

## HOME EQUITY RELEASE LOANS

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### 1. HER Product

Home Equity Release (HER) Loans are also called “Reverse Mortgages” and “Lifetime Loans”. The term of the loan is for life or earlier move-to-care or voluntary move-out. Where there is joint ownership the term is until the second to exit the home. Interest is not paid but rolled up and added to the accumulated debt. The product is very much designed for retired people with limited income available to service mortgage interest.

The repayment at maturity is limited to the lower of accumulated debt and house realisation value – this is referred to as NNEG (non-Negative Equity Guarantee).

The minimum entry age is typically 60. The maximum available loan is linked to age (younger if joint-lives) and value of property. The Loan to Value Ratio (LVR) is typically 15-20% at age 60 - rising to a maximum of about 45-50% at age 90. The USA has substantially higher LVR's with the NNEG insured through HUD, a Government agency.

There is considerable debate as to whether interest rates should be fixed or variable. I have a strong preference for the variable rate. My long term analysis indicates that interest rates and house price inflation (HPI) both tend to be driven by inflation and also move in the same direction throughout a greater part of an economic cycle. I believe that in the long term there is higher NNEG risk with fixed rates. An additional problem with fixed rates is that there needs to be a penalty on voluntary move-out if fixed rates have fallen. The penalty is typically the interest rate fall multiplied by the remaining years of life expectancy. The husband could die after a few years leaving a 70 year widow who might want to move to be closer to family or friends. If interest rates have fallen 2%, with a 20 year remaining life expectancy, this results in a 40% penalty!

We have found that the main uses of HER are to fund the following

- Home renovation, extension or upgrade
- Repaying outstanding and expensive debt, particularly credit cards
- Travel
- New vehicle
- Medical treatment
- Helping children or grand-children
- Just making life easier and more fun!

Attitudes to HER have changed considerably over the last decade. The family home is now seen as something to be shared between the generations rather than a purely bequeathable object. It is, however, important that the client be advised to consider the alternative options that are available – such as trade-down, taking in lodgers, etc.

Reversions are only a small part of the HER business and mainly in the UK.

## 2. Demographics

Slower birth rates, strong mortality improvements and the ageing of the “baby-boomers” will present a major demographic challenge to most of the developed world in the first half of this century.

A summary of the current and projected age distributions for New Zealand can be seen from the following table – and these figures are typical for the developed world. The total NZ population grows by 56% over the 50 years but the 65+ age group grows by 231%.

Age Band	2006		2031		2056	
	m	%	m	%	m	%
<20	1.19	29	1.32	25	1.53	24
20-64	2.40	58	2.84	53	3.18	49
65-84	.46	11	.98	18	1.16	18
85-99	.06	1	.16	3	.51	8
>99	.00	0	.01	0	.05	1
Total	4.11	100	5.31	100	6.43	100

There are currently 4.6 “working age” 20-64 year olds to each “retired” 65+. By 2031, we expect this proportion to fall to 2.5 and to 1.8 by 2056.

The number of people aged 85+ are projected to grow nearly 10-fold over the next 50 years. Although one would anticipate health levels for a given age to rise, this is likely to place a large expense on the health service budget. This together with provision of state pension benefits will be a huge burden on the economy. There are a number of potential government solutions, but all are likely to be politically difficult.

With the life expectancy of a 65 year old increasing by about 1 year every 5 years, the obvious solution is raising the retirement age from time to time. The 65 retirement age was first introduced by Chancellor Otto von Bismark in the 1880’s when life expectancy was under 50 years – admittedly about another 11 years if one actually survived to 65.

## 3. HER Market

Although HER has been available in the UK, the USA and other parts of the world for many years, it really only started to become a meaningful volume from the year 2000. Access to funding has slowed the growth since the 2007 Credit Crisis, apart from USA where there is government provision.

### 3.1 United Kingdom

I was involved in the early London HER days, designing a combination of a fixed interest mortgage with a life annuity – demand was minimal.

The UK has had a relatively chequered past with some inappropriate and dangerous schemes that did not help the reputation of the HER market. The worst product was a combination of a variable rate mortgage to purchase Asian Equity Growth stocks right at the top of the equity market and immediately preceding a strong rise in interest rates. Another was SAM’s (Shared Appreciation Mortgages) where the roll-up interest rate was equated to a rate of 3x the actual capital appreciation rate of the house – introduced just as the property market took

off with 40% appreciation and hence 120% as an interest rate – not surprisingly, this was considered fairly usurious!

This is all behind them now and the UK market has grown from a mere £50m in loans 14 years ago to over £1bn new loans in 2003. New loans were about £1.2bn in 2008 and were expected to grow to about £1.4bn in 2009. However, the demise of players such as Northern Rock and Prudential pulling out of the HER market will have reduced new business volumes. Loans now in force total about £10bn on about 140,000 homes – representing about 4% of the market potential. All loans are fixed rate.

### 3.2 USA

The US experience has also seen most of the growth in the last 10 years – 43,000 new loans in 2005 and 165,000 in 2009. A total of 500,000 in force loans would represent about 3.2% of the market potential. Loans are variable rate.

### 3.3 Australia

Most of the Australian growth started about 2002. The Credit Crisis in 2007 has greatly slowed the non-bank provider business and the market for new loans overall. A total of 39,000 in force loans with a book size of \$2.71bn at December 2009 represent about 3.2% of market potential. New business slowed slightly in 2009 to \$260m. 85% of all in force loans have a variable interest rate – higher proportion on more recent loans. Full discharge rate is 11% a year.

### 3.4 New Zealand

Sentinel, our NZ operation commencing in 2004, has the bulk of the NZ market. A total of 7,000 in force loans with a book size of \$450m represent about 2.8% of market potential. New business has fallen 85% since 2007 as a result of limited funding access with GFC. 93% of loans are on a variable interest rate. The full discharge rate is 10% a year. Most of the loans are variable rate.

### 3.5 Estimating the Potential HER Market

The current and projected position in 2030 for 65+ home ownership is as follows :-

		<b>2009</b>	<b>2030</b>
Population of NZ	=	4.25m	5.25m
Population Proportion 65+	=	12.5%	21.0%
Population 65+	=	.53m	1.10m
Home-ownership Rate	=	80%	80%
Average house occupancy	=	1.50	1.50
Potential home numbers	=	.28m	.59m
Average 65+ house value	=	\$350,000	\$925,000 (2.25% real HPI p.a.)
Total 65+ House Values	=	\$100 billion	\$550 billion
Percentage of 65+ taking Home Equity Release	=		20%
Average Accumulated Loan to Value Ratio	=		30%
Anticipated HER Market in 2030	=		\$33 billion

#### **4. Non-Negative Equity Guarantee (NNEG) Risk**

NNEG is a complex risk to properly manage as it relates to the tail end of the contract many years ahead.

The risks are a function of

- Longevity of life
- Move-out rates to a care facility
- Rates of voluntary move-out for other reasons – many of these are actually health-related issues
- House appreciation v. interest rates

##### **4.1 Mortality Rates**

I had expected mortality of HER clients to be slightly lighter than population statistics, with a selection period of about 2 years. I also expected a delay distribution between death and house sale averaging about 9 months. Our Australasian experience has quite a strong positive selection effect in the >80 age bands – lighter mortality. However, there is negative selection in the <70 age bands – I put this down to clients taking loans for medical procedures and early retirees with health issues. The average delay to house sale is about 9 months with quite a wide distribution.

Rates of mortality improvement are a larger unknown as our risks cover numerous decades. Australasian population mortality tables over the last 30 years indicate mortality improvement rates running at about 3% a year for ages up to 70 – these rates then fall to about 1% by age 90 and to zero by age 100. I am mindful of the higher improvement rates extending to the older ages over time. I believe that strong improvements through to age 70 have resulted in some less healthy lives reaching the older ages and depressing the overall improvement rate in the 80+ age band.

##### **4.2 Move-to-Care Rates**

The Australian Institute of Health & Welfare produced a report in 2001 by gender and age of numbers in the population that are/not in care, numbers moving into care and deaths of those that are/not in care. From these figures I have developed an addition to be applied to the overall mortality rate to reflect the probability of a person not in care dying or moving into care.

These figures were consistent with NZ research showing about 60% of females and 40% of males aged 95+ to be in care or hospital. I think that there are probably a high number of males that would be in care but are being looked after at home by a younger, healthy wife. I have not been able to obtain similar figures for other parts of the world.

##### **4.3 Joint Life Mortality/Care**

Joint lives introduce additional complexity. The probability of a life dying or moving to care is nearly doubled, but the surviving life might remain in the home or alternatively VMO. It is not clear what the overall impact is likely to be. To-date, our experience has been a lower move-out rate. At this stage I adopt a basis of treating the joint lives as if there is one life at the younger age. For reserving I deduct 2 years from the younger age.

#### 4.4 Voluntary Move-Out

I think that VMO is probably the least known element in the NNEG risk. VMO includes move-out resulting from

- Death of spouse and moving to friends or family
- Health failure and moving in with family
- Unable to handle large house and garden
- Need to be close to family or facilities
- Move to retirement village or other protected facility

We are building experience on the VMO rates – I have found that it does vary considerably by country. NZ and Australia are quite similar and Irish VMO rates are much lighter – I think the high level of Irish stamp duty and a less developed retirement village industry may be reasons. HUD figures for the USA and CHIPS figures for Canada show a higher VMO experience than Australasia. The Australasian experience indicates a strong U-curve age relationship – heavier VMO at the younger ages with life-style changes and also at the older ages with health limitations. Rates in the first year are about half the on-going rate.

#### 4.5 House Appreciation

Real NZ house appreciation (net of CPI) over the last 75 years has fallen into 9 cycles averaging about 8 years each as follows. These figures assume that there are no further nominal price increases for the remainder of the current cycle, assumed to last for a further 2 years.

Period	No. of Years	Annual Real Growth %	Period	No. of Years	Annual Real Growth %
1936-42	6	4.1	1980-86	6	3.9
1942-50	8	-.9	1986-92	6	1.4
1950-60	10	5.1	1992-01	9	3.2
1960-71	11	.8	2001-12	11	4.7
1971-80	9	.0			

The average net real house appreciation rate for NZ over the last 77 years is 2.47% - the UK 3% since 1938. This trend-line reflects affordability. With future inflation likely to average 2.5%, I would have some comfort assuming best-estimate future nominal house appreciation of about 4.5-5% p.a. In projections I have to ascertain where we are in the cycle.

For solvency reserving purposes, I would think a rate of about 3.0% would be appropriate – thus a margin of 1.5-2%. I also adjust values through the cycle to a perceived trough – this would mean discounting current values by about 5% on the assumption that we are close to the trough. This recognises that the future worst NNEG claim experience will occur at the property troughs.

#### **4.6 Interest Rates**

I think that historical patterns of interest rate movements are less helpful. Interest rates lagged behind inflation in the first half of the hyperinflationary 1970-90 period, producing negative real interest rates. In the second half of this period and particularly towards the end, real interest rates were very high as the falls lagged behind the drop in inflation. The introduction of the NZ Reserve Bank control mechanism in the early 90's greatly reduced inflation, but interest rates followed down more slowly.

If inflation remains at about 2.5% p.a., I expect variable mortgage interest rates to average about 7.5% and thus HER rates would be about 8.5-9%. A best-estimate margin of 2.5-3% for standard mortgage interest rates over house appreciation together with buy/sell/maintenance/rates costs is consistent with investor net rental yields of about 4%.

For reserving purposes, I would adopt a further interest margin of about 1.5% - making a combined interest/house appreciation risk margin of 3.5-4%. I believe this is very conservative but appropriate for a new product in its infancy.

If inflation were to increase, I would expect interest rates to compensatingly rise with house prices and our risk would not increase. We would be similarly protected were there to be a long deflationary period.

#### **4.7 Expenses**

The average size of an HER loan is very much lower than a standard mortgage, particularly as many clients borrow only their current needs, planning to return for more at a later date. In Australasia, our typical first HER loan is about 10-15% of a standard average mortgage. Marketing costs are substantial for a new business. The positive is that the expected average term is substantially higher than a standard mortgage.

CHIPS, a Canadian HER company, has been in the market 25 years. Their initial costs were about 10% of new loans but have fallen with new business growth to about 6% - maintenance runs at .65% of accumulated loans. Prudential UK has just announced that it is pulling out of the HER market because the high up-front costs are resulting in an inadequate return on capital.

It is important in design of the funding strategy to allow for these costs. It is logical to build in over-issuance when securitizing a book to recover the costs born.

#### **5. Solvency Reserving**

For solvency reserving, I include a 10% margin on mortality and move-to-care and assume a long term VMO rate much lower than experience to-date for a given territory. Together with the assumptions regarding HPI and interest, this typically results in a solvency reserve kicking in shortly after entry where a loan equal to the maximum LVR is taken. To-date I have assumed that negative reserves on loans are zeroized. This is probably too conservative as there is unlikely to be any selection effect.

NNEG risk is very benign until one reaches the edge of the cliff! The tail risk then becomes quite huge as the HPI assumption falls below a certain level. For a closer and, I think, more meaningful understanding of the real exposure, I use a simulation model.

## **6. Simulation Model**

With only 15,000 loans globally, it is simple to run a 5,000 simulation test going out up to 50 years on an individual loan basis. There are a number of variables that are decided through a random number generator.

### **6.1 HPI and Interest Assumptions**

I first set cyclical model assumptions as to HPI, funding interest rates and charge margin. For each simulation I then build in a randomly normal variation about the HPI rate each year. These are then set for the whole portfolio of loans. I believe that splitting HPI indexed movements in this way is realistic and also more conservative than modelling an overall variation.

To allow for regional and individual house price variations, I calculate a normally distributed variation on HPI for each loan and each year.

### **6.2 Top-Up Loans**

Additional top-up loans are provided on a best-endeavours basis where the drawn loan amount is under the original maximum and house prices have not tumbled. Top-ups are randomly drawn each year based on experience probability.

### **6.3 Repayments**

Best estimate assumptions are used for probability of mortality, move-to-care and VMO. For VMO rate, I scale down the rate by an increasing amount as the accumulated debt rises closer to the house value and NNEG is closer to biting.

### **6.4 Net Profit**

Net profits equal to interest margin plus charges less expenses and NNEG claims are discounted back to outset.

### **6.5 Simulation Result**

A discounted profit is thus generated on each of the 5,000 simulations. Each of these simulations is then sorted into ascending level of profit to produce a distribution of the results. There are then 2 risk measures that I use

- VaR (Value-at-Risk) is the amount of discounted profit or loss (=required reserve) on risk at a given probability – e.g. a 5% VaR would be the discounted profit on number 250 out of the 5,000 runs.
- tVar (tail-Value-at-Risk) is the average discounted profit or loss at 5% on results 1 to 250. tVar is particularly useful for measuring very fat tail risks.

It is critical in all these risk measures to apply appropriate assumptions.

## **6.6 Additional Stress Testing**

With our low LVR's, the discounted profits are still strongly positive even at the tail-end. I then produce further stressed simulations with higher immediate HPI falls and/or lower HPI rates throughout the term. This gives me a good understanding of where things really turn nasty.

## **7. Funding**

The principal issue facing HER at all times is regular and cost-effective funding. HER repayments produce a very steady cash-flow on an existing book over a period of about 30 years before tailing down.

### **7.1 Pension Annuity Matching**

HER repayments are a perfect match against an annuity book. This can be achieved by selling the book to a pension fund or obtaining funding from a pension fund through a securitization process. A possibly more attractive option might be to do a Pension Fund Buy-Out, whereby the HER company takes on the PF annuity liabilities in return for a premium equal to the PF assets that are transferred. There are large amounts of Defined Benefit PF liabilities that would probably welcome an HER home and many companies and trustees would probably welcome seeing the end of longevity and investment risks. HER would also be a good home for Defined Contribution annuities when they commence annuity payment.

I think there are additional benefits from combining HER with annuities. The investment return is likely to be above gilt yields for very little risk and thus might help by raising the reserving interest assumption.

I also believe that HER might provide some longevity hedge. Greater longevity increases the margin flow. The downside is higher numbers in the NNEG claim region, but I believe greater longevity will actually put pressure on the housing market and thus increase the HPI and move the NNEG point to a higher age – thus overall increasing profit.

### **7.2 Securitization**

Another good funding mechanism is securitization – when the markets are not frozen! The principal issue with a relatively new book is the demand for top-up loans from the existing client book and how to fund these. One option could be repaying some loans to the Special Purpose Vehicle and placing these in a new facility and then using the funds to pay top-ups on other loans that remain in the SPV.

Another method could be a liquidity facility attached to the securitization – this would be required anyway to cover the event that repayment rates suddenly slow down.



A further method could be to mix some HER loans with standard mortgages that would be interest-paying and typically have higher repayment rates. This would slightly increase the complexity but reduce the liquidity risk.

The maximum term of the issue is typically about 40 years but with an option for the HER company to repay and roll after about 5 years. This is achieved by starting with an interest rate equal to a set margin over Bill Rate – a higher margin for the lower rated bonds. After 5 years, this margin increases by a step-up rate. The HER company has the option of continuing at the higher rate or repaying. It would usually make sense to roll after 5 years and then to mix with some newer loans – the older loans are likely to provide greater liquidity. A long term investor such as a pension fund might not want this repayment option.

Clearly, a mixture of Buy-Outs and securitizations is the less risky ideal.

### **7.3 Rating Agencies**

We have found the Rating Agencies to be overly conservative. Despite now having considerable data on Australasian HER experience, their assumptions have not changed much from the original criteria. My understanding of an AAA rating is that the default probability should be about .01% a year and growing or about 1.5% over a 30 year period.

My thoughts on the various AAA rating assumptions are as follows

- mortality and move-to-care assumptions are quite reasonable.
- VMO assumptions are wildly conservative for Australasia – S&P assume .5% against steady 6% actual experience. We have had about 2,500 VMO's against S&P assumption of 200 – i.e. 160 stdv out which is not calculable!
- HPI 45% fall over the first 4 years is reasonable. My analysis of property cycles shows an expected fall of 12.5% and a stdv of 12.5% - hence 3 stdv's out and probability of about .13%.
- long term AAA assumptions for the average differential of Bill Rate less HPI of about 6% is excessive. In NZ this differential has averaged about 1% over the last 45 years. My statistical analysis suggests a standard deviation of average long term difference is about .5% - 10 stdv carries a probability of about 1 in a 10<sup>24</sup>.

## 8. Cash-Flow & Profit Example

The following table gives some insight to the pattern of cash-flows and accounting profits one could expect from HER. This example follows the VMO pattern we are seeing in Australasia. The NNEG reserves jump around a bit through the HPI cycle but are conservatively assessed to protect against harsh experience.

**Example M70 & F70 House Value \$400,000 Loan \$100,000**

YR	===== Cash Flow =====					===== Net Profit =====				
	GDebt @ end	Gross Repay	NNEG Claim	Exp & Comm	Net Cash	Total Margins	Exp & Comm	NNEG Claims	Resv Inc - Int	Net Profit
0	0				-100,000					
1	106,816	3,507	0	7,192	-3,685	2,931	7,192	0	0	-4,261
2	109,681	6,583	0	212	6,371	1,911	212	0	0	1,699
3	112,495	6,871	0	205	6,666	1,958	205	0	0	1,753
4	115,439	6,991	0	197	6,794	2,007	197	0	424	1,386
5	118,602	7,036	0	190	6,846	2,058	190	0	441	1,427
6	121,992	7,094	0	183	6,911	2,114	183	0	459	1,472
7	125,606	7,173	0	177	6,996	2,174	177	0	476	1,521
8	129,436	7,281	0	171	7,110	2,238	171	0	493	1,574
9	133,467	7,421	0	165	7,256	2,306	165	0	516	1,625
10	137,680	7,597	0	160	7,437	2,376	160	0	1,868	348
11	141,387	8,448	0	156	8,292	2,446	156	0	462	1,828
12	144,432	9,403	0	151	9,252	2,506	151	0	439	1,916
13	146,703	10,406	0	146	10,260	2,552	146	0	400	2,006
14	148,134	11,405	0	140	11,265	2,585	140	0	359	2,086
15	148,622	12,428	0	134	12,294	2,601	134	0	302	2,165
16	147,531	13,980	0	127	13,853	2,596	127	0	191	2,278
17	144,693	15,550	11	120	15,419	2,562	120	11	52	2,379
18	140,018	17,055	73	112	16,870	2,496	112	73	-107	2,418
19	133,885	18,036	150	103	17,783	2,401	103	150	-4,544	6,692
20	126,255	18,929	142	94	18,693	2,280	94	142	55	1,989
21	117,091	19,727	150	84	19,493	2,132	84	150	-111	2,009
22	106,585	20,207	260	75	19,872	1,958	75	260	-290	1,913
23	95,015	20,304	467	65	19,772	1,764	65	467	-472	1,704
24	82,739	19,967	747	55	19,165	1,554	55	747	-657	1,409
25	70,219	19,129	1,059	46	18,024	1,336	46	1,059	-835	1,066
30	19,813	9,319	727	12	8,580	407	12	727	-2,023	1,691
35	2,649	1,772	436	1	1,335	58	1	436	-743	364
40	182	176	53	0	123	4	0	53	-83	34
45	4	7	2	0	5	0	0	2	-3	1

There tends to be a steady cash-flow after year 1 and peaking about year 20-25. With low VMO rates early cash-flow is low and peaks about year 25 at a much higher level. The cash-flow shows a very good fit against an annuity portfolio with other assets mainly matching the shorter term.

There are accounting strains in year 1 as non-variable expenses are immediately recognised – in some areas these might be deferred. With the up-front new business IFRS profit strains and very long term and growing profit emergence, HER is an ideal candidate for European Market Consistent Embedded Value reporting – particularly if part of a life company.

The main profit driver is the interest margin obtained above the cost of funding. This also helps with the NNEG reserving.

## 9. Conclusions

My conclusions are

- With limited retirement savings made by those that are in or close to retirement, and limited pension benefits that the state is able to provide, there is a strong need to find additional funds. Until recently there has been a strong attitude that the family home is solely for bequeathing. I believe that HER will increasingly be seen as a sensible additional option.
- Later generations are also likely to find themselves with a fund shortfall at retirement. I also understand that there is an increasing rate of people reaching retirement with an outstanding mortgage. There are limited options other than HER to solve the funding shortfall.
- There will be strong pressures to increase retirement age as the proportion of the population over age 65 increases. This has already started in a number of countries.
- The “matures” and the “baby-boomers” are likely to be better off than later generations through high property appreciation in the past – particularly during the high inflation 1970’s and 80’s.
- HER is growing very strongly in the UK, but did need a period to understand and accept.
- NNEG is an essential element within an HER loan.
- NNEG risk depends upon interest rates v. house appreciation, longevity improvement rates, move-to-care and voluntary move-out rates.
- NNEG is a risk that occurs many years hence and could be quite substantial. Absolutely essential to have a robust approach to recognize elements that affect this risk over time and adjust the reserving appropriately – particularly before strong patterns emerge.
- I believe the future potential for HER is huge. Because of its long term nature, I think the product is likely to be handled better by life companies than banks - although the bank is the obvious starting point if the mortgage is just finishing.
- I shall be interested to see how the insurance/reinsurance markets react to including NNEG in their product ranges. To-date it has been rather slow.