Kent Business School, Centre for Quantitative Finance

HOME EQUITY RELEASE FOR LONG TERM CARE FINANCING: AN ALTERNATIVE APPROACH

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Background

- Existing Home Equity Release (HER) products have been promoted as a potential source of financing for expenses in old age, but there has been **unexpectedly low utilization**

  Represents a degree of <u>market failure</u>

- Residential real estate is a **desirable asset class** for many investors

  Attractive to hold exposure to average house prices (rather than individual homes)

- No Negative Equity Guarantee (NNEG) is a feature of HER loans, leading to **pricing challenges**

Our Proposal

A different product

- Based on the return on a regional house price index (HPI)
- Targeted at seniors, especially those near retirement that may have care-related expenses and who wish to age in place
- Permits unbundling of risks
- Allocates risks to investors and financial institutions having experience of managing such risks

Advantages for Borrowers

- **Higher loan-to-value ratio**, especially if loan disbursed in instalments
- Remain in home and retain some **upside** in excess of the total index returns ("basis" in financial terms) and fees
- **Fairly priced NNEG** made possible through unbundling
- Fixed rate charge based on initial appraisal and thereby protected against subsequent variation
- Product is **closer to optimal life-cycle exposure** to residential real estate (according to a growing body of household finance literature)

Advantages for Lenders

- Lender receives an **upfront fee**
- NNEG charge may also provide **diversification** benefits
- The unbundled product structure lends itself to **securitization** permitting lenders to decide which risks to retain and potentially providing a profit opportunity
- Through securitization lenders and insurance firms may take the risks that are more closely aligned with their **Solvency II capital** requirements

Advantages for Investors

(individuals / institutions purchasing securitized loans)

- Opportunity to earn return on residential real estate without the hassles of ownership, because NNEG is separated
- Lender remains with "skin in the game" as they retain the NNEG
- Lower transaction costs than outright ownership
- May lead to increase in overall market size with ancillary benefits such as more complete market in futures contracts on HPI which may improve pricing
- Basis risk is estimated directly and can be separated from HPI risk, which does not need to be modelled
- By focusing on retirement age homeowners who wish to age-in-place the risk of early opportunistic exit is reduced
- By unbundling and disentangling the risks associated with HER the components are a better fit for hedging and risk management requirements (*true also for lenders*)
- Lenders may also retain loans as investors themselves

How it Works

(*see main picture*)

<u>Loan Initiation</u>

→ Valuation of home (V_0)

→ Underwriting of borrowers to determine expected date of exit (τ_0)

→ Initial loan value set: Maximum loan is calculated as

$$L_0 = V_0 e^{-(m+c)\tau_0}$$

where

– m is a fixed rate charge, conceptually like a compensation for rental income forgone

– c is an ongoing charge for NNEG plus an annual maintenance fee

→ Fees charged and at initiation are added to the initial loan amount:

– Initial fees **plus** upfront NNEG charge

→ Thus total loan value at initiation is

$$I = L_0(1 + initial\ fees)$$

→ Investor pays I to Lender

→ Lender retains initial charges

→ Fixed charge m may be determined by market

<u>Exit</u>

→ Amount repayable is

Lesser of

$$B_\tau = I\left(e^{(m+c)\tau} + e^{\Delta S} - 1\right)$$

<u>or</u>

Value of the home

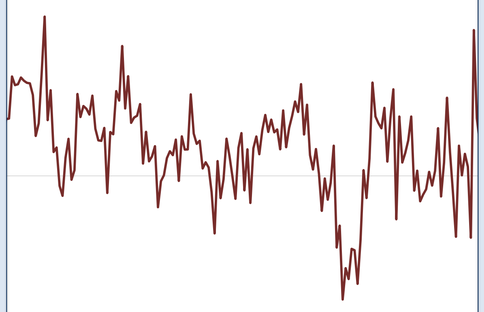
where

– τ is the time since loan initiation

– ΔS is the change in the HPI since initiation

→ Loan value is based on change in the HPI, plus fixed charges. If loan value exceeds the value of the home, repayment is limited to value of home i.e. NNEG exercised (standard policy in the industry)

→ Lender is compensated for NNEG by initial plus ongoing fixed charge



<u>Potential Securitization</u>

→ Investor receives

$$I\left(e^{m\tau} + e^{\Delta S} - 1\right)$$

→ Similar to return on an <u>*average*</u> home

Acronyms

HER = Home equity release
HPI = House Price Index
NNEG = No Negative Equity Guarantee

Illustration/Pricing

- UK Land Registry data on house sales from Jan. 1995 to Sep. 2015 (**20.3 million records**) used to establish data base of re-sales by region – this provides a sample of **<u>individual house price returns</u>**. We take account of time between sales to determine return samples at different horizons.
- **Markov model for exits**: Mortality and morbidity developed using modified version of model in Rickayzen and Walsh (2002) combined with more recent data from Continuing Mortality Investigation. Couple are **aged 65** and healthy when they take out the loan. To remain in the home, they stay healthy or one of them needs care (or dies) while the other remains healthy. If both require care (or die), or one dies and the other requires care, exit takes place from the home.
- Nonparametric (Historical Simulation style) pricing strategy, <u>requiring no model for HPI</u>
- Take a value for m (we illustrate at various levels: 200, 300, and 400 bps)
- Simulate 10 million paths to exit (scenarios) for given m
- For a grid of values of NNEG charge, calculate the payoff to Lender. The value of NNEG charge leading to break-even is a fair premium
- Other assumptions
  - Initiation fee = 50 bps (i.e. 0.5% of loan value)
  - Upfront NNEG charge = 25 bps
  - Maintenance fee component = 25 bps annually, charged to expenses each year (i.e. does not contribute to profit)

Results (higher loan to value ratios)

Region	Rent replacement charge (m)	Loan to value ratio (%)	Initial charges (%)	Annual NNEG fee (%)
East Midlands	*2.0%*	69.15	0.730	0.056
	3.0%	59.30	0.602	0.016
	4.0%	50.66	0.507	0.000
East	*2.0%*	69.15	0.730	0.055
	3.0%	59.32	0.601	0.014
	4.0%	50.66	0.507	0.000
London	*2.0%*	68.75	0.751	0.092
	3.0%	59.16	0.610	0.030
	4.0%	50.66	0.507	0.000
Northeast	*2.0%*	68.92	0.742	0.077
	3.0%	59.16	0.610	0.031
	4.0%	50.66	0.507	0.000
Northwest	*2.0%*	68.84	0.746	0.083
	3.0%	59.13	0.612	0.034
	4.0%	50.66	0.507	0.000
Southeast	*2.0%*	69.09	0.733	0.061
	3.0%	59.29	0.603	0.017
	4.0%	50.66	0.507	0.000
Southwest	*2.0%*	69.07	0.734	0.063
	3.0%	59.28	0.603	0.018
	4.0%	50.66	0.507	0.000
Wales	*2.0%*	68.84	0.746	0.083
	3.0%	59.13	0.612	0.034
	4.0%	50.66	0.507	0.000
West Midlands	*2.0%*	56.64	1.304	1.302
	3.0%	50.20	1.033	1.057
	4.0%	44.13	0.822	0.862
Yorkshire and Humber	*2.0%*	69.00	0.738	0.069
	3.0%	59.22	0.607	0.025
	4.0%	50.66	0.507	0.000

Conclusion

- Use <u>consistent UK datasets</u> to demonstrate an alternative HER market structure with **better sharing of house price risks** and potentially **more attractive products**
- Show NNEG by region, level of other charges, method of loan disbursement, and borrower characteristics

For Further Details

1. Andrews, D. and J. Oberoi. 2015. Home equity release for long term care financing: an improved market structure and pricing approach, *Annals of Actuarial Science* 9: 85-107
2. --- Structuring and Pricing Home Equity Release with Better Sharing of House Price Risks. Working paper. https://ssrn.com/abstract=3305050
3. Rickayzen, B.D. and D.E.P. Walsh. 2002. A Multi-state Model of Disability for the United Kingdom: Implications for Future Need for Long-term Care for the Elderly, *British Actuarial Journal* 8: 341-393.

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