Prospects for Reverse Mortgage Loan Insurance in Canada

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1 Introduction

This document will briefly survey some of the larger reverse mortgage lending markets around the world. By comparison, we find that Canada has a somewhat small market. Loan insurance might thicken the supply of capital for reverse mortgages in Canada, and Section 4 considers pricing with and without a design innovation concerning interest accumulation.

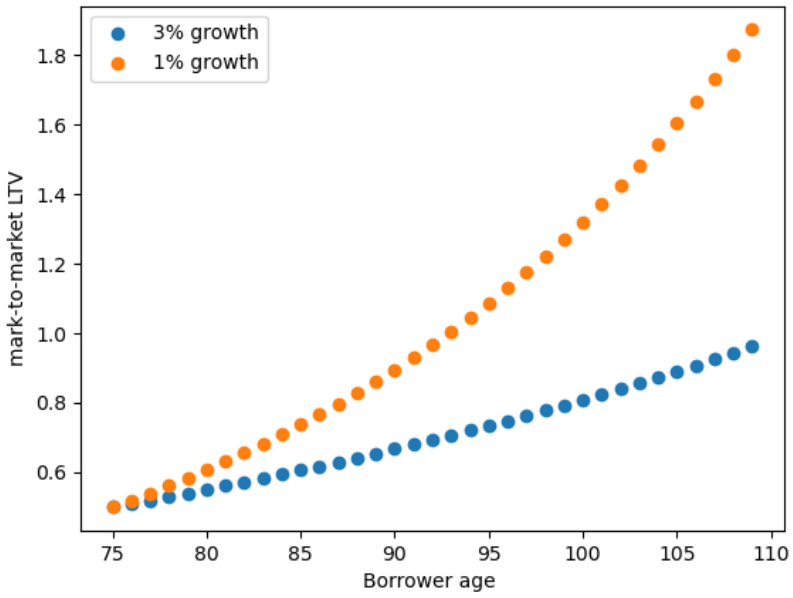
2 The global market for reverse mortgage loans

A reverse mortgage typically involves a lump sum, credit line, or guaranteed income stream given from a lender to an older homeowner in exchange for repayment at loan termination. Termination occurs at the earliest of a voluntary prepayment, a move while alive, or death of the borrower. Typically the lender has no recourse to assets other than the home, and no principal or interest payments are required until the date of loan termination. The borrower is responsible for property tax and insurance payments. Borrowers may be single or married couples; the former are easier to consider for termination purposes.

The expected present value of collateral at termination, and hence loan to value (LTV) ratios at origination, will rise with a borrower's age and fall with interest rates, as the discounted value of collateral at termination can be expected to rise with current age and fall with discount rates.

Figure 1 plots mark-to-market LTV over time for a loan with an initial 50% LTV for a 70 year old borrower, with the borrower's age on the horizontal axis on the top panel. Due to the non-recourse feature, the fundamental risks are that the borrower will remain in the home for too long, with too large of a gap between the investors' discount rate and home price appreciation. With continual compounding and constant rates of interest on the loan

Figure 1: Loan to value ratio for a 50% loan at 5% interest over time for different home price growth rates



r and growth of the collateral value g, an initial ltv of L, the mark-to-market LTV at date t is:

$$LTV(t) = Le^{[r-g]T}. \tag{1}$$

The value of the limited liability "put option" induced by the non-recourse provision per dollar of initial property value, discounting at rate δ is equal to:

$$p(t) = \max\left(0, LTV(t) - 1\right) e^{-\delta t} \tag{2}$$

Because the put option may have considerable value, and may induce contractual problems (see below), reverse mortgage debt may be an expensive source of funds, even risk-adjusted. We thus expect that borrowers will be drawn from the high end of the distribution of home value to other asset ratios. This has certainly been true in the U.S. (Davidoff (2014)) and anecdotally appears to be the case in Canada.

A fundamental tension in reverse mortgage design is between initial LTV and put option value. Conditional on LTV, there are multiple ways to price and allocate put option risk among investors.

Among the best-developed markets for reverse mortgages globally are the US, the UK,

South Korea, and Australia.[1]

In both the U.K. and Australia, both reverse mortgages ("lifetime mortgages") and "home reversion schemes" are available. The latter are forward sales of a fixed fraction of the proceeds from the seniors' home, but in both countries reversion schemes are niche products with much lower market share than reverse mortgages. Home reversion schemes do not explicitly feature a put option, but the lender loses money as the borrower's tenure grows.[2]

Per Australian Securities & Invesments Commission (2018), through December 2017, Australian reverse mortgage balances were AUD 2.5 billion on a total population of 24.6 million, with 72% lines of credit and 11.3% lump sum.[3] However, Kobayashi, Konishi, and Takeishi (2017), citing Deloitte and SEQUAL, find larger numbers of 41,500 outstanding loans with a balance of 3.6 billion AUD through 2013. This suggests a market penetration rate of roughly 1% given the senior share of households and high homeownership rates.

LTV ratios appear to be quite low, commonly 30% or lower for 70 year olds based on a government calculator, with interest rates above 6%.[4] Australia has a "Pension Loan Scheme" run by its government that allows only a regular payment option. This market is quite small, at 1,100 users as of October, 2019.[5].

The UK lifetime income market appears significantly larger than Australia's, with annual originations of roughly 3.9 billion, 44,870 originations in 2019 and a similar number in 2018.[6] Combined with older figures from Kobayashi, Konishi, and Takeishi (2017), this suggests roughly 500,000 outstanding reverse mortgage loans and up to a 10% share of the potential market of senior homeowners, far larger than in other countries.[7] Neither the UK nor Australia appears to have a securitization or insurance market for reverse mortgage loans. Rates appear to be somewhat lower in the thicker UK market and available LTV ratios somewhat higher: a 70-year old based on one calculator can obtain a 43% LTV at 5.5% interest.

A relatively recent product offering in the U.K. market is "Retirement Interest-Only" (RIO) mortgage loans. These require income sufficient to pay interest, but not principal,

[1]The Chinese market, despite a population with many very low income, high housing wealth seniors, is tiny, per Hanewald et al. (2020). Japan's government offers reverse mortgage-type specialized loans, but with restricted use of the proceeds.

[2]As with reverse mortgages, a high LTV reversion plan will provide borrowers with poor incentives to move while aive.

[3]Australian Securities & Invesments Commission (2018), there might be a stock versus flow issue in my reading.

[4]Per `https://moneysmart.gov.au/retirement-income/reverse-mortgage-calculator#section-details`. and `https://www.canstar.com.au/home-loans/reverse-mortgages/what-might-a-reverse-mortgage-cost-over-time`

[5]"Pensioners Win Reverse Mortgage Reprieve", Financial Review, Joanna Mather, October 23, 2019

[6]Per `https://www.equityreleasecouncil.com/news/2019-was-a-year-of-consolidation-as-equity-lease-lendir`

[7]There are roughly 6.5 million UK households over age 65, with 78% homeowners and only 6% still paying a mortgage.[8].

and are not due and payable until pre-defined life events occur. Rates appear somewhat lower and LTVs somewhat higher than lifetime mortgages.

Until recent growth in the U.K. market, South Korea and the U.S. appeared to be the largest markets for reverse mortgage loans, and notably both featured government guarantees to investors. In South Korea, the JTYK (JooTaekYeonKeum "Housing pension") program offers relatively low interest rates (under 2% spread above 6-month COFIX rate, currently near 2%, inclusive of the guarantee fee). The Korean Housing Finance Agency guarantees these loans.[9]. Notably, in Korea, while a lump sum is available, a life annuity appears to be the favored drawdown style, and reverse mortgage borrowers appear to have *higher* pre-retirement incomes than non-borrowers. The Korean program was originating roughly 5,000 loans per year in the mid-2000s, up to 10,000 to 11,000 in each of 2016 through 2019, suggesting a stock of roughly 50,000 loans on a 65+ 65+ homeowner household population of roughly 5 million, for a 1% penetration rate.

The U.S. Home Equity Conversion Mortgage (HECM) has been sponsored and guaranteed by the U.S. Federal Housing Administration and run through the Department of Housing and Urban Development since the early 1990s. Congressional Budget Office (2019) estimates that as of the end of fiscal year 2018, $111 billion of HECM credit was outstanding, for a penetration rate of 1.5% by value. Combining recent estimates from Congressional Budget Office (2019), Housing Studies (2018), and Community Living (2018), there are approximately 40 million homeowners over age 65, and roughly 400,000 outstanding HECM loans, for a penetration rate of 1%. Growth has slowed dramatically since the Great Financial Crisis. In 2007, there were 107,000 originations, in 2019, just 31,274 (per the National Reverse Mortgage Lenders' Association). Loan to value ratios have fallen, and for seniors with low incomes or poor credit histories (a sizeable fraction of HECM borrowers), a holdback of proceeds was introduced.

The U.S. experience has been notable for very poor *ex-post* performance of the FHA insurance fund. Because a large fraction of reverse mortgages were originated at the peak of the mid-2000s housing boom, in the states with the largest housing cycles, and in the neighbourhoods with the worst housing cycles within markets, a large number of loans have terminated with outstanding balances greater than collateral value.[10]. As Moulton, Haurin, and Shi (2015) and Begley et al. (2020), a surprisingly large percentage of HECM loans have fallen into property tax and insurance default, which puts servicers and FHA in a difficult position. Allowing non-performing loans to fester with no payments will generate large losses, but displacing delinquent seniors who have run out of cash is also unattractive both

[9]Kobayashietal

[10]Davidoff (2014)

for policy and reputational reasons. Responding to this problem, FHA introduced the "Life Expectancy Set Aside." ("LESA") That set aside is placed into an account that grows with time, and can only be used to fund property tax and insurance payments, although there is limited protection against longevity.[11] From the 2019 acturial analysis: "The Economic Net Worth is defined as cash available to the Fund plus the Net Present Value (NPV) of all future cash outflows and inflows that are expected to result from the mortgages currently insured by the MMIF. As of the end of Fiscal Year 2019, Pinnacle's Actuarial Central Estimate (ACE) of the MMIF HECM Cash Flow NPV is negative $11.228 billion. The total capital resource as reported in FHA's audited financial statement is $1.694 billion at the end of Fiscal Year 2019. Thus, the estimated economic net worth of the MMIF is negative $9.534 billion."

A notable feature of the U.S. market is a healthy market for HECM mortgage backed securities (HMBS). These are pass-through claims on pools of HECM loans, with Ginnie Mae guarantees at the pool level, on top of FHA guarantees. Investors are protected in terms of timing risk further by FHA's right and obligation to purchase loans out of pools when loan-to-value (based on original appraisals) hit just below 100%.[12]

Recently, private, uninsured securitized "jumbo" reverse mortgage loans that allow constant loan to value ratios at collateral values greater than those supported by FHA insurance have grown to roughly 25% of reverse mortgage https://www.newviewadvisors.com/commentary/hmbs-december-2019-stocking-half-full-in-2018-then-hang-two-stockings-this-year/originations by dollar volume.[13] Interest rates appear to be similar to HECM at 4.5% to 5%. To my knowledge, these are not securitized loans.

3 The Canadian Reverse Mortgage Market

A significant number of Canadian seniors may be characterized as house rich, with a moderate number both house-rich and cash-poor. The high value of homes, particularly in Greater Toronto and Vancouver is well-known. Median income among single Canadian Canadians over 65, per the 2016 Censs was $28,325. Poverty rates were relatively low, at 4%.

The reverse mortgage market in Canada has grown rapidly with home prices in recent years, but on a very small base. The oldest and largest product, the Canadian Home Income Plan, owned by Home Equity Bank, holds a portfolio of approximately $4 billion. CHIP originations began in 1986 in Vancouver, and 2019 originations at $820 million represented

[11] This is described in FHA HECM Mortgage Letters 2014-21 and 2015-09.Upon the loan's termination, LESA reverts to borrowers, undoing true annuitization.

[12] This repurchase saves guarantee fees to the government, as investors earn rates in excess of the riskless rate.

[13] `https://www.newviewadvisors.com/commentary/hmbs-december-2019-stocking-half-full-in-2018-then-hang-t`

roughly 20% of the stock of balances. CHIP offers loan to values up to 55%. Interest rates on CHIP loans vary from 5% for a one-year term to 6% for a five year term. CHIP offers both lump sum and line of credit advances. CHIP originations appear to be growing at roughly 20% per year. With roughly 3 million households in Canada headed by a senior over 65, and assuming a $200,000 average loan balance, CHIP has a market share of roughly one-half of one percent of eligible Canadian owners.

A new entrant to the market is Equitable Bank. They originated only $20 million in loans in 2019, but have been doubling or tripling volume in recent years. Equitable Bank offers somewhat lower rates than CHIP, at 4.24% to 4.84$ from 1 to 5 year terms, and lower origination fees, but lower loan-to-value ratios, at only 25% at age 70, and only 40% at 85.

A significant challenge to reverse mortgage lending in Canada appears to be the funding model. U.K. lenders appear willing to offer fixed rate loans at moderate interest rates. In Korea, banks, which are not liquidity constrained (anecdotal), are willing to retain loans on their balance sheets, as they have guarantees from the federal government that they will be repaid in full.

The Canadian banks fund loans through GICs.[14] As a result, they typically do not commit to interest rates past the first five years of a loans life. An attentive prospective borrower might therefore be worried about a hold up problem. Should the home appreciate significantly after origination, an unscrupulous lender could raise interest rates dramatically. Borrowers would have the right to sell at term, but have presumably used a reverse mortgage because they wish to remain in their homes for a long time.

4 Insurance and securitization

Were Canadian lenders able to sell cashflows to patient investors at origination, they could presumably commit to interest rates or at least margins over an index at origination.

Almost all securitization of reverse mortgages appears to have taken place in the U.S., and the overwhelming majority of securitized loans are HECMs, backed by insurance. In Canada, the residential mortgage backed securities market outside of CMHC insurance is small, suggesting that reverse mortgage loan insurance might be critical to creating a market for reverse mortgage backed securities, and in turn a way for lenders to commit to reasonable interest rates beyond the first five years of a reverse mortgage loan's life.

This section considers two questions: what are fair insurance premiums for put option risk in Canada under standard pricing? The second is how an innovation to design might

[14] In late 2019, CHIP completed its first sale of whole loans to another Canadian lender, while retaining servicing rights and obligations.

reduce the required insurance premium.

4.1 Standard reverse mortgage put option pricing in Canada

Computing a fair premium for standard reverse mortgage loans of a given LTV and interest rate requires considerable modeling. Naturally, the critical questions are: how long will loans survive under different price growth trajectories? And what are reasonable price parameters to consider?

4.1.1 Terminations

Reverse mortgage terminations typically occur with a move while alive or death of the borrower. Death probabilities may be considered exogenous functions of age, but with a more generous put options, selection may be adverse.[15] As observed in Davidoff and Welke (2006), there is an important moral hazard dimension to moves while alive: once the accumulated loan balance has "crossed over" there is little financial incentive for the borrower to move. Property taxes and insurance are payable, but there is no equity or debt cost for an underwater borrower remaining in the home. That paper and several industry studies have observed empirically that terminations are much more rapid when mark-to-market LTV is lower.

Modeling terminations in Canada for a single borrower might reasonably target HECM terminations in excess of U.S. mortality plus Canadian mortality. One natural source is the Canadian Institute of Actuaries Individual Annuitant mortality experience data.

4.1.2 Market Price implied home price growth and volatility

The propensity of HECM borrowers to default on tax and insurance obligations is an example of the possibility of endogenous price growth. Borrowers have little incentive to maintain homes while underwater, a problem shared with the forward mortgage market.

One way to calibrate the mean and volatility of home prices is to consider forward mortgage insurance premiums. Given CMHC's central role in Canadian mortgage insurance pricing, their implied beliefs about risk-adjusted price movements are particularly interesting.

It is possible to use CMHC's pricing to observe implied price growth and volatility. Examples of this approach include Downing, Stanton, and Wallace (2008) and a note I produced on the BC Home Partnership program. The latter document calculated that CMHC's pricing as of 2016 best fit a lognormal distribution of home prices with parameters μ = -1%, σ = 16.5%, and a default probability linear in underwaterness with slope 36%.

[15] Jeanne Calment, the famously long-lived French woman, was a "viager" borrower in France.

These parameters reflect both risk neutral expectations and a combination of Crown and market aversion to price risk.

We can use a similar approach to infer the parameters underlying the Canadian reverse mortgage industry's pricing. Assuming lognormal shocks to the difference between an underlying discount rate and price growth, we can ask which parameters best fit industry pricing given a model of terminations.[16]

4.2 Product Design

Davidoff (2019) proposes an annuitized reverse mortgage design that may save considerable insurance costs. Like a Retirement Interest Only loan, it is possible to design interest-paying reverse mortgages that need not be income tested as U.K. RIO loans are. In particular, if borrowers must use some loan proceeds to finance a life annuity with proceeds used to make partial interest payments as long as the loan survives, there are two actuarial advantages:

1. The loan balance over time depicted in Figure 1 tilts up in the early years of the loan's life, but down later.

2. Because the annuity reverts to the borrower after the loan is terminated, the borrower retains an incentive to move out of the home even if the LTV grows to exceed 100%..

With a 100% LTV (inclusive of the annuitized component), and with deterministic growth and interest rates, this product would be equivalent to a sale leaseback, with the annuity providing exactly enough income to pay rent.

Realistically, consumer impatience and distaste for annuitization, combined with stochatic prices, make a 100% LTV stylized annuitized reverse mortgage infeasible. However, Davidoff (2019) shows that for reasonable initial LTV, a partial annuitization of remaining home equity can offer consumers the same initial proceeds with lower up-front or interest-based insurance premiums while holding lender profits constant.

4.3 Remaining work

Ongoing work on this project will complete the model of fair insurance premiums for reverse mortgage loans at different LTV ratios under price growth parameters implied by current Canadian reverse mortgage and insurance pricing. That exercise will be conducted based on status quo reverse mortgage design and with the annuitized component proposed in Davidoff (2019).

[16] See Davidoff (2012) for a discussion of put option value calculation.

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