Hacking Reverse Mortgages

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**Hack** *(verb).*

- To cut or sever with repeated irregular or unskillful blows  
  --Merriam Webster Dictionary

- An appropriate application of ingenuity  
  --Phil Agre, MIT hacker and UCLA prof
Plan

- Importance of home equity as a retirement asset, and the promise of reverse mortgages (RMs)

- RMs in practice: the FHA’s Home Equity Conversion Mortgage “HECM”

- Valuation model: identifying winners and losers

- Structural weaknesses of HECMs and possible fixes

- Broader lessons for federal credit program design
Importance of home equity for retirees

- About 80% of U.S. households over the age of 62 own their homes
- Home equity makes up about half of older households’ median net wealth (Poterba et. al., 2011)
- As an asset class, home equity extends further down the income distribution than other forms of private retirement savings
Importance of home equity for retirees

Median Potential Annuitable Assets and Housing Equity, by potential annuitizable asset percentile interval households age 62-80 in 2012

Source: HRS data; tabulations by Mark Warshawsky
Reverse mortgages

- A financial innovation designed to let older homeowners access home equity while staying in their homes for as long as they choose.
  - Liquefies home equity
  - Provides longevity insurance

- Predecessor is a “viager”
  - An ancient French system for selling apartments and obtaining a life annuity
Reverse mortgages

• Design features:
  – Homeowner gets loan (or LOC or annuity) capped at portion of current home equity
  – House is collateral; no other recourse
  – Interest, premiums and fees rolled into loan balance
  – Balance comes due when borrower permanently moves or dies
    • If balance < house value, investors get balance, borrower or heirs get house
    • If balance > house value, investors get house value
In the U.S., about 95% of reverse mortgages are originated under the FHA’s HECM program

- HECM = Home Equity Conversion Mortgage
- FHA = Federal Housing Administration (part of HUD)

A very unpopular product
- <2% of eligible households take out a HECM each year
- Only $16 billion outstanding in 2015
A “Reverse Mortgage Puzzle”

• Why is a subsidized financial product that appears to solve the problem of liquefying home equity for older households so unpopular?

• Literature has suggested several possible answers:
  – distrust and lack of understanding exacerbated by the product’s complexity;
  – high upfront costs;
  – limited need because of Medicaid coverage;
  – reluctance to spend bequests
A “Reverse Mortgage Puzzle”

- Why is a subsidized financial product that appears to solve the problem of liquefying home equity for older households so unpopular?

- The analysis here suggests a simpler and purely financial reason: HECMs are very expensive for borrowers
  - Complement to, not substitute for, other reasons suggested
HECMs are costly to borrowers
- Average fair value NPV of -$27,000 per loan (-18.6% of LOC)
- Exception is “ruthless” strategy that earns $53,000

HECMs are expensive for the government
- Average fair value NPV of -$4,000 per loan (-2.8% of LOC)
- Ruthless strategy costs $55,000

The winners are private lenders
- Average fair value NPV of $31,000 per loan (21.4% of LOC)

Qualitative results robust to variations in house price volatility, moving frequency, age at origination, etc.
What explains who wins and who loses?

- Program rules and structure
  - Government bears all of the default risk (write the put option)
  - Program rules mandate high fees
  - Lenders charge high rate spreads
  - Sum of premiums, fees and spreads exceeds cost of default risk
  - Lenders bear no default risk but earn high fees and spreads

- Deeper question is why doesn’t competition reduce costs to borrowers and gains to lenders?
HECM market structure

- A federal loan guarantee program
- Government guarantees repayment up to insured limit; sets rules
- Private lenders originate and fund HECMs
- Most are securitized through Ginnie Mae
HECM program rules

- Detailed and complex rules
HECM program rules

- Key features
  - Borrowers must be age 62 or older (co-borrower can be younger spouse)
  - Maximum loan or LOC is function of (1) age of youngest borrower, (2) interest rates, (3) house value, (4) cap $625,000
    - Typical amount is about 50% of current home value
  - Loan limit grows over time at rate of interest charged + insurance premium
  - Existing mortgage must be paid off (can use HECM funds)
HECM program rules

- Key features
  - Origination fees ($2,500 to $6000; based on house value)
  - Servicing fees up to $360/yr, closing costs (appraisal, etc.)
  - Mortgage insurance premium .5% upfront on house value; 1.25% annually on loan balance
  - Lender sets interest rate spreads (typically between 1% & 3%; mandated caps and floors)
HECM program rules

• Oodles of options and optionality
  – Borrowers can take lump-sum, LOC, tenure annuity, term annuity, or combo
  – Borrower chooses fixed or floating rate; lender sets offered rates
  – No prepayment penalties
  – Borrowers chooses whether and when to sell house
    • Tendency to sell appreciated houses at faster rates increases government cost
  – Borrower chooses whether to maintain house
  – Borrower chooses when to take out HECM
    • Higher usage in areas that had high appreciation rates
  – Lenders can sell loan to FHA when balance reaches 98% of insured limit, which is initial house value
Valuation model

- House prices follow a geometric random walk with drift
  - Only source of risk in this version of model
  - Base case: 2.5% average nominal growth rate; 16% volatility
  - Risk-neutral implementation assumes 1% risk premium in housing returns

- Borrower types
  - (1) ruthless (10% of population)
  - (2) draw entire line in year 1 (80% of population)
  - (3) draw 50% in year 1 and 50% in year 3 (5% of population)
  - (4) draw 50% in year 1 and nothing more (5% of population)

- Program rules as previously described
Valuation model

- Mortality and move rates by age calibrated to data.
- Short-term interest rate fixed at 1%; risk-neutral and government discount rate fixed at 2%

- Run Monte Carlo
  - Over borrower types and over time (maximum of 50 years)
  - Draws from random number generator each year determine house price changes, and whether move or die (exit)
  - If exit repay min(house value, loan balance)
  - Cash flows to/from borrowers, gov’t, lenders recorded and discounted to present
## Results

**Table 4.1**

*Panel 1: Risk adjusted NPV ($)*

<table>
<thead>
<tr>
<th></th>
<th>Borrowers</th>
<th>Government</th>
<th>Lenders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base case</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>population-weighted average</td>
<td>-27,415</td>
<td>-3,970</td>
<td>31,075</td>
</tr>
<tr>
<td>ruthless</td>
<td>53,149</td>
<td>-55,287</td>
<td>1,838</td>
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<tr>
<td>full draw in year 1</td>
<td>-36,412</td>
<td>1,319</td>
<td>34,793</td>
</tr>
<tr>
<td>50% draw in year 1, rest in year 3</td>
<td>-32,539</td>
<td>-313</td>
<td>32,330</td>
</tr>
<tr>
<td>50% draw in year 1</td>
<td>-39,480</td>
<td>10,381</td>
<td>28,798</td>
</tr>
<tr>
<td>never draw</td>
<td>-10,503</td>
<td>3,311</td>
<td>6,892</td>
</tr>
<tr>
<td>&lt;=age 75</td>
<td>-30,353</td>
<td>-4,048</td>
<td>34,097</td>
</tr>
<tr>
<td>&gt; age 75</td>
<td>-20,290</td>
<td>-3,783</td>
<td>23,742</td>
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## Results

<table>
<thead>
<tr>
<th>Variants</th>
<th>Borrowers</th>
<th>Government</th>
<th>Lenders</th>
</tr>
</thead>
<tbody>
<tr>
<td>vol = .3 overall</td>
<td>15,295</td>
<td>-46,664</td>
<td>31,013</td>
</tr>
<tr>
<td>vol = .3 ruthless</td>
<td>96,997</td>
<td>-98,522</td>
<td>1,225</td>
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<tr>
<td>vol = .1 overall</td>
<td>-45,669</td>
<td>14,279</td>
<td>31,089</td>
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<tr>
<td>vol = .1 ruthless</td>
<td>34,384</td>
<td>-36,669</td>
<td>1,986</td>
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<tr>
<td>&lt;=age 75 ruthless</td>
<td>64,872</td>
<td>-66,472</td>
<td>1,300</td>
</tr>
<tr>
<td>&gt;75 ruthless</td>
<td>24,713</td>
<td>-28,155</td>
<td>3,142</td>
</tr>
<tr>
<td>flat 10% odds of moving</td>
<td>-18,286</td>
<td>-642</td>
<td>18,601</td>
</tr>
<tr>
<td>moving odds up with HPA</td>
<td>-20,007</td>
<td>-10,024</td>
<td>29,721</td>
</tr>
<tr>
<td>.5% lower HPA</td>
<td>-19,875</td>
<td>-11,477</td>
<td>31,040</td>
</tr>
</tbody>
</table>
Interpretation of main results

- Anything that increases the loan balance early on, or that increases the average life of the loan, makes it more expensive for the borrower
  - Because fees are high relative to the value of the risk transfer
- Higher house price volatility increases the value of the put option
  - Beneficial to borrowers, detrimental to government, neutral to lenders
The ruthless strategy

- Proposed by Thomas Davidoff as creating a reverse mortgage puzzle
  - Davidoff, Thomas and Jake Wetzel (2014), “Do Reverse Mortgage Borrowers Use Credit Ruthlessly?”

- The strategy:
  - Take out LOC but do not draw on it
  - When you sell your house, if house value < LOC limit, draw the maximum; otherwise draw nothing
  - Takes advantage of put option and avoids insurance premium and rate spread
Why doesn’t competition improve outcomes?

- Possible reasons for limited rate competition:
  - Opaque prices, (too) many options
  - Older households may be reluctant to shop, or lack the know-how to compare offers
  - Costs may in fact be high
    - high marketing and selling costs could dissipate rents
    - There could be high risk premiums on longevity and prepayment risk
    - GNMA securities may be poorly structured or have wrong buyers
Why doesn’t competition improve outcomes?

- Possible reasons for no product innovation:
  - Arguably there would be a market for simpler reverse mortgages with less optionality and lower cost to borrowers
    - E.g., floating rate w/out cap would reduce prepayment and longevity risks
    - E.g., penalize ruthless strategy to reduce value of put option
  - Liability, difficulty competing with government-endorsed product
Lessons for government credit programs

• HECMs comprise a small fraction of the over $3 trillion outstanding in federal direct and guaranteed loans

• Under gov’t accounting rules (which use same cash flows but Treasury rates to discount), HECMs appear profitable:
  – Fair value NPV = -$4,000 (this analysis)
  – Budgetary NPV = $10,500 (this analysis w/gov’t discounting)
  – Systematic understatement of credit costs tends to distort decision-making and creates hidden subsidies
  – Analysis here is part of a research agenda to increase transparency of credit programs by designing and implementing models to estimate fair value subsidy costs
Lessons for government credit programs

- The finding that a federal guaranteed loan program provides greater benefits to guaranteed lenders than to the intended beneficiaries is not unique to HECMs.

- Related analyses of the now-discontinued Guaranteed Student Loan program (Lucas and Moore, 2010) and of the Small Business Administration’s 7a program (de Andrade and Lucas, 2013) reach similar conclusions.
Guaranteed lending vs. direct lending

- Guaranteed lending can be efficient when monitoring and screening borrowers is important and guaranteed lenders are required to have skin-in-the-game
- Guaranteed lending can be costly when fees are set by regulation rather than by market forces

HECM structure has the downside of guaranteed lending with none of the upside:
- No judgmental screening is needed; eligibility by simple rules.
- No monitoring because no required payments
- Fees set to fixed levels; no restrictions on rate spreads
Hacking Reverse Mortgages

• Thank you!