Structuring Mortgages for Macroeconomic Stability

John Y. Campbell,¹, Nuno Clara,² João F. Cocco³

¹Harvard University  
²Duke University  
³London Business School

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Motivation

- Recent focus on mortgages as a monetary policy transmission mechanism
- Declining interest rates can stimulate the economy through mortgage effects on household budgets (mortgage channel of monetary policy)
- The mortgage channel: Mortgage rate reduction → lowers payments by borrowers but also payments received by lenders. Aggregate effects if borrowers increase consumption more than lenders cut theirs.
  - Domestic borrowers and foreign lenders
  - Borrowers have high MPC because they are borrowing constrained and lenders have low MPC because they are unconstrained (works if mortgage payment reduction is temporary)
ARMs, FRMs, and the Mortgage Channel

- The mortgage channel works better for ARMs than FRMs (Di Maggio et al. *AER* 2017).
  - Mortgage payments decline for all ARM borrowers when the central bank cuts the short rate, but FRM borrowers have to refinance.
  - Underwater borrowers may not be able to refinance
  - Less sophisticated borrowers may not refinance even though they could do so (Campbell 2006, Keys, Pope, and Pope 2016, Andersen, Campbell, Nielsen, and Ramadorai 2020).
  - Decline in ARM payments is temporary while the decline in FRM payments is long-lasting, offsetting stimulus

- ARMs have problems too ...
  - Expose borrowers to interest rate risk
  - Ineffective in a ZLB environment

Can we design better mortgage contracts?
Mortgage Design Proposals

- Eberly and Krishnamurthy (2014) propose a system in which borrowers can costlessly refinance from FRM to ARM, with unchanged principal, even when underwater.
  - Guren, Krishnamurthy and McQuade (2020) evaluate this proposal in an equilibrium model of the housing market with risk-neutral lenders.
- Piskorski and Tchistyi (2010) argue for an option ARM that allows borrowers to defer principal repayment (or even negatively amortize) during a recession.
- A full evaluation of these mortgage systems requires some consideration of default and the impact on lenders.
  - High-LTV lending or negative amortization can worsen default later in a recession, with possible damage from default externalities.
- We undertake this analysis using a calibrated life-cycle model of borrowers’ decisions and a long horizon risk-averse lender.
  - In an option ARM the decline in payments is temporary, while the decline in FRM payments is long-lasting which implies a larger offset from reduced lender consumption.
Features of the model

- Overlapping generations of borrowers entering and exiting the economy every period.
- Business cycle (recession and expansion), interest rate state and house price risk correlated with the business cycle.
- Real income process of Guvenen, Ozkan, and Song (2014) for borrowers, capturing non-normality and business cycle variation of income growth.
- Constant inflation (or real mortgages).
- Borrowers decide in each period whether to refinance, default, or prepay their mortgages.
- Infinite-horizon risk-averse representative lender that chooses consumption to maximize expected utility.
- The representative lender provides the loans and receives the cash-flows from the mortgages.
- The loans are priced using the stochastic discount factor derived from the lender’s optimal consumption choices. (In equilibrium, higher Sharpe ratios in recessions than in expansions).
- Model parameterized using several data sources. It endogenously captures observed borrowers’ default behavior.
Mortgage Designs Considered

1. Standard ARM (benchmark case).
2. Option ARM with a free option to extend maturity in a recession.
3. Standard FRM.
4. Option FRM with a free option to switch to an ARM in a recession with no home equity constraint (Eberly-Krishnamurthy proposal).
Option ARM Shifts Defaults To Expansions

Cyclicality of default rate
Option ARM Stabilizes Consumption

Cyclicality of aggregate consumption growth

<table>
<thead>
<tr>
<th></th>
<th>ARM</th>
<th>ARM with option to extend maturity in recession</th>
<th>FRM</th>
<th>FRM with option to switch to ARM in recession</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclicality</td>
<td>0.08</td>
<td>0.07</td>
<td>0.09</td>
<td>0.08</td>
</tr>
</tbody>
</table>
Option ARM is Not That Expensive

Average loan premia

- ARM
- ARM with option to extend maturity in recession
- FRM
- FRM with option to switch to ARM in recession
Summary of Cyclicality and Pricing Results

- Relative to a standard ARM, an option ARM
  - stabilizes consumption growth over the business cycle,
  - shifts defaults to expansions,
  - and has a lower premium because of lower probability of default and lender losses in recessions.

- Relative to a standard FRM, an option FRM
  - modestly stabilizes consumption growth over the business cycle,
  - modestly reduces defaults in recessions,
  - but has a higher premium because lenders lose payments in recessions.
Welfare Gains relative to the Standard ARM
Summary of Welfare Results

- In our model, borrowers prefer FRMs to ARMs despite the good macroeconomic properties of ARMs:
  - they dislike the risk of interest rate increases.
  - The welfare benefits of FRMs in our model depend on our assumption that there is no inflation uncertainty.
- But an option ARM is even more strongly preferred:
  - it is attractively priced and reduces risk during recessions.
  - Relative to the plain vanilla ARM, the option ARM improves borrowers’ and lender welfare.
- Relative to the plain vanilla FRM, the FRM with an option to switch to an ARM improves lender welfare but is disliked by borrowers.
### Comparison of Different Mortgage Contracts

<table>
<thead>
<tr>
<th>Description</th>
<th>Baseline ARM</th>
<th>Mat ext. ARM</th>
<th>Baseline FRM</th>
<th>FRM with option</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Mean</td>
<td>Cyclic.</td>
<td>Mean</td>
<td>Cyclic.</td>
</tr>
<tr>
<td>Loan premium</td>
<td>0.020</td>
<td>-0.013</td>
<td>0.018</td>
<td>-0.013</td>
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<tr>
<td>Default rate</td>
<td>0.013</td>
<td>-0.006</td>
<td>0.013</td>
<td>0.011</td>
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<tr>
<td>Fraction using option</td>
<td>n/a</td>
<td>n/a</td>
<td>0.134</td>
<td>-0.606</td>
</tr>
<tr>
<td>$\Delta c_{it}$</td>
<td>0.040</td>
<td>0.073</td>
<td>0.039</td>
<td>0.065</td>
</tr>
<tr>
<td>Lender cash/income</td>
<td>2.363</td>
<td>-2.030</td>
<td>3.163</td>
<td>-2.555</td>
</tr>
<tr>
<td>$\Delta c^l_t$</td>
<td>0.000</td>
<td>0.107</td>
<td>0.000</td>
<td>0.137</td>
</tr>
<tr>
<td>$\Delta c^a_t$</td>
<td>0.000</td>
<td>0.082</td>
<td>0.000</td>
<td>0.078</td>
</tr>
<tr>
<td>Welfare gain borrowers</td>
<td>0.015</td>
<td></td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td>Welfare gain lender</td>
<td>0.001</td>
<td></td>
<td>0.022</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

- The option ARM has many advantages in our analysis.
- Because of the impact on the risk-averse lender, the form through which cash-flow relief is provided to borrowers during recessions matters.
- Like the option FRM, the system depends on a disinterested party declaring a recession in a timely and credible manner.
- The COVID-19 recession that started in the US in February 2020 was announced roughly three months later, on June 8, 2020.
- Our maturity extension option has some similarities to mortgage forbearance provisions in the US Coronavirus Aid, Relief, and Economic Security (CARES) Act of March 2020.
- And the mortgage repayment holidays introduced in other countries.