 0$ , the NNEG valuation approaches the Principle II NNEG lower bound whatever option pricing model is used.

We can obtain the  $ERM_t$  upper bound as the minimum of  $e^{-rt}L_t$  and  $e^{-rt}F_t$ . Note that this upper bound can be estimated using only information about the current house price and LTV (which together give us the current amount loaned), the risk-free rate  $r$ , the net rental  $q$ , the loan rate  $l$  and the exit probabilities. For example, in the baseline case, we estimate the ERM upper bound to be £47.3. So even without estimating ERM or its NNEG or estimating any underlying option model or calibrating any additional parameters, such as the volatility, we immediately know that any proposed ERM valuation that exceeds £47.3 is not consistent with rational pricing.

If we can estimate an upper bound for ERM without requiring an option-pricing model or relying on any volatility parameters, then by

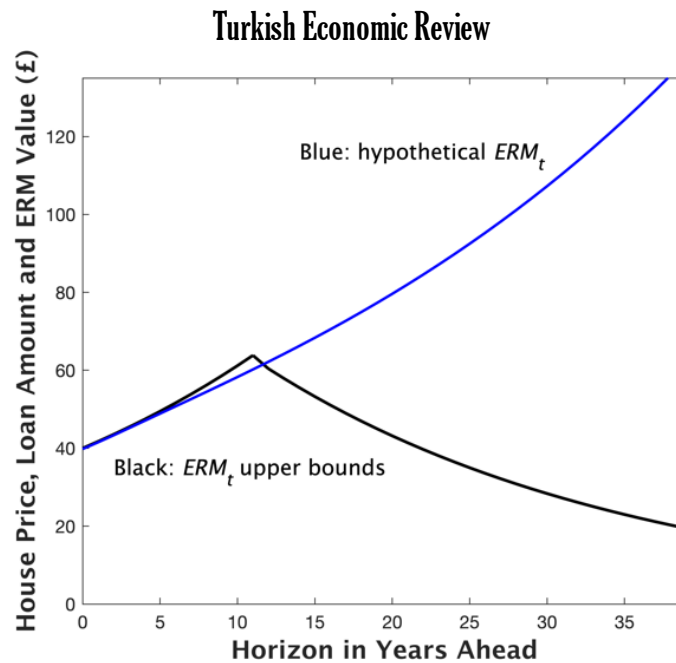
$$ERM = L - NNEG \quad (9)$$

we can also estimate a lower bound for NNEG on the same basis. Given that  $L = £81.7$  in our baseline case, the upper bound ERM estimate of £47.3 implies a NNEG lower bound equal to £34.4. So even without estimating the NNEG or relying on any NNEG valuation model or any volatility estimate that might go into any such model, we know that any proposed NNEG valuation below £34.4 is not consistent with Principles-based rational option valuation.

To cut to the chase, given these various inputs – the assumed age and gender, the assumed house price and LTV, the assumed  $r$ ,  $q$ , and  $l$  rates, and the inputted house exit probabilities – it is *impossible* to get a rational NNEG valuation any lower than £34.4 *whatever option pricing model one might use*.

## 5. Example application

We now set out an example application of the Principles' bounds. Suppose that a supervisor in a firm establishes to their satisfaction what they regard the  $ERM_t$  upper bound to be in some particular case. The supervisor delegates the task of obtaining the  $ERM_t$  series itself to a subordinate. If the subordinate comes back with an  $ERM_t$  series that falls below the  $ERM_t$  upper bound, then the series is deemed to pass the bound test. The  $ERM_t$  shown in Figure 1 is an example. If the subordinate comes back with an  $ERM_t$  series that breaks through the  $ERM_t$  upper bound, the series is deemed to fail the bounds test. An example of such an  $ERM_t$  series is given in Figure 3 below.



**Figure 3. Example Illustration**

Notes: As per Figure 1.

Where an  $ERM_t$  series fails the bound test, we can conclude that the model that generated it is flawed and/or incorrectly calibrated. As it happens, the hypothetical  $ERM_t$  series that fails the bound test comes from a version of the discounted projection approach calibrated using the same parameters as used for Figure 1 except for the house price inflation assumptions reported by Just Group on p. 110 of their 2017 *Annual Report*.

## 6. Misconceptions About Principle III

*Guy Thomas on Principle III*

The PRA Principles were widely misunderstood by equity release analysts, however. A prominent example is Guy Thomas, who objected that Principle III may not hold because corporates value deferred possession more than individual homeowners or landlords do. An example of this argument is made by Guy Thomas in a recent posting ([Thomas, 2018](#)). In his piece, he acknowledges that the loss of foregone rights (e.g., to income or use of the property) during the deferment period [i.e., the argument underlying Principle III] “appears a reasonable argument” but even so, adds that “there are also reasonable counter-arguments.” His key claim is the following:

...current interests in houses are evidently not attractive to insurers and other institutional investors. Deferred interest might well be more attractive, particularly if in the form of cash-settled financial contracts, so that all the problems of current interests are permanently avoided. Even if a deferred interest is not strictly preferred, *the relative valuation of a deferred interest compared to a current interest seems very likely to be much higher for an insurer than a typical individual owner.*<sup>11</sup> (Our emphasis)

<sup>11</sup> He makes a similar point in Thomas (2020, p. 10): “The equivalence ... between net rental yield and deferment rate depends on the assumption that both the spot price and the deferment price are fully determined by a “dividend discount” model applied to rents, with the same effective discount rate used by both spot and deferment purchasers. Since the spot



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Now if there were a substantial market for deferred interests, the money weight of individuals' preference for current interests versus insurers' preference for deferred interests would determine the relative *market prices* for the two types of interest (i.e. what the PRA calls the 'deferment rate'). But we have the same problem as with the hedging arguments: *the market for deferred interests does not exist on any meaningful scale.* (Our emphasis)

However, there are no legal barriers to a market for deferred interests and such a market already exists in the form of freeholds. If his argument about corporate deferred valuations being above individual deferred valuations were correct, we would also expect insurers to be getting into the deferred property market on the grounds that deferred property ownership is underpriced, and yet he acknowledges that it is not.

In any case, Thomas is comparing one hypothetical non-market valuation (i.e., insurers' valuations of current possession) against another (i.e., their valuations of deferred possession). A comparison of the relative valuations of spot and deferred possession made by a party that is *ex hypothesi* not a major player in the market does not establish (a) anything about the market prices or plausible values for current possession or the market prices or plausible values for deferred possession or any relationship between them. In any case, no such comparison establishes (b) that deferred 'interests' have the negative value necessary to undermine the validity of Principle III.

To make point (a) in a different context, suppose we value a typical stately home as being worth 2 times the value of a typical castle, but the market values a typical stately home as being worth 3 times the value of a typical castle. Our views might be sincerely held, but they are of no relevance if we don't have any portfolios of castles or stately homes and are not in the market trading them. Because we are not in the market trading these things, our views about their relative valuations have no relevance to anyone but ourselves. The only valuations that matter for valuation purposes are those of the market.

### *IFoA Misconceptions on Principle III*

In June 2016, the Institute and Faculty of Actuaries issued "DP 1/16: Equity Release Mortgages: IFoA Response to the Prudential Regulation Authority," its official response to the PRA's earlier Discussion Paper DP 1/16, which had had asked for industry views on ERMs. To quote from this response:

33. For the second relationship in paragraph 4.9 [i.e., Principle III] to hold, in theory, there needs to be a deep and liquid market. Otherwise the implication is that the average value of the HPI [House Price Inflation] assumption is less than or equal to the discount rate assumed

price is determined primarily by owner-occupiers, but the (hypothetical) deferment price would be determined by a quite different type of purchaser – those interested in deferred possession – the two discount rates might not be the same. Hence, the deferment rate may not be equivalent to net rental yield."

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in the valuation of the NNEG. In practice, the approach to setting the HPI assumption varies significantly from firm to firm.

There are several mistakes here:

- Mistake #1 is that for Principle III “to hold, in theory, there needs to be a deep and liquid market.” The validity of Principle III has nothing to do with a deep and liquid market and we have just shown that its validity holds under general conditions.

- Mistake #2 is to suggest that the “average value of the HPI assumption is less than or equal to the discount rate assumed in the valuation of the NNEG.” This statement is just plain wrong. The correct statement is that we can assume any HPI we want to, but the assumed value of the HPI is always irrelevant to the valuation of the NNEG.<sup>12</sup>

Para 35 then gives some illustrations of circumstances in which Principle III allegedly might not hold:

- One is the claim that Principle III “is a statement of ‘value’ and applies to any individual. However this is not necessarily true in terms of the exchange value.” This strange statement is an imaginative addition to the economic theory of value but is unfortunately also wrong. The claim that the Principle III “is a statement of value and applies to any individual” is true, but the corollary is that it also applies to all individuals *including* (and not excluding!) when they engage in trade at market or exchange values.

- Another is the claim that “in a negative yield curve scenario, the relationship (Principle III) would fail as the premise that deferral could lead to a lower present value no longer holds.” This statement is a head scratcher but one can see that it must be wrong because the deferment price (or value, makes no difference here) is equal to  $S e^{-qt}$  and this expression does not include any interest rate or yield, negative or not. To repeat, Principle III depends only on the  $q$  rates being positive (or mostly positive) and it is difficult to imagine plausible ERM situations where that would not be the case.

So how could actuaries representing the IFoA make such mistakes? A clue is that the covering letter opens with the following statement:

The IFoA’s *Equity Release Members Interest Group* (ERMIG) and Life Board have been involved in the drafting of this response. The contributors to this response *include members who are actively engaged with use of equity release assets by life insurers.* (My italics)

The IFoA had allowed itself to be used as a mouthpiece for ERM industry practitioners to broadcast their objections aka misunderstandings of Principle III.

But the authors of the IFoA official response to DP 1/16 are not alone in misunderstanding these principles. Consider these passages from a recent Deloitte communiqué on ERMs:

In our view, the third principle (that future possession of a property cannot be more valuable than current possession) is likely to attract the most future debate.

<sup>12</sup> This point is developed at length in Buckner & Dowd (2020a).

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But Principle III is just elementary economics!

Very importantly, this principle implies that assumed future house price growth cannot exceed the discount rate applied in the valuation....

No it does not.

The PRA expects there to be a positive value associated with possession of a property.

Yes, obviously.

The practical implication of this is that the assumed house price growth within the NNEG option pricing calculation cannot exceed the discount rate, as this would imply that future possession is more valuable.

This principle therefore effectively sets a cap on firms' house price growth assumptions.

These statements are wrong. Principle III has *no* implications about assumed future house price growth. You can make any assumptions about future house price growth that you like and Principle III would be still be valid.

We would expect firms investing in ERMs and other direct investments to see an increased level of scrutiny and questioning from the PRA, with the *bar set very high for management's understanding of the valuation of such investments*. (Bulley *et alia*, 2017, our italics)

They are off to a flying start on that one.

We appear to have here another case of 'actuarial judgment' gone awry.

We are reminded of some comments made on this subject by Tim Gordon just over two decades ago (Gordon, 1999). He wrote (p. 4) about the actuarial conviction that "actuarial judgment is the only technique for valuing long-term liabilities" but 'actuarial judgement' produces an answer that "varies enormously depending on which actuary carries out the calculation." He continued:

actuaries assume that judgmental methods are the only methods available which give sensible answers. What is more, the judgement involved is something which apparently only comes with years of experience. In other words, we claim to know the answer but cannot tell anyone else how to derive it in advance.

The experienced actuary knows it when they see it. Roman augurs had the same skill reading chicken entrails. As he continued further:

The problem is that the difference that actuarial judgement can make to valuations using the traditional approach is enormous. It means that:

- we are exposed to pressure from clients seeking to move answers in the direction which favours them, and
- we lose credibility because we are unable to explain precisely how we arrive at an answer.

Actuarial judgment can also lose credibility when it produces answers that are demonstrably wrong.

*IFoA ERM Working Party on Principle III*

In February 2020, the IFoA took another stab at the Principle III issue in a 'discussion note' issued by its ERM working party (IFoA, 2020). In essence,

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their view (p. 4) was that ‘we would expect the deferment rate of a residential property to usually be positive,’ but ‘there is no logical necessity for this to always be the case.’ This latter phrase is to be understood as suggesting that it is *theoretically possible* that Principle III might not hold for some cases.

We agree.

We gave the example earlier of a property in Chernobyl. In this case, Principle III does not hold because the forward and spot values are identical, i.e., zero. However no equity release lender would lend to properties that are nuclear waste. That is why Chernobyl is not an ERM asset class.

Consequently, any exceptions to Principle III are irrelevant, at least to equity release, and we should conclude that Principle III makes perfectly good sense for the kinds of properties that equity release lenders might lend against. The WP’s emphasis on the *theoretical possibility* of a negative deferment rate is then misdirected, because there is not much point dwelling on theoretical possibilities that *don’t apply to any real world* cases that equity release firms deal with.

The working party has a *deus ex machina* up its sleeve, however: an illiquidity premium (ILP). Unfortunately, this trick doesn’t work either.

As the discussion note explains:

There is a technical argument, presented in recent actuarial ERM valuation research,<sup>13</sup> that the presence of an illiquidity premium in the underlying house price should reduce the cost of the NNEG (note that the illiquidity premium of the residential property is distinct from the illiquidity premium of the mortgage). Specifically, the present value of the house price illiquidity premium that will be earned over the life of the option should be added to the house price that is used in the NNEG valuation. This is equivalent to deducting the house price illiquidity premium from the deferment rate used in the NNEG valuation, implying:

$$\text{Deferment rate} = \text{Net rental yield} - \text{house price illiquidity premium}$$

Let’s play along and calibrate this equation. Our ballpark estimate of the net rental yield is 4.2%.<sup>14</sup> If we accept this estimate for the sake of argument, then we need an illiquidity premium of more than 420 basis points per annum to get to a negative deferment rate. This is an extremely high value for the illiquidity premium and there is no empirical evidence to support it.

There is also a deeper problem. ‘Technical argument’ or no, the working party’s equation

$$q = \text{net rental yield} - \text{ILP} \tag{10}$$

is wrong.<sup>15</sup> The correct equation is

<sup>13</sup> ‘See Section 5.3.5 and 5.3.6, Jeffery & Smith (2019).’

<sup>14</sup> See Buckner & Dowd (2020b, chapter 7).

<sup>15</sup> Alternatively, they might have been trying to rewrite one of the fundamental equations of financial mathematics which would be akin to rewriting one of the laws of thermodynamics. That would be brave.

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$$q = \text{net rental rate} = d/S \quad (11)$$

and its correctness is proven in Buckner and Dowd (2020, chapter 7). The underlying reason is that the ILP (or  $\lambda$ ), assuming it exists, should appear in the formula for the discount factor  $1/(1 + r + \pi + \lambda)$ . According to bedrock finance theory in the form, e.g., of the mathematics of the Discount Dividend Model,  $\lambda$  can appear nowhere else. If we accept this discount factor, then Buckner & Dowd (2020) shows that the impact of the ILP washes out and the ILP has no effect on the deferment rate. Therefore (11) is correct, and if (11) is correct then unless the ILP is zero, then (10) must be incorrect.

To avoid any misunderstanding, we are *not* saying that the ILP does not exist or does exist but has a zero value. We are not arguing (much) about its size. As far as we care, you can set it as large as you want. We are saying that if the ILP does exist, whatever its size, its impact on the deferment rate gets cancelled out because (11) is always true.

### 7. Conclusions

The Principles set forward by the PRA in Supervisory Statement SS 3/17 mark a major step forward in equity release valuation methodology. They are based on elementary pricing economics, their validity is easily demonstrated and they are easy to apply. It can be used to provide a cross-check on any proposed set of valuations and so test the reliability of any underlying valuation model or its calibration. They can also be used to obtain surrogate ERM and NNEG valuations in circumstances in which one believes that one cannot apply B76 or Black-Scholes option pricing methodology or cannot calibrate such pricing models. In short, the Principles' bounds approach should be regarded as an essential feature of good practice valuation in the equity release sector and there is no good reason for equity release valuation specialists not to use it.

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