On the Profitability of Equity Release Mortgages for the UK

By

Kevin Dowd, Dean Buckner and Hardy Hulley

September 17 2024

Purpose of presentation is to give updated estimates of the profitability of ERMs in the contemporary UK

Market grew to £6 billion by end of 2022

New customers shown in blue below

Figure 1: ER customer numbers per quarter

Source: Equity Release Council (2024)

Sharp falloff in new business due to recent rise in interest rates / cost of credit

Equity Release Basics

ERM: older borrower, loan secured by home and repaid on house exit, any proceeds returned to estate

Lifetime mortgage (LTM) vs. Drawdown
- Focus here on LTM

Most ERMs also have a NNEG: repayment capped at max of rolled up loan amount or home value on exit

ERM = PV of Equity Release Mortgage loan

L = PV of a risk-free loan ignoring NNEG

$NNEG$ = PV of the NNEG guarantee

Equity Release Basics, cont.

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

(2) $$L = \sum_t [exit\ prob_t \times current\ loan\ amount \times e^{(l-r)t}]$$

where l = loan rate, r = risk-free rate

(3) $$NNEG = \sum_t [exit\ prob_t \times NNEG_t]$$

where 'NNEGlet' $NNEG_t$ = put_t = PV of the NNEG guarantee for period/decrement t

The key issue is how to value the 'NNEGlet' $NNEG_t$

B76 and BS are equivalent

Two alternative NNEG and ERM models

First is **Black '76 (B76 or BS)** which is based on following equations

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

where K_t is strike price for period t, F_t is the forward house price for period t

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

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

σ = volatility of the forward house price

(7) $K_t = current\ loan\ amount\ \times e^{lt}$

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

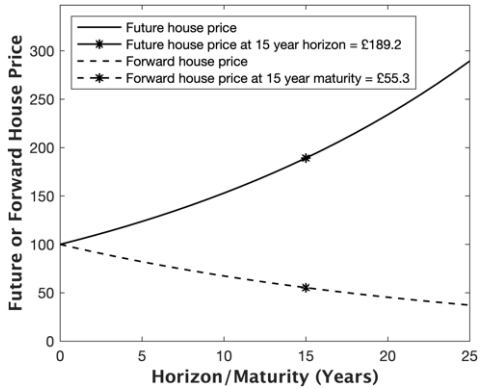
where q = deferment rate = net rental rate

Two alternative NNEG and ERM models, cont.

Note that the B76 underlying variable is the forward house price F_t.

Alternative is **Discounted Projection (DP)** approach which takes (4) but incorrectly replaces the correct **forward house price F_t** underlying with the **projected future house price $Se^{hpi.t}$** as the underlying

Figure 2: Forward vs Future House Prices



Source: Buckner and Dowd (2021, Figure 1)

Two alternative NNEG and ERM models, cont.

DP approach favoured by ER industry over B76 because it produces lower *reported* NNEG values and hence higher *reported* ERM values and **higher reported profits for ERM investors**

DP approach is promoted by Hosty et al (2008) because it gives *lower* NNEG values, not because it gives *right* ones!

Use of DP can lead to NNEG valuations that are about an order of magnitude too low

However, use of DP involves an **egregious intellectual error**

Since DP can overstate ERM values, reported DP-based ERM values can involve **substantial hidden losses**

We ignore 2 other incorrect NNEG/ERM models

Tunaru model (2020)

Sponsored by Actuarial Research Council, this model has several fatal errors that undermine its usefulness

More on this issue in our blog site, *The Eumaeus Project*

Andrew Smith: "No perspective from which this makes sense"

Thomas model (2021)

This posits NNEG model on the presumption that govt. imposes a lower bound on house prices

Produces lower NNEG prices than B76

Root confusion between time spent on barrier (zero) and 'local time' (positive)

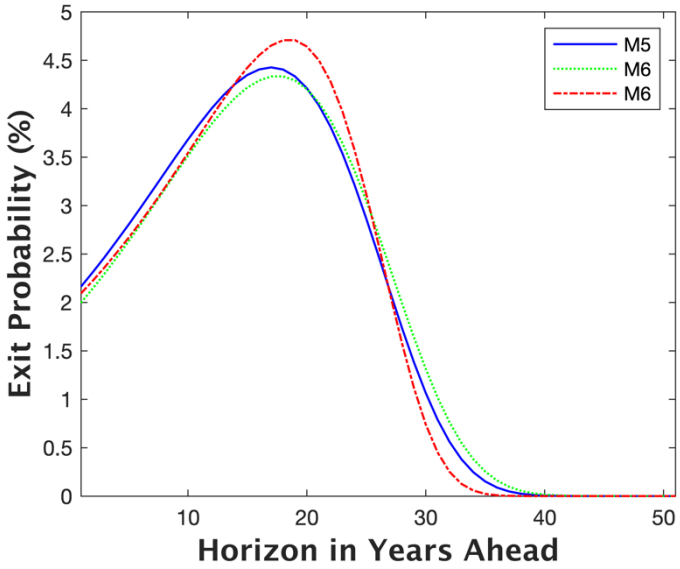
However, this model is not arbitrage free, hence exposes to arbitrage attack

Thus, 4 proposed models, but only B76 (or BS) is correct

Mortality models

Chart below gives M5, M6 and M7 projections of Cairns-Blake-Dowd, 2009

Figure 3: Male 70 projected cohort mortality rates using M5, M6 and M7



Broadly similar pattern but moderate mortality model risk

Hence, we focus on simplest model, M5 or CBD

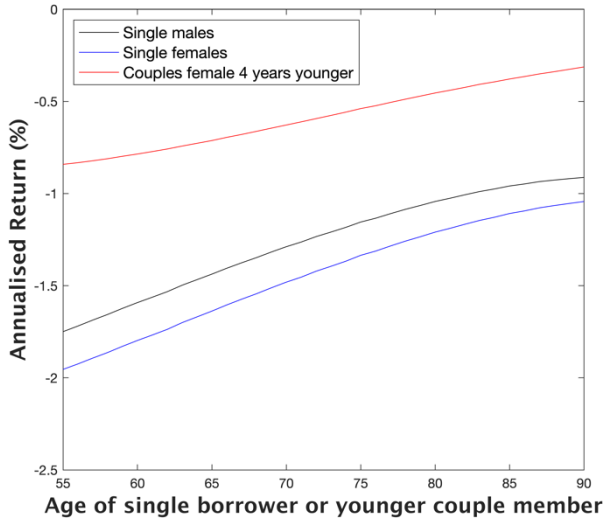
Baseline calibrations for valuations

We assume the following calibrations for our baseline model:

- Male aged 70; female aged 66; couple male 70 female 66
- Loan to value (LTV) = 40%, typical case
- r = 5.25%, based on Base Rate
- l = 5.52%, based on latest loan rates
- q = 3.5%, 'best' guestimate
- Volatility calibrations based on earlier work reported in our *Eumaeus Guide* (2020)

Annualised Returns

Figure 4: Annualised Returns



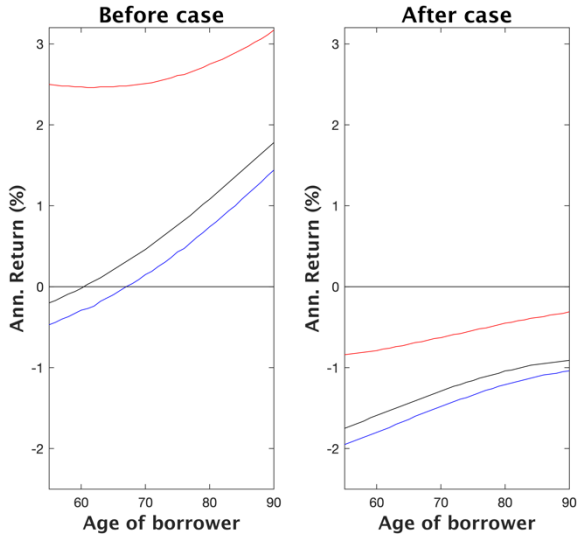
Plot patterns consistent with returns falling with higher expected lifetime

Why so low?

Returns on ERMs are known to be very low – in fact, negative here - but in addition

Annualised Returns Before and After Recent Rates Rises

Figure 5: Annualised Returns: Before vs After



Recent rises in rates have inflicted LARGE losses on ERM holders!

Intuition is?

DP vs. B76 NNEG and ERM values

Under current circumstances, B76 leads to higher ERM values than DP!

This is a **major** historic reversal!

To obtain DP, use $q = r - hpi$, e.g, currently q = 5.25%-(-2%) = 7.25%

Last year's HPI = -2%

B76 uses q set at 3.5%, DP uses q set at 7.25%

We then get

B76: L = £41.72, $NNEG$ = £8.77, ERM = £32.95
DP: L = £41.72, $NNEG$ = £16.02, ERM = £25.70

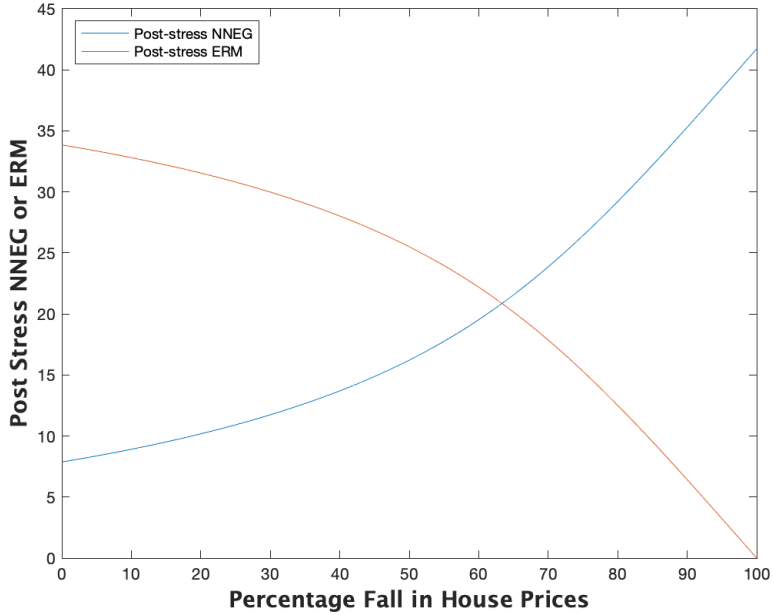
Advice to equity release industry: if you adopt B76 now, you can report substantially higher ERM values i.e. higher profits!

i.e. it **now** pays ER providers to be honest

Scope for some innovative marketing strategies for ERMs!

House price stress test

Fig 6: HP stress test

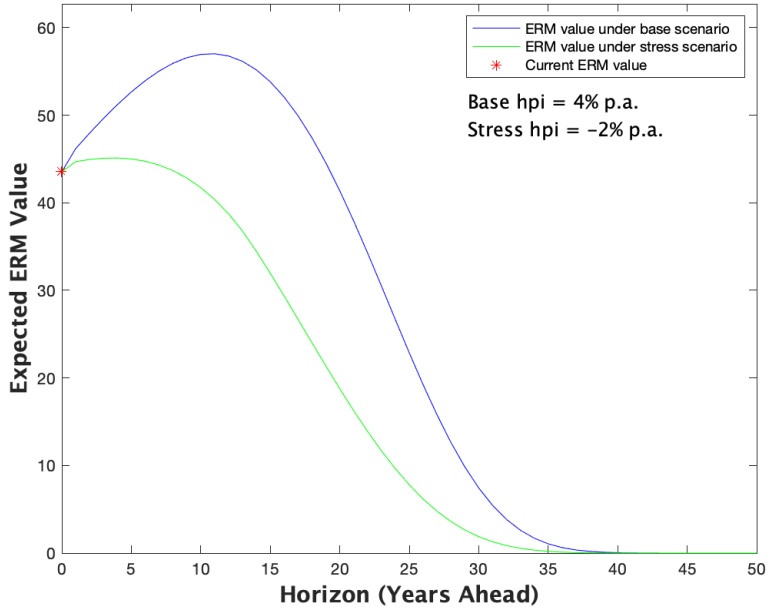


50% fall in HPs leads to < 20% fall in ERM valuations, etc.

House Price Scenario Analysis I

Impact on ERM valuations of 4% increase in HPs vs 2% decline in HPs

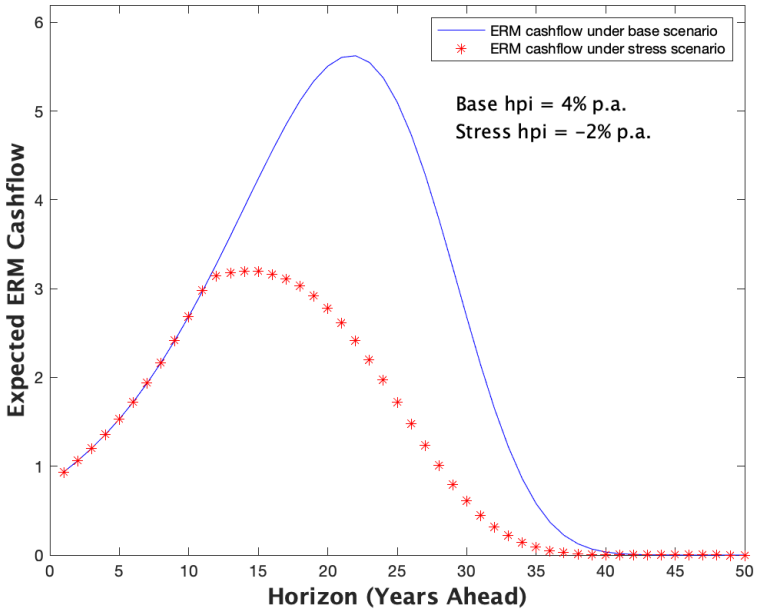
Fig 7: 4% increase vs 2% fall



House Price Scenario Analysis II

Impact on ERM cashflows of 4% increase in HPs vs 2% decline in HPs

Fig 8: 4% increase vs 2% fall



Conclusions

Bad news for ERM providers is that **ERMs are loss-making**

- ERM investors are throwing money away

ER industry needs to give **serious thought** to how it can reduce its losses

More bad news is that ERMs are also exposed to house prices

But good news is that they can improve their reported profitability by switching to B76 valuations instead of DP valuations

References

Buckner and Dowd (2020) “How profitable are equity release mortgages?” *Economics Letters*

Buckner and Dowd (2021) “Discounting the discounted projection approach” *North American Actuarial Journal*

Buckner and Dowd (2020) *The Eumaeus Guide to Equity Release Valuation*, second edition

Buckner, Dowd and Hardy (2023) “Arbitrage problems with reflected geometric Brownian motion” *Finance and Stochastics*

Dowd et al. (2019) “The valuation of no-negative guarantees and equity release mortgages” *Economics Letters*

Hosty *et al*. (2008) “Pricing and capital in the equity release market.” *British Actuarial Journal*