EUMAEUS DISCUSSION PAPER 2101

On the Profitability of Equity Release Mortgages Loans to Couples

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This draft: 30 March 2021

Abstract

We obtain projections of the profitability to lenders of equity release mortgage loans to borrower couples over a wide range of ages. Results suggest that these loans are less profitable than loans to borrowers who are single and are only profitable at all if both members of the couple are in their late 70s or older. These results are not particularly good news to ERM investors.

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1. Introduction

An Equity Release Mortgage (ERM) is a loan made to an older property-owning borrower that is collateralised by their property.[1] In the UK, ERMs usually embody a No-Negative Equity Guarantee (NNEG) that stipulates that the amount due for repayment is capped at the minimum of the rolled-up loan amount and the property value at the time of repayment, where the latter would be the time of the borrower's death or entry into a care home. This obligation to repay the minimum of two future values implies that the NNEG involves put options granted by the lender to the borrower.[2]

A recent article (Buckner and Dowd, 2020) examined the projected profitability of ERM loans to lenders, where borrowers were both single male and single females and ranged in age from 55 to 90. Their results suggested that the projected profitability of such loans was surprisingly low and negative for younger borrowers. This follow-up article extends the earlier one by also examining the profitability of ERM loans to borrower couples, including couples of different ages.[3] We find that ERM loans to couples are even less profitable to lenders than loans to single borrowers.

The main explanation for this result is that the expected time to house exit for a borrower couple is considerably longer than for borrowers who are single, but in the case of couples, there are further longevity-related impacts where the members of the couple are of different ages.

The layout of this article is as follows. Section 2 addresses the time to home exit. Section 3 sets out the mechanics of ERM valuation and projected profitability. Sections 4 and 5 discuss model calibration and results, and section 6 sets out the conclusions.

1. Expected Time to Exit

We consider loans to a single male, a single female and a male-female couple. Excepting early repayment, an ERM contract specifies that the loan is to be repaid when the borrower permanently exits their home. Assuming away any

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[1] ERMs are commonly known outside the UK as reverse mortgages. Examples of earlier literature on ERMs in the UK context include Li et al. (2010), Prudential Regulation Authority (2016) and Dowd et al. (2019).

[2] The ERM loans we are interested in here are lifetime lump sum loans, as opposed, e.g., to drawdown loans.

[3] According to ERC (2020, p. 13), 16% of new lump sum plans are made to single males, 26% to single females and 58% are made to couples.

prolonged stay in care,[4] exit occurs when a single borrower dies or when the last surviving member of a borrower couple dies.

Figure 1 shows the density functions for the time to exit.

Figure 1: Density Functions for Time to House Exit
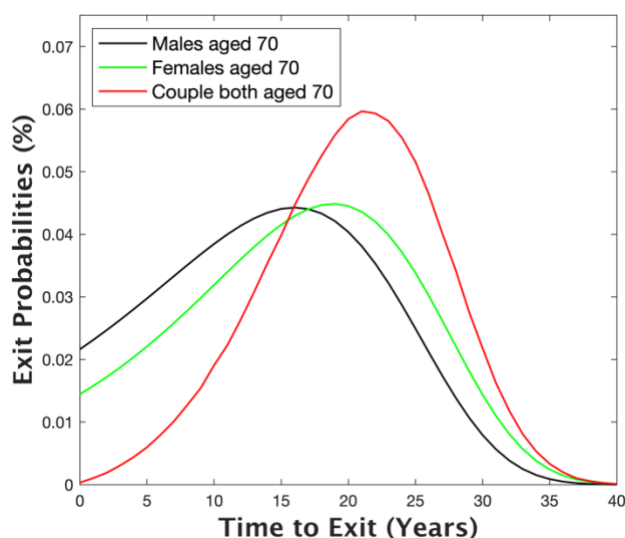
Notes: Obtained from 1,000,000 Monte Carlo simulations of the mortality rates q_t using the M5-CBD stochastic mortality model (Cairns et al., 2009) calibrated on Life & Longevity Markets Association death rates data for England & Wales spanning years 1971-2017 and ages 55-89.

The intuition is that the expected time to exit for the couple is longer than that for single borrowers because house exit for the couple occurs when the last surviving member dies but house exit for a single borrower occurs after only the one death.

Table 1 gives expected years to exit for males aged 70 and for couples involving a male aged 70.

Table 1: Expected Years to House Exit

Borrower	Expected Time to Exit
Male aged 70	15.0
Female aged 70	17.1
Couple male aged 70, female aged 70	20.7
Couple male aged 70, female aged 66	23.2

Note: As per Figure 1.

The results in Table 1 show that a male aged 70 can expect to exit in 15 years' time and a female aged 70 can expect to exit in 17.1 years' time. A couple of the same age can expect the longest surviving member to exit in 20.7 years' time.

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[4] Workarounds to this assumption are suggested in Buckner and Dowd (2020, pp. 74-76).

The expected time to exit then increases, as the age gap between the male and the (younger) female gets bigger.

3. ERM Valuation and Profitability

The present value ERM of an Equity Release Mortgage loan is equal to the present value L of a risk-free loan, minus the present value $NNEG$ of the NNEG guarantee:

(1) $ERM = L - NNEG.$

L is given by

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

where $exit\ prob_t$ is the probability of exiting the house in year t, r is the risk-free interest rate and $amount\ loaned \times e^{lt}$ is the rolled-up loan amount.

$NNEG$ is given by

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

where $NNEG_t$ is the present value of the NNEG guarantee for t.

Each $NNEG_t$ involves a put option on the value of the property in t, struck at the rolled-up loan amount in t. $NNEG_t$ is valued using a Black '76 option pricing model (Black, 1976), where the underlying price, F_t, is the forward house price for t, given by

(4) $F_t = Se^{(r-q)t}$

where S is the spot property price, r the risk-free interest rate and q, known as the deferment rate, is equal to the net rental yield. We calibrate q from an estimate of the net rental yield as the ratio of the net nominal annual rental to the current property price.

We obtain the profitability of each ERM loan as the annualised return on the original loan amount, so the ratio $ERM/loan\ amount$ gives the (approximate) return on the loan over its expected lifetime. The annualised returns are then obtained from the internal rates of return.

When a borrower is single, lenders will assess the amount of the loan by some approximation of the 'age minus 30' rule, i.e. the LTV ratio will be the difference between the borrower age and 30 divided by 100. Where the borrower is a

couple, lenders typically determine the loan amount by applying their loan determination rule to the younger member of the couple.

4. Calibration

We build an ERM valuation model based on plausible parameter values:

- $r = 0.25\%$ p.a.
- $l = 4\%$.[5]
- $q = 4.2\%$.[6]
- We assume that the Loan to Value ratio (LTV) follows an 'age minus 30' rule of thumb, which we believe approximates the LTVs applied in the UK.

We calibrate the volatility parameter σ using

$$(8) \qquad \sigma = \sum_t exit\ prob_t \times \sigma_t,$$

where σ_t is a volatility term structure that is dependent on both the age and gender of the borrower.[7]

5. Results

Table 2 provides results for the ratio of *ERM* to *amount loaned*.

Table 2: *ERM/Amount Loaned* for Various Cases

Borrower	*ERM/Amount loaned*
Male aged 70	99.2%
Female aged 70	93.6%
Couple male aged 70, female aged 70	87.6%
Couple male aged 70, female aged 66	85.5%

Note: Calibrations given in text and Note to Figure 1.

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[5] The Equity Release Council report that the average loan rate fell to 4.01% during 2020Q4 (Equity Release Council, 2021). This point made, loan rates are trending downwards and there is considerable variation.

[6] See Buckner and Dowd (2020, pp. 36-37).

[7] To explain, recall that the underlying is a forward contract. It can then be shown (see Buckner and Dowd (2020, pp. 64-65) that the return on a forward contract is a linear function of T, the period to maturity of the contract (see their equation (9.2)). The impact of a change in the interest rate or deferment rate will then depend on T, from which it follows that the volatility of the forward price has a term structure. More details are provided by Buckner and Dowd (2020, pp. 50-63).

The *ERM/amount loaned* ratio is 99.2% for a male borrower aged 70 and 93.6% for a female borrower of the same age.

For a couple both aged 70, the *ERM/amount loaned* ratio falls to 87.6%. If the female were 4 years younger, the ratio falls to 85.5%

Projected annualised returns for the age range up to 90 are given in Figure 2.

Figure 2: Projected Annualised Returns
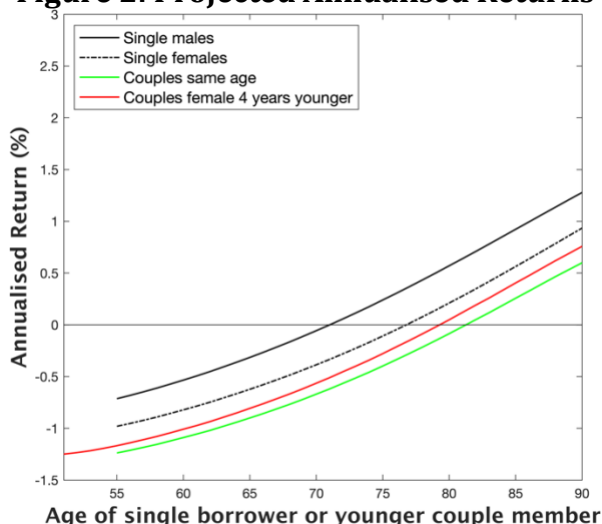
We see that loans to single males are only profitable if borrowers are in their early 70s or older, those to single females are only profitable if borrowers are around 76 or older, and loans to couples are only profitable if the younger member is even older.

We also see that the difference between a loan to a single male and one to a couple of the same age is a fall in annualised returns of about 70 bps relative to the single male borrower and about 35 bps relative to the female. For couples with a female 4 years younger than her partner, returns are somewhat higher than for a couple of the same age.

These latter results can be explained by two offsetting impacts. First, as the younger member gets younger, the expected period to exit will rise, and this effect will reduce the expected return relative to the case where both members are of the same age. On the other hand, as the younger member gets younger, the LTV will fall, which will increase the expected return. The plots shown in the figure indicate that, in this particular case, the second effect is somewhat stronger than the first.

6. Conclusions and Implications

Our results suggest that ERM loans to single males are only profitable if borrowers are in their early 70s or older, those to single females are only profitable if borrowers are around 76 or older, and loans to couples are only profitable if the younger member is even older. These results have fairly obvious implications for the financial wellbeing of the equity release industry. The implication for lenders is that they should increase their minimum age requirement and lend only to borrowers in their 70s or older.

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