Efficient Credit Policies in a Housing Debt Crisis

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Three Topics

1. Optimal government policy to boost household spending
    - payment reduction and payment deferral, not principal reduction
2. Principal reduction best offered by lenders, in the context of debt renegotiation.
3. Policy proposal: floating rate reset option to implement ex-ante optimal mortgage design.
    - Avoids renegotiation frictions.
    - Variation on current mortgage design

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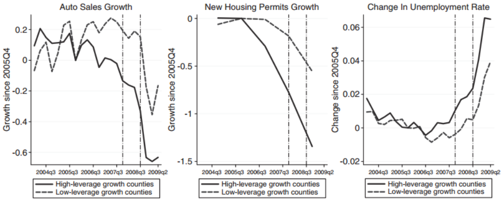
Apologies: Model has no deep reason (market failure) for policy.



Note: High-leverage growth counties are defined to be the top 10 percent of counties by the increase in the debt-to-income ratio from 2002:Q4 to 2006:Q4. Low-leverage growth counties are in the bottom 10 percent based on the same measure. The left panel plots the growth in auto sales since 2005, the middle panel plots the growth in new housing permits since 2005, and the right panel plots the change in the unemployment rate since 2005.

Source: Mian and Sufi (2010)

“Convert" high-debt counties into low-debt counties

Mian and Sufi, 2014: “Government policy should do what it can to boost household spending. Debt forgiveness is exactly one such policy, and arguably the most effective, given its role in reducing foreclosures and the very large differences in MPCs between creditors and debtors"

Basic Model

Household utility

$$C_t \equiv \left(c_t^h\right)^{\alpha} (c_t)^{(1-\alpha)},$$

c_t^h is consumption of housing services; c_t is consumption on non-housing goods.

$$U = C_1 + C_2,$$

Income:

$$y_1 = y_2 = \bar{y}$$

Housing cost, r per unit of housing. For c^h size home,

$$P_0 = rc^h + rc^h + P_2$$

P_2 is terminal value of home. Discount rate is one everywhere

Optimal consumption and borrowing

Cobb-Douglas utility means constant expenditure shares on each good:

$$c_t^h = \alpha \frac{\bar{y}}{r} \qquad c_t = (1-\alpha)\bar{y}$$

Implement with:

1. Initial mortgage loan of P_0
2. Payments of $rc^h = \alpha \bar{y}$ in each period
3. Final payment $D = P_2$

Lender profits:

$$-P_0 + rc^h + rc^h + D$$

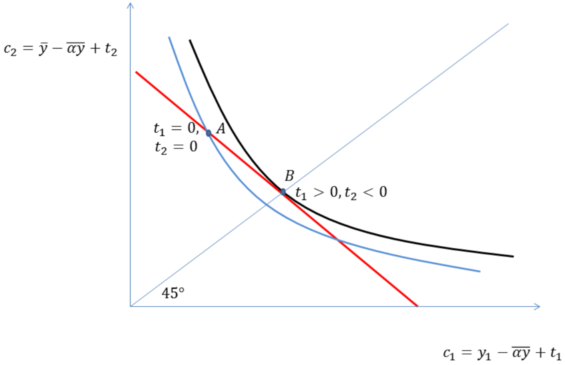
equal zero so $P_0 = rc^h + rc^h + P_2$

Crisis: unanticipated income shock

$y_1 < \bar{y}$

With no adjustment: $c_1 = y_1 - \alpha\bar{y} < c_2 = \bar{y} - \alpha\bar{y}$.

Options: default, or borrow from future income ($\bar{y}$)



Government policy

- Consider government-paid modifications with maximum net spending of Z: $t_1 + t_2 = Z$
- Optimal modification is "payment deferral": $t_1 > 0$, $t_2 < 0$

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Motivation for policy

1. Countercyclical policy/liquidity constraint on household
2. Intermediary capital/liquidity problems: $t_1 + \frac{t_2}{1+\pi} = Z$, with $\pi > 0$ as cost of private credit
3. Foreclosure externalities

(Government can pay lenders to modify, or directly transfer to households.) How robust is this result? default, debt overhang, delay.

Default

Let P_2 be a random variable

Household wealth at $t = 2$ if no default: $P_2 - D + \bar{y} + t_2$.

If prices go up, can increase consumption:

$$c_t^h = \alpha \frac{P_2 - D + \bar{y} + t_2}{r} \qquad c_t = (1-\alpha)(P_2 - D + \bar{y} + t_2)$$

giving utility (for constant ψ):

$$(\bar{y} + P_2 + t_2 - D) \overbrace{\left(\left(\frac{\alpha}{r}\right)^{\alpha} (1-\alpha)^{1-\alpha} \right)}^{\psi}$$

If default, household suffers deadweight costs (loss of credit access, etc.)

wealth $= \bar{y} - \theta$, utility $= (\bar{y} - \theta)\psi$

Define $\phi \equiv P_2 - D + \theta \Rightarrow$ default if $\phi < -t_2$.

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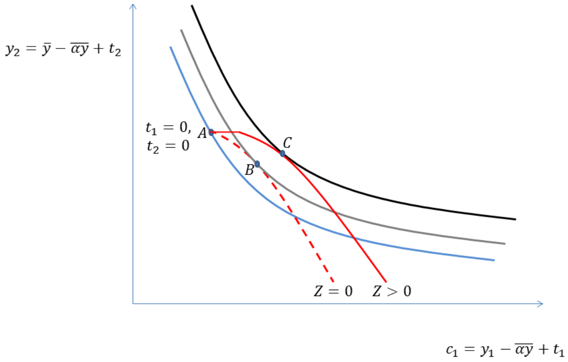
Define $\phi \equiv P_2 - D + \theta \Rightarrow$ default if $\phi < -t_2$. The potential for default limits the size of payment deferral: cannot be larger than ϕ

Modifications with Default Risk

Let ϕ be random, with CDF $F(\phi)$

$$\text{Program budget:} \qquad t_1 + t_2(1 - F(-t_2)) = Z$$

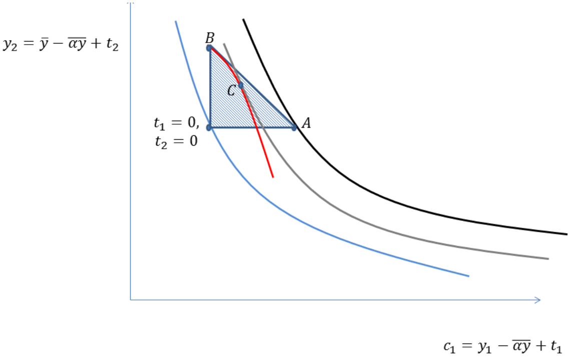
$$\max_{t_1, t_2} (1 - F(-t_2)) E\left[v(y_1 - \alpha\bar{y} + t_1) + (\bar{y} + t_2 + P_2 - D)\psi | \phi > -t_2\right] + F(-t_2) E\left[v(y_1 - \alpha\bar{y} + t_1) + (\bar{y} - \theta)\psi | \phi < -t_2\right]$$



Support c first: "payment deferral", then $Z > 0$ payment reduction.

Debt overhang and principal reduction

Suppose government sets $t_2 = Z$: reduce principal by Z.
If this opens up borrowing, private lender loans τ_1 at zero profit:$-\tau_2(1 - F(-\tau_2)) - \tau_1 = 0$



Result: $A > C$, payment reduction is still best

Default timing

At date 1, $E\phi \equiv E_{t=1}[\phi]$ is known (e.g., mortgage is already underwater). Should the homeowner default and reoptimize?

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Default if:

$$y_1\psi + (\bar{y} - \theta)\psi > \left(\frac{\alpha\bar{y}}{r}\right)^{\alpha} (y_1 + t_1 - \alpha\bar{y})^{1-\alpha} + E[\bar{y} + \max(P_2 + t_2 - D, -\theta)]\psi.$$

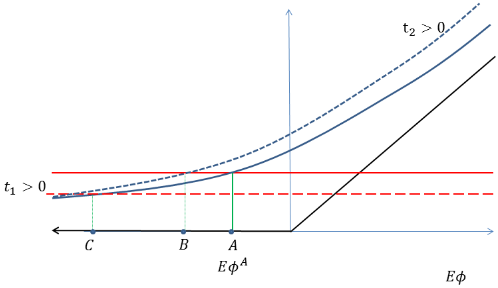
or,

$$y_1 - \bar{y}\left(\frac{\frac{y_1+t_1}{\bar{y}} - \alpha}{1-\alpha}\right)^{1-\alpha} > E[\max(t_2 + \phi, 0)].$$

LHS is value of defaulting and reducing housing consumption. RHS is value of option to delay default.
[Note if $y_1 = \bar{y}$ (and $t_1 = 0$), LHS $= 0$.]

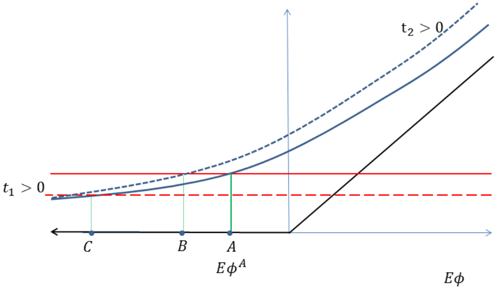
Default and delay

- Default if $E\phi < 0$; underwater households service debt, hoping P_2 rises.
  - No default as long as $E[P_2] - D \geq E\phi^A - \theta$.
- This depends on equity, *plus* uncertainty and carrying cost
  - “Double trigger" (Fuster-Willen 2012, Campbell-Cocco, 2011)



Modifications and default

- Increase t_1 shift red line down => point C
  - *reduce the price paid for the option*
- Increase t_2, shift blue curve up => point B
  - *reduce the strike price of an OTM option*
- Flow relief produces biggest bang for the buck.



Liquidity-driven defaults are costly

Simple model of home prices: $p_0 = E[r_1 + r_2 + p_2]$
At planning stage, set housing consumption $c_t^h = \alpha \frac{\bar{y}}{r_t}$
Income falls to $y_1 < \bar{y}$ for a group of agents; these hh are liquidity constrained.
Fraction $m_{1,L}$ are foreclosed upon and move to the rental market,

$$c_1^h = \alpha \frac{y_1}{r_1}$$

Suppose residual curve has elasticity of η_1

$$\frac{dp_0}{dm_{1,L}} = \eta_1 \alpha (\bar{y} - y_1) < 0$$

Also likely that $\eta_2 < \eta_1$ (more liquid market in non-crisis period), so even delay is valuable.

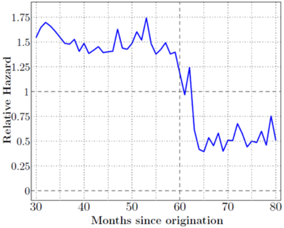
Payment relief via ARMs

Fuster and Willen (2013)

- Alt-A ARMs that adjust downwards in the recession.
- Typical case 5/1 ARM orginated in 2005-2006 with reset in 2010-2011; reset drops rate around 3%
- Estimate proportional hazard model as a function of CLTV, payment, borrower characeteristics.
- Use non-reset ARMs as control group.

Payment relief and foreclosures

Default hazard of 5/1 relative to 7/1+ loans drops discretely around reset



A. Negative equity does not attenuate the effect of rate reduction

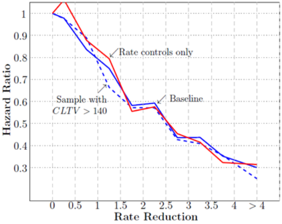
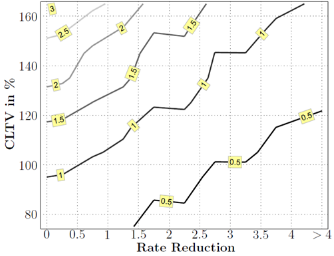


Figure 8: Iso-default curves

Lines on plot represent the combinations of rate reductions and CLTVs that lead to the same probability of default according to our baseline specification. Number on line measures the default probability relative to other lines; for example, borrowers with combinations of CLTV and rate reduction on the line marked "0.5" are half as likely to default as borrowers on the line marked "1" and one-third as likely to default as borrowers on the line marked "1.5."



Source: Fuster and Willen (2013)

Summarizing

- If borrowers are liquidity constrained, payment relief offers greater benefit than principal reduction
- Both in terms of increasing household consumption (MPC highest out of liquidity) and in terms of reducing default (default most sensitive to liquidity)
- High stocks of debt may have gotten us in this mess, but flow relief is best policy to get out!
- ARMs help do the job

Further Questions

- When is principal reduction preferrable?

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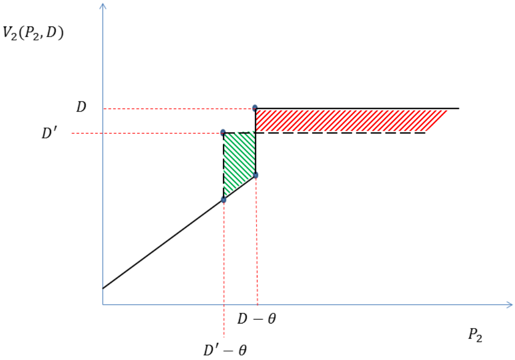
1. Lender initiated modifications
2. Mortgage design

Lender-initiated modifications



- Solution $D' = P_2 + \theta$ for $P_2 < D - \theta$.
- Conclusion: Lenders will want to reduce principal, for $\theta > 0$
- Principal reduction avoids foreclosures

Why didn't lenders modify more?

Suppose at date 1, household has not defaulted, but is underwater. Will lender want to write down debt at that point?

$$\max_{D' \leq D} E[V_2(P_2, D')|P_1].$$

With any uncertainty,

$$\max_{D' \leq D} E[V_2(P_2, D')|P_1] < E[\max_{D' \leq D} V_2(P_2, D')|P_1]$$

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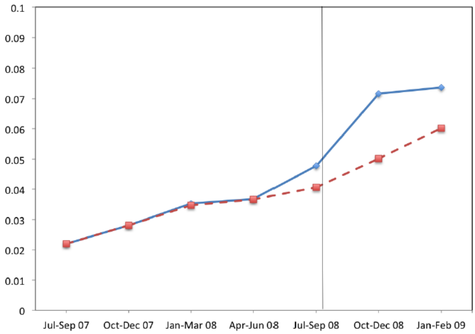
- If government wants to implement early writedowns, it must “buy" the option from the lender.
- Pay $E[\max_{D' \leq D} V_2(P_2, D')|P_1] - \max_{D' \leq D} E[V_2(P_2, D')|P_1]$
- It is possible that paying for an early writedown alleviates the borrower debt overhang sufficiently that borrower consumption rises.

Informational frictions in modifications

Modifications may attract the wrong types.

Below, default rates on Countrywide loans after announcement of modification programs only available to delinquent borrowers



Source: Mayer, Morrison, Piskorski, Gupta (2013)

Ex ante mortgage design

- Ex-ante contracts can avoid some of the frictions inhibiting ex-post modifications
- Temporary payment reductions to reduce liquidity/cash-flow problems
- Principal (really PV of debt) reductions to reduce strategic default incentives

Best implementation

- Cut/reschedule payments in a recession
- Index principal to local real estate prices

The latter appears to be hard

Refinancing as Principal Reduction

Take a $200,000, 30 year mortgage at 6%

- Reset the rate to 4%, so payments fall.
- An equivalent reduction in payments is generated by reducing principal to $160,000

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Default incentives depend on present value of future debt payments

- In static case, compare utility benefit of service flow from home to present value of debt payments
- In dynamic case, compare flow utility benefit to flow cost of servicing debt

FACE value does not enter this computation

- Strategic default incentives reduced via interest rate reduction
- Same as induced by a reduction in face value (principal)

“Stabilizer Contract"

Mortgage gives homeowner a one-time right to convert a fixed rate mortgage into an ARM. (Retain the standard prepayment option.)

1. Low rates, steep yield curve in recession ⇒ temporary payment reduction
2. Reset of mortgage rate just like refinancing into lower rate ⇒ principal reduction

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Comments

- Current mortgages require prepayment to reset mortgage rates – but underwater homeowners cannot refinance.
- Proposal is a simple variant on the current design, priced in the MBS market: Prepayment = 100, or refinance to ARM floater = 100
- Index to interest rates allow for monetary policy passthrough, which was a problem in the crisis.

Conclusion

1. Optimal government policy to boost household spending is payment reduction and payment deferral not principal reduction.
   - Principal reduction is an inefficient use of resources to boost spending.
2. Principal reduction is best offered by lenders, in the context of debt renegotiation.
   - Frictions and poor incentive structures limited renegotiation in crisis.
   - The main form of adjustment was via refinancing.
3. Policy proposal: floating rate reset option to implement ex-ante optimal mortgage design.
   - Simple and within space of current mortgage contracts.
   - Builds on the relative benefits that accrued to ARM borrowers in the crisis.