

# Structuring Mortgages for Macroeconomic Stability

John Y. Campbell,<sup>1</sup> Nuno Clara,<sup>2</sup> João F. Cocco<sup>3</sup>

<sup>1</sup>Harvard University

<sup>2</sup>Duke University

<sup>3</sup>London Business School

MIT Golub Center for Finance and Policy 7th Annual Conference

October 14-15 2020

# 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 Tchisty (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.

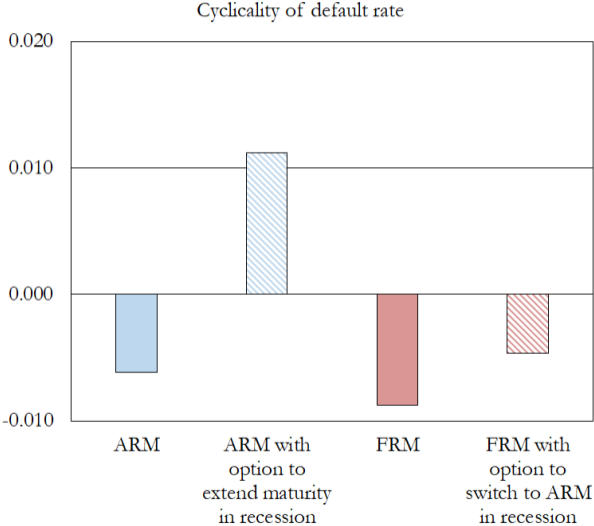
## Features of the model

- ▶ 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.

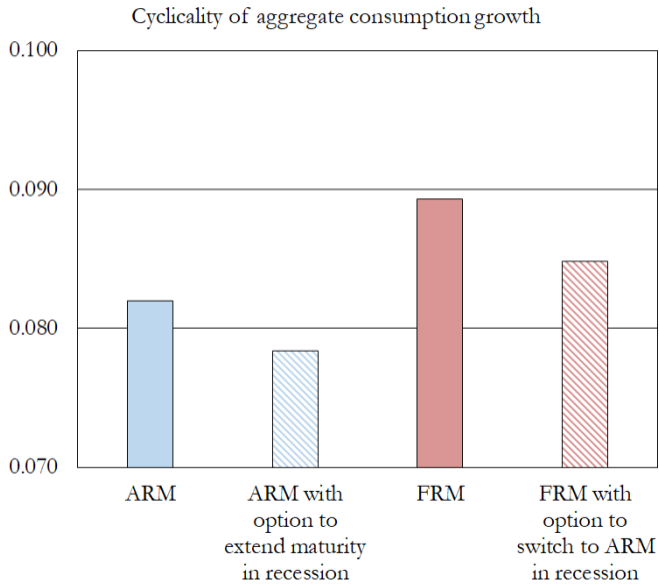
## Mortgage Designs Considered

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

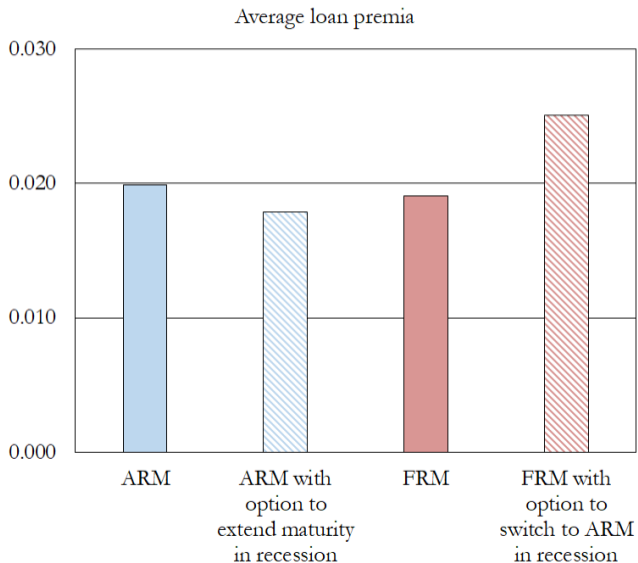


## Option ARM Stabilizes Consumption





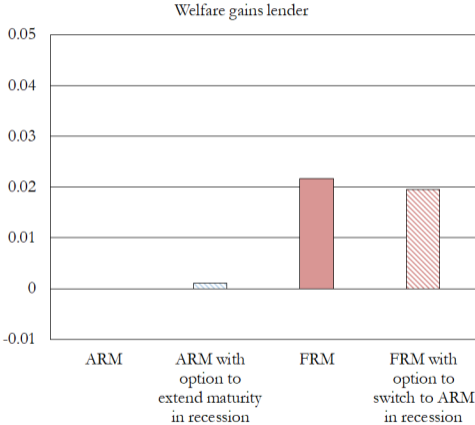
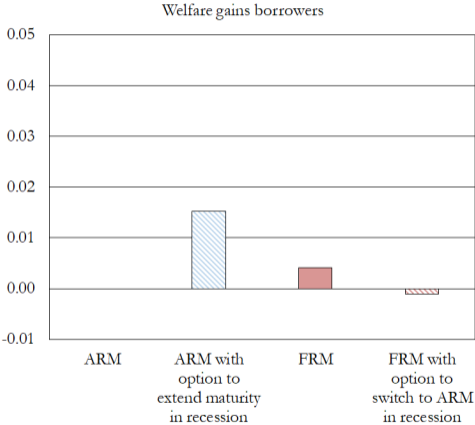
## Option ARM is Not That Expensive



## Summary of Cyclicity 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

Description	<u>Baseline ARM</u>		<u>Mat ext. ARM</u>		<u>Baseline FRM</u>		<u>FRM with option</u>	
	<u>Mean</u>	<u>Cyclic.</u>	<u>Mean</u>	<u>Cyclic.</u>	<u>Mean</u>	<u>Cyclic.</u>	<u>Mean</u>	<u>Cyclic.</u>
Loan premium	0.020	-0.013	0.018	-0.013	0.019	-0.018	0.025	-0.018
Default rate	0.013	-0.006	0.013	0.011	0.013	-0.009	0.013	-0.005
Fraction using option	n/a	n/a	0.134	-0.606	n/a	n/a	0.108	-0.546
$\Delta c_{it}$	0.040	0.073	0.039	0.065	0.040	0.075	0.040	0.072
Lender cash/income	2.363	-2.030	3.163	-2.555	2.521	-2.163	2.375	-1.962
$\Delta c_t^l$	0.000	0.107	0.000	0.137	0.000	0.128	0.000	0.119
$\Delta c_t^a$	0.000	0.082	0.000	0.078	0.000	0.089	0.000	0.085
Welfare gain borrowers			0.015		0.004		-0.001	
Welfare gain lender			0.001		0.022		0.020	

## 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.